

# Greater Minneapolis External Origin-Destination Survey

*2010 Travel Behavior Inventory*

## Draft Report

*prepared for*

**Metropolitan Council**

*prepared by*

**Cambridge Systematics, Inc.**



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*date*

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# 1.0 Background

The 2010 Travel Behavior Inventory project is aimed at capturing travel behavior and travel patterns in the 19-county Metropolitan Council area. As part of this study, an origin-destination survey was conducted to capture the automobile-based travel patterns of non-residents that travel into, out of, or through the Metropolitan Council area.

This survey was conducted in a two-phase approach. First, license plates were captured at several key perimeter roadway locations. These license plates were matched to vehicle owner addresses by Minnesota and Wisconsin DOT staff analysis. These surveys were administered to those drivers whose addresses were outside the Metropolitan Council area.

Key steps in the survey process include:

- Coordination with Minnesota and Wisconsin State Departments of Transportation (MnDOT and WisDOT) to match license-plate information with driver address databases;
- Development of a simple survey questionnaire that focuses on only the most relevant travel behavior questions; and
- Development of customized location-specific questionnaires to serve as a prompted recall instrument for drivers.

Cambridge Systematics developed the survey questionnaire and assisted the Metropolitan Council in identifying the 14 locations for the license plate capture. The license plate capture was conducted by the Minnesota Traffic Observatory (MTO) at the University of Minnesota with support from Robert Gollnik, an independent contractor.

The report is structured as follows. **Section 2** presents an outline of roadways included in the data collection and outlines the license plate capture data collection process. **Section 3** describes how these license plates were used to support the prompted recall survey process. Also included in this section is an outline of the survey expansion process. **Section 4** summarizes some of the key findings.



## 2.0 License Plate Capture Study

This project included 14 sites - four Interstate locations and ten non-Interstate locations on major roadway facilities at the perimeter of the Metropolitan Council region. The roadways selected include: I-35 North, I-94, US-12, US-10, US-169 North, MN-7, MN-65, and MN-55.

This section of the report outlines the site selection procedures, data collection plan, and results from the count analyses conducted using the license plate capture data.

### 2.1 SITE SELECTION

Prior to gathering data on each roadway, it was necessary to inspect the area in person in order to determine the best locations to set up the video equipment. The criteria for selecting a site included the following:

- The safety of the data collection crew was critical - only those sites that ensured safety for the crews were considered further.
- The only other selection criterion was to identify locations that were best suited for the mounting of the video cameras to maximize the clarity of the recorded license plates.

John Hourdos and Stephen Zitzow of the MTO visited all the sites in the northwest portion of the study region (MN-7, US-12, MN-55, I-94, US-10, US-169 North, MN-65, I-35 North). Dr. Hourdos also visited all other sites except the MN-52 site which was inspected by Robert Gollnik.

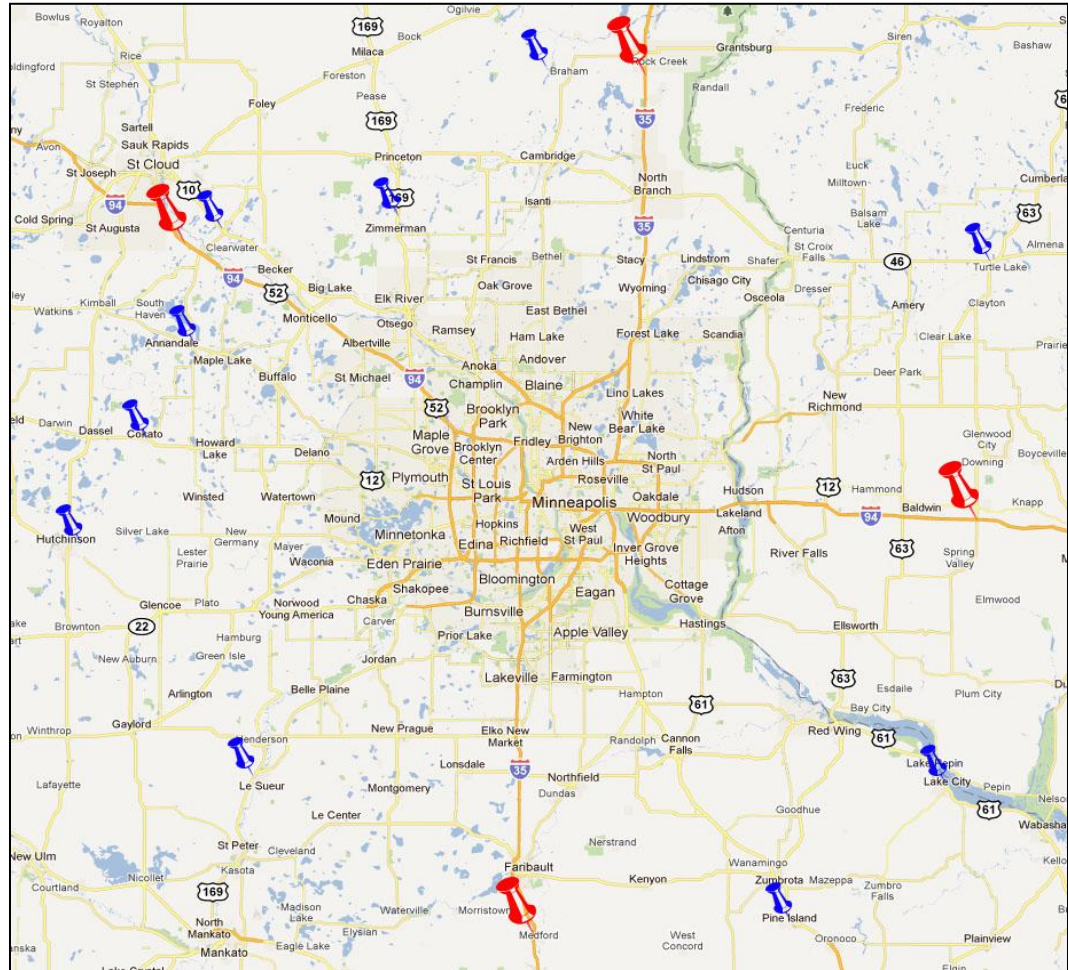
Site inspections focused on locating either a safe overpass location from which to observe the desired freeway, or a generally straight segment with as low a speed limit as possible. Overpasses were preferred as they allowed the camera equipment to be placed on a lower-volume roadway, usually protected by curbs or concrete barriers for pedestrians.

In cases where there were no nearby overpasses, low-speed zones within towns offered a good second option. Lower speeds allowed cameras more time to capture license plates clearly and reduced the safety concerns for the crew. If no low-speed zones were available, straight segments of rural highway were acceptable locations.

**Figure 2.1** below shows the locations of each of the 14 sites identified for data collection. Low speed sites are marked with small blue pins and the Interstate locations are marked with larger red pins.

- High Speed Locations:
  - I-35 north at Rush City
  - I-35 south at Medford
  - I-94 east at Wisconsin-128
  - I-94 west at Opportunity Drive
- Low Speed
  - MN-7 at Hutchinson
  - MN-55 at Annandale
  - MN-65 at Andree
  - US-8 at Turtle Lake (Wisconsin)
  - US-10 at Clear Lake
  - US-12 at Cokato
  - US-52 at Pine Island
  - US-61 at Lake City
  - US-169 north at Zimmerman
  - US-169 south at Le Sueur

Figure 2.1 Site Location Map



Source: Site Location Map Developed by MTO.

## 2.2 CAMERA EQUIPMENT

The four Interstate locations controlled purchasing decisions as they represented the highest speed locations and required the most cameras. The study design required that all four sites were surveyed simultaneously to capture through movements. These sites also included the greatest number of lanes. As a result, 16 sets of camera equipment were required to successfully complete the capturing of license plates using one set for each lane across all the Interstate locations.

- The Samsung SMX-F50 camcorder was selected based on its resolution, optical zoom, manual shutter control, ease of use, and cost.
  - Each camera came with a standard battery pack, cables, and software. In addition to the standard battery pack, 3 extended-life battery packs were purchased for each camera.

- In order to charge the batteries, rapid battery chargers were purchased. Each charger included an adapter to plug into a vehicle, allowing on site charging during data collection.
- Power splitters were also purchased for each team (set of four cameras) in order to charge multiple batteries simultaneously on site.
- Fourteen Voyager tripods were purchased to mount and secure the cameras on site. A total of 22 (one per camera and six backup) 32-GB flash cards were purchased to store the data on each video camera. **Table 2.1** describes the costs associated with the equipment purchase.

**Table 2.1 Equipment Cost**

<b>Item</b>	<b>Number</b>	<b>Price/Unit</b>	<b>Total Cost</b>
Samsung SMX-F50 Digital Camcorder	16	\$139.00	\$2224.00
BP210E Battery Pack	4	\$19.95	\$79.80
BP210E Battery Pack	44	\$26.26	\$1155.44
Rapid Battery Charger	16	\$9.99	\$159.84
Voyager Lite Tripod	14	\$47.88	\$670.32
Transcend 32 GB SD Memory	6	\$42.80	\$256.80
Transcend 32 GB SD Memory	16	\$43.79	\$700.64
<b>Total</b>			<b>\$5,246.84</b>

Source: So



## 2.3 DATA COLLECTION – LICENSE PLATE CAPTURE

Between October 25th and November 10th, 2011, each site was visited once to collect data. The ten non-interstate sites were visited by a team of two staff at a time, except for US-10 which required two teams simultaneously. The Interstate sites were surveyed simultaneously on November 9th, 2011 to capture the through movements more accurately. Sites were only visited during mid-week days (Tuesday, Wednesday, or Thursday) in order to avoid capturing irregular travel patterns.

Each crew was equipped with one set of equipment per lane, rope, bungee cords, weights, and safety cones, barrels, and vests. Crews arrived on site between 6:00 and 6:30 am for setup. Cameras began recording as soon as possible between 6:30 and 7:00 am depending on natural light conditions. Crews monitored equipment every 15-20 minutes throughout the day to ensure that the cameras were set correctly and were able to capture license plates as clearly as possible. Batteries were switched out as necessary and charged as quickly as possible.

Recording at each site continued throughout the day until dark. When light became insufficient to capture license plates, equipment was packed up and returned to the MTO for processing. For non-Interstate sites, only two to four cameras were required per site so each 'team' of four cameras would have at least one day of "down time" for uploading and recharging before going out on the field again.

In order to ensure the safety of the crews on site, traffic cones and barrels were deployed slightly upstream of the cameras and near the crew's parked vehicle as necessary. Crew members wore reflective vests whenever outside the vehicle. **Figure 2.2** below shows an example of cones protecting a camera at a roadside location.

**Figure 2.2 Safety Procedures Employed During License Plate Capture**



Source: Safety Procedures Undertaken by the MTO.

As teams completed the data collection at each site, the equipment sets were returned to the MTO. The data from each camera were given a quick examination to make sure they were useable before being uploaded to the MTO file server and duplicated onto an offline hard disk. Once the files were confirmed on both the server and hard disk, the originals on the flash drives were erased in preparation for reuse in the field.

Cameras, tripods, batteries, and chargers were all checked after the completion of data collection at each site to ensure that the equipment was functioning properly.

## 2.4 DATA PROCESSING

A specialized video processing program was used for data processing. The software allowed the video to proceed at a faster-than-real-time speed until a vehicle appeared in frame. All vehicles were categorized into one of three categories:

- Standard passenger vehicles with plates that were visible were counted and their license plates were recorded (plate and state);
- Standard passenger vehicles with plates that were not visible were counted; and
- Semi tractor-trailers, construction equipment, and other large commercial vehicles which would not lead to an individual driver-owner were noted.

Each vehicle was then classified and recorded using a shared spreadsheet system. Any irregularities such as nearly readable plates, unknown states, etc. that were found by the students were noted and checked by S. Zitzow.

**Figure 2.3** shows the video processing software. Due to the way the cameras stored video data, a filter had to be used to remove image blurring.

**Figure 2.3 Screenshot of Video Analysis Software with Filter Applied**



Source: Video Filter Procedures Employed by MTO.

**Figure 2.4** shows a portion of a spreadsheet where the data were recorded. Each location was recorded on a separate spreadsheet with tabs for directions and, if necessary, lane or am/pm. Each camera recorded video in a series of files with varying lengths from a few seconds up to slightly over an hour. Each video file was listed separately on the appropriate spreadsheet and tab.

**Figure 2.4 Screenshot of a Spreadsheet for License Plate Recording**

	A	B	C	D	E	F	G
1	Folder	File	Plate	State	Comments	Irrelevant	Not Visible/Unreadable/Missing
104			VXH779	MN			
105			267MBT	WI			
106			495SVK	WI			
107			328CRU	MN			
108			749DWX	MN			
109			927RPH	WI			
110			074BVK	MN			
111			193RVZ	WI			
112			585BWT	MN			
113			876BSR	WI			
114					I-94-E EB LN1 SDV_0046	87	28
115							
116	I-94-E EB LN1	SDV_0047	389GBT	MN			
117			702PTS	WI			
118			301NBN	WI			
119			169DTL	MN			
120			704DYU	WI			
121			NSE074	MN			
122			798SHS	WI			

**Source: Data Processing and Reporting Spreadsheets Developed by MTO.**

After the data retrieval for each location was completed, the relevant spreadsheet was reviewed by supervisors and a backup duplicate was made. A special script written by the MTO was used to cross check the plates recorded for each video file against every other video file to ensure that no mistaken duplications had been made<sup>1</sup>.

<sup>1</sup> It is important to note that the MN-55 data was processed first and, initially, commercial vehicles were not counted. Partway into the processing for MN-55, commercial vehicle counts were kept. As a result, the commercial/other vehicle counts for MN-55 are significantly lower than reality. Since the count of commercial vehicles is secondary to the project, the videos were not revisited.

## 2.5 RESULTS

Table 2.2 details the final results of data processing. 138,217 vehicle events and nearly 100,000 unique plates were collected from the 436 hours of video recording. Over 26,000 commercial vehicles and nearly 13,000 unreadable plates were also noted. These values corresponded to 19 percent and 9.4 percent of the total highway volume, respectively.

**Table 2.2 License Plate Counts by Location and Direction**

	Location	Direction	Lanes	Time	Plates	Plates/Hr/Ln	Commercial	Unreadable	Volume
High Speed	I-35 North	NB	2	18:47:39	6175	328.7	815	721	7711
		SB	2	18:53:16	5011	265.1	709	613	6333
	I-35 South	NB	2	19:45:48	4924	249.1	2010	687	7621
		SB	2	19:35:04	4996	254.9	2127	848	7971
	I-94 East	EB	2	19:46:32	4842	244.8	2733	742	8317
		WB	2	19:47:12	3778	190.9	2705	650	7133
	I-94 West	EB	2	18:38:07	6330	339.7	2419	1352	10101
		WB	2	18:53:10	7991	422.9	2532	847	11370
	<b>Subtotal</b>		<b>16</b>	<b>154:06:48</b>	<b>44047</b>	<b>287.0</b>	<b>16050</b>	<b>6460</b>	<b>66557</b>

	Location	Direction	Lanes	Time	Plates	Plates/Hr/Ln	Commercial	Unreadable	Volume
Low Speed	MN-7	EB	1	11:17:15	2209	195.7	432	290	2931
		WB	1	10:27:56	2333	222.9	475	169	2977
	MN-55	EB	1	11:30:50	2940	255.3	142	198	3280
		WB	1	10:25:06	3262	313.1	196	411	3869
	MN-65	NB	1	10:05:53	1597	158.1	194	145	1936
		SB	1	8:58:43	1104	123.0	182	156	1442
	US-8	EB	1	9:29:07	1342	141.5	346	155	1843
		WB	1	9:39:17	1219	126.3	337	174	1730
	US-10	EB	2	20:34:04	4382	213.4	978	489	5849
		WB	2	20:16:22	4261	210.1	1067	558	5886
	US-12	EB	1	11:52:37	2368	199.4	472	349	3189
		WB	1	10:59:40	2501	227.5	482	275	3258
	US-52	NB	2	19:17:08	4417	225.2	1093	391	5901
		SB	2	15:31:25	3478	236.3	618	351	4447
	US-61	EB	1	10:10:53	1564	153.6	354	222	2140
		WB	1	10:48:22	1758	162.7	315	174	2247
	US-169 North	NB	2	20:19:16	4508	220.8	561	746	5815
		SB	2	20:39:09	3749	181.5	578	751	5078
US-169 South	NB	2	20:04:47	2993	151.2	659	212	3864	
	SB	2	20:04:56	2961	147.2	769	248	3978	
	<b>Subtotal</b>		<b>28</b>	<b>282:32:46</b>	<b>54946</b>	<b>194.7</b>	<b>10250</b>	<b>6464</b>	<b>71660</b>

	Lanes	Time	Plates	Plates/Hr/Ln	Commercial	Unreadable	Volume
<b>PROJECT TOTALS</b>	<b>44</b>	<b>436:39:34</b>	<b>98993</b>	<b>228.2</b>	<b>26300</b>	<b>12924</b>	<b>138217</b>

Source: Data Processing Results Prepared by MTO.

A trip is defined as a ‘through’ trip when a vehicle enters the Metropolitan Council area by Interstate, travels through the freeway network using different paths, and emerges at a different Interstate location. In order to locate such trips, the plates entering at each Interstate site were compared to the plates exiting at every other Interstate site. Any plates appearing in both lists were considered ‘through’ trips. The condensed results are presented in **Table 2.3**.

**Table 2.3 Through Trips by Direction with State-by-State Volumes**

From	To	Total	State	Number	From	To	Total	State	Number
I-35 North	I-35 South	58	CO	1	I-94 East	I-35 North	17	MN	8
			IA	4				WI	9
			MN	44				I-35 South	21
			MO	1		MI	1		
			NE	1		MN	3		
			SD	2		WI	16		
			WI	4		I-94 West	82	AK	1
			WY	1				IL	6
	I-94 East	16	IL	6				MI	3
MN			7	MN	19				
NY			1	MT	1				
I-94 West	4	WI	2	ND	8				
		MN	3	NY	3				
I-35 South	I-35 North	51	WI	1	I-94 East	I-35 North	5	MN	5
			IA	14				I-35 South	55
			IL	1		IL	2		
			MN	31		MN	42		
			NE	2		I-94 East	108	MO	3
	SD	1	IL	2					
	WI	2	MN	53					
	I-94 East	16	CO	1	ND			16	
			IA	2	SD	1			
			MI	1	WI	36			
	I-94 West	62	MN	1	I-94 West	I-94 East	108	IL	2
			NE	1				MN	53
SD			1	ND				16	
WI			9	SD				1	
CO			1	WI				36	
IA	17								
MN	30								
MT	1								
ND	12								
WI	1								

Source: Data Processing Results Prepared by MTO.

The license plates recorded were rechecked by Cambridge Systematics and shared (by location) with Minnesota DOT and Wisconsin DOT to generate user addresses for the prompted recall survey portion of the study. This process is discussed in greater detail in Section 3.



## 3.0 Prompted Recall Origin-Destination Survey

The next stage in the external origin-destination survey was to conduct a prompted recall survey to non-resident drivers whose vehicles were identified in the license plate capture portion of the study. This section outlines the development and implementation of the prompted recall survey.

### 3.1 HOME ADDRESS INFORMATION

The license plate database provided by MTO was parsed into three separate databases – Minnesota license plates, Wisconsin license plates, and license plates from other states. The Minnesota and Wisconsin license plates were considered for further analysis:

- Of the 98,993 license plates that were recorded by MTO, 91,971 license plates were unique and belonged to either Minnesota or Wisconsin residents. Very few license plates were found to be from states other than Minnesota and Wisconsin.
- Among these, nearly 90 percent (83,373) of license plates belonged to Minnesota residents.
- There were only two locations, I-94 East and US-8, where more Wisconsin license plates were recorded than Minnesota license plates.
- The 91,971 license plates were shared with Minnesota and Wisconsin Departments of Transportation for address matching.

### 3.2 IDENTIFYING DRIVERS FROM EXTERNAL REGIONS

Once the home addresses were obtained, Cambridge Systematics' staff assigned the home locations to a mapping system to identify drivers with home addresses outside the Metropolitan Council's region.

- Of the 83,373 Minnesota licenses that were shared with Minnesota DOT, address matches were found for 78,744 license plates, a matching rate of over 94 percent.
- The matching of Wisconsin license plates was lower with 6,003 addresses matched among the 8,598 available license plates, a rate of 70 percent.
- Of the 84,747 license plates with an address match, only 24,725 addresses were found to be outside the study area. This is about 30 percent of all Wisconsin and Minnesota matched license plates.

- These 24,725 addresses serve as the sampling frame for the prompted recall origin-destination survey.

### 3.3 QUESTIONNAIRE DESIGN

It was always expected that a considerable amount of time would elapse from the time the license plate had been captured to the time the survey would be conducted. As a result, it was planned that the survey would be limited to a few key questions that provide information about travel purpose, time-of-day of travel, trip ends and frequency of trip making.

Further, it was also determined that customized questionnaires would be developed for each of the 14 locations. The surveys included a map of the interchange of interest (where the counts had been captured) to allow the respondent to provide information about a geographically accurate trip.

Figure 3.1 shows the customized questionnaire for the I-94 corridor.

Appendix B provides a list of all the survey questionnaires customized by location.

Figure 3.1 I-94 Origin-Destination Survey Questionnaire

**I94E**

**Travel Behavior Inventory Origin-Destination Survey**

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in St. Croix and Dunn Counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of Interstate 94. Please take a few minutes to answer the following questions.

Thank you for your time.

If you have any questions, please contact:  
 Jim Henricksen, Minnesota Department of Transportation  
 Tel. 651-234-7782 or [jim.henricksen@state.mn.us](mailto:jim.henricksen@state.mn.us)

Please think about the last time you used Interstate 94 crossing the St. Croix/Dunn County line.

Did you start your trip on Interstate 94 at home?  
 a. Yes      b. No

If not, where did you start your trip on Interstate 94?  
 Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
 City or Place name: \_\_\_\_\_

What was the destination of your trip?  
 Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
 City or Place name: \_\_\_\_\_

What day of the week did you make your trip on Interstate 94?  
 a. Monday   b. Tuesday   c. Wednesday   d. Thursday   e. Friday

When did you make this trip on Interstate 94?  
 a. Before 4 AM      e. 12 Noon – 3 PM  
 b. 4 AM – 6 AM      f. 3 PM – 6 PM  
 c. 6 AM – 9 AM      g. 6 PM – 9 PM  
 d. 9 AM – 12 Noon    h. 9 PM – 12 Midnight

What was the primary purpose of your trip?  
 a. Commute to work or work-related  
 b. Shopping or leisure  
 c. School or University  
 d. Other \_\_\_\_\_

Did you make this trip alone?  
 a. Yes      b. No

If no, how many passengers were travelling with you? \_\_\_\_\_

Did you make a return trip on Interstate 94 on the same day?  
 a. Yes      b. No

When did you make your return trip on Interstate 94?  
 a. Before 4 AM      e. 12 Noon – 3 PM  
 b. 4 AM – 6 AM      f. 3 PM – 6 PM  
 c. 6 AM – 9 AM      g. 6 PM – 9 PM  
 d. 9 AM – 12 Noon    h. 9 PM – 12 Midnight

Source: Survey Questionnaire Developed for the Origin-Destination Study by Cambridge Systematics.



### 3.4 SURVEY IMPLEMENTATION

A mail-in/mail-out survey option was selected for survey administration. Special care was taken to ensure that respondents were provided with a questionnaire that was consistent with the location where their license plate was captured.

- A local Minneapolis printing firm was hired to print and mail-out the surveys. The surveys had a pre-paid mailback postage stamp attached to them and respondents could simply fill out the survey and mail it back.
- In total, over 5,300 surveys were retrieved during the implementation phase reflecting a very good response rate of over 21 percent.
- One out of every three surveys had incomplete information, especially related to trip location information. These surveys were discarded from the final database which had a total of 3,377 surveys.
- **Table 3.1** showcases the distribution of the final survey database and compares it with other totals, such as total license plates captured, and the number of external addresses.

**Table 3.1 Survey Statistics by Roadway and Direction**

Roadway	MN/WI Total License Plates		MN/WI External-to-Region Addresses		Usable Survey Records	
	MN	WI	MN	WI	MN	WI
I-35 N	10,123	709	1,495	417	252	62
I-35 S	7,993	258	2,404	101	308	17
I-94 E	3,308	4,604	254	2,241	30	285
I-94 W	12,936	316	3,543	137	440	15
MN-7	4,235	40	448	14	48	0
MN-55	5,347	14	934	4	130	0
MN-65	2,623	14	1,302	8	206	1
US-8	639	1,853	55	525	4	75
US-10	8,135	66	2,118	25	233	0
US-12	4,340	41	934	11	127	0
US-52	7,238	298	2,228	144	335	15
US-61	2,885	286	1,075	123	187	17
US-169 N	8,033	32	2,909	13	389	3
US-169 S	5,538	67	1,233	30	196	2
<b>Total</b>	<b>83,373</b>	<b>8,598</b>	<b>20,932</b>	<b>3,793</b>	<b>2,885</b>	<b>492</b>

### 3.5 SURVEY EXPANSION

Based on the available data, a simple two-step expansion procedure was developed and implemented:

- **Step 1.** The completed surveys from each location were expanded to the total number of “external addresses” for that location.
- **Step 2.** Given that different survey locations were surveyed for varying durations of time, a second expansion factor was used to properly compare the relative number of movements at each location.
- **Table 3.2** identifies the expansion factors by survey location.

**Table 3.2 Survey Expansion Factor**

Survey Location	Completion Rate Factor	Duration Normalization Factor	Joint Expansion Factor	Expanded Totals
I-35 N	5.99	1.21	7.28	2,321
I-35 S	7.64	1.16	8.88	2,912
I-94 E	7.90	1.16	9.13	2,885
I-94 W	8.02	1.22	9.77	4,486
MN-55	7.11	1.04	7.41	978
MN-65	6.33	1.20	7.59	1,571
MN-7	9.63	1.05	10.12	486
US-10	9.20	1.12	10.30	2,400
US-12	7.44	1.00	7.44	945
US-169 N	7.45	1.12	8.32	3,262
US-169 S	6.38	1.14	7.27	1,439
US-52	6.76	1.31	8.88	3,117
US-61	5.87	1.09	6.40	1,306
US-8	7.34	1.19	8.77	693
<b>Total</b>				<b>28,800</b>

## 4.0 Analysis

This section highlights some of the key findings from the External O-D prompted recall survey data. The analysis focused on the three most relevant variables – travel purpose, time-of-day of travel and roadway traveled.

### 4.1 ORIGINS AND DESTINATIONS BY ROADWAY

As outlined in Table 3.2, the three major roadways comprising of I-35, I-94 and US-169 account for nearly 60 percent of all external trips. **Figures C.1 through C.11** in **Appendix C** showcase the distribution of trip origins by major roadway type. Similarly, **Figures D.1 through D.11** in **Appendix D** showcase the distribution of trip destinations by major roadway type.

### 4.2 TRAVEL PURPOSE

Travel purpose was segmented into four categories – work, shopping, university and “other” summarized in **Figure 4.1**.

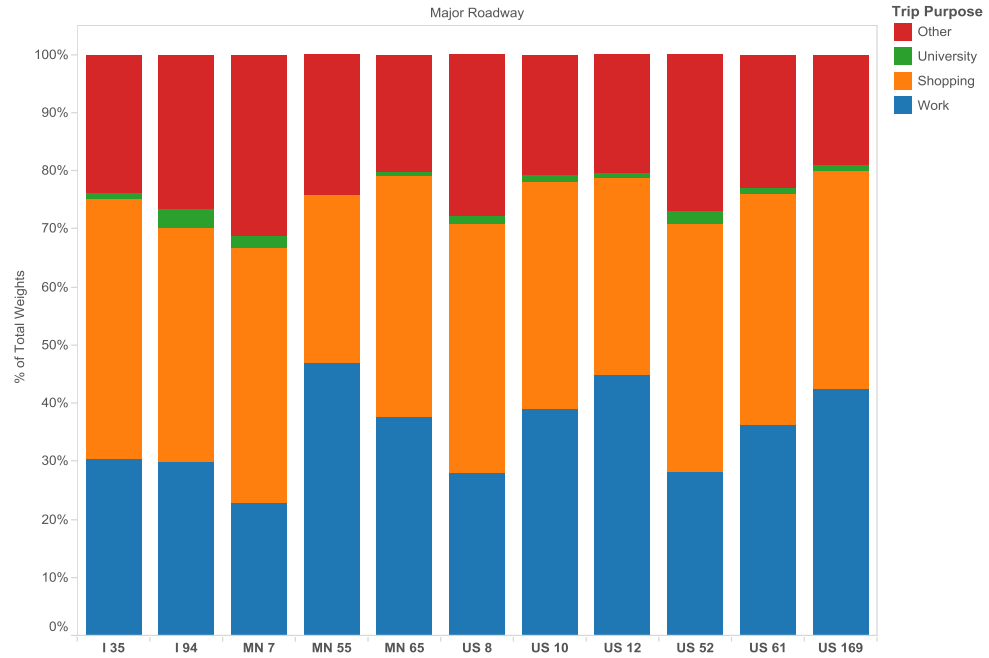
- Work-related travel varies from a low of 23 percent on MN-7 to a high of 47 percent on MN-55.
- US-169, US-12, US-10 and US-61 also have a high share of work-related travel that is over 35 percent.
- The share of work-related travel on the two interstates is almost identical at 30 percent each.
- Shopping-related travel has a share of about 40 percent on all major roadways, except MN-55 (29 percent) and US-12 (34 percent).
- University-related travel has relatively modest shares of 1-2 percent on all roadways except I-94 which has a relatively higher share of about 4 percent.

### 4.3 TIME-OF-DAY OF TRAVEL

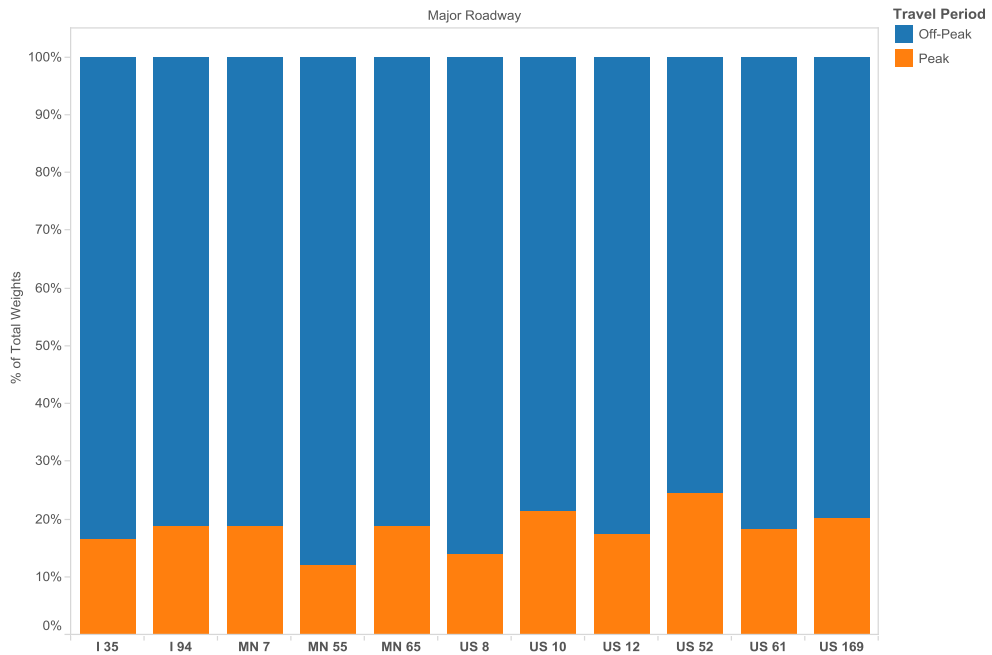
Since this is a prompted recall survey, respondents could choose multiple times during which they made the trip. If respondents reported making the trip during the peak period, the data was assigned a “peak travel” label. If respondents reported making trips during off-peak hours only, then the trip was assigned an “off peak travel” label (**Figure 4.2**).

The share of off peak travel remains in the 18 – 20 percent range across all major roadways except US-52 where it is 24 percent, MN-55 where it is 12 percent, and US-8 where it is 14 percent of total trips.

**Figure 4.1 Share of Travel Purpose by Roadway**



**Figure 4.2 Peak vs. Off Peak Travel by Roadway**



The final dataset from the external O-D survey is included in this report as an attachment in Excel format. The documentation of the survey variables is included in **Appendix E** which provides a dictionary of all variables.

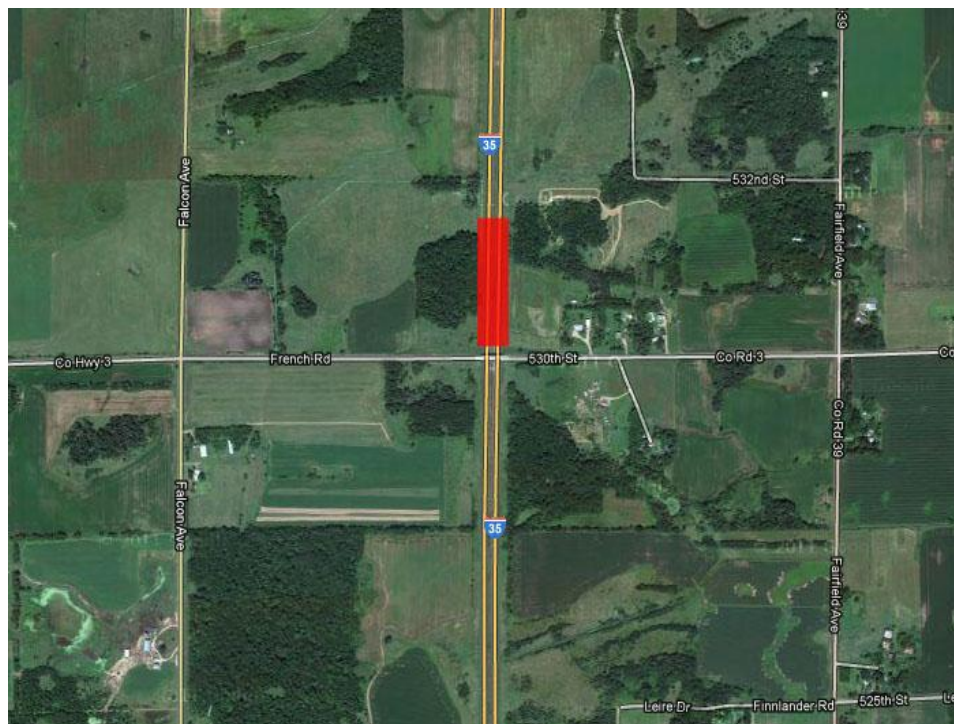


## A. Site Locations

The specific license plate capture locations for each of the data collection sites are shown in **Figure A.1** through **Figure A.14**.

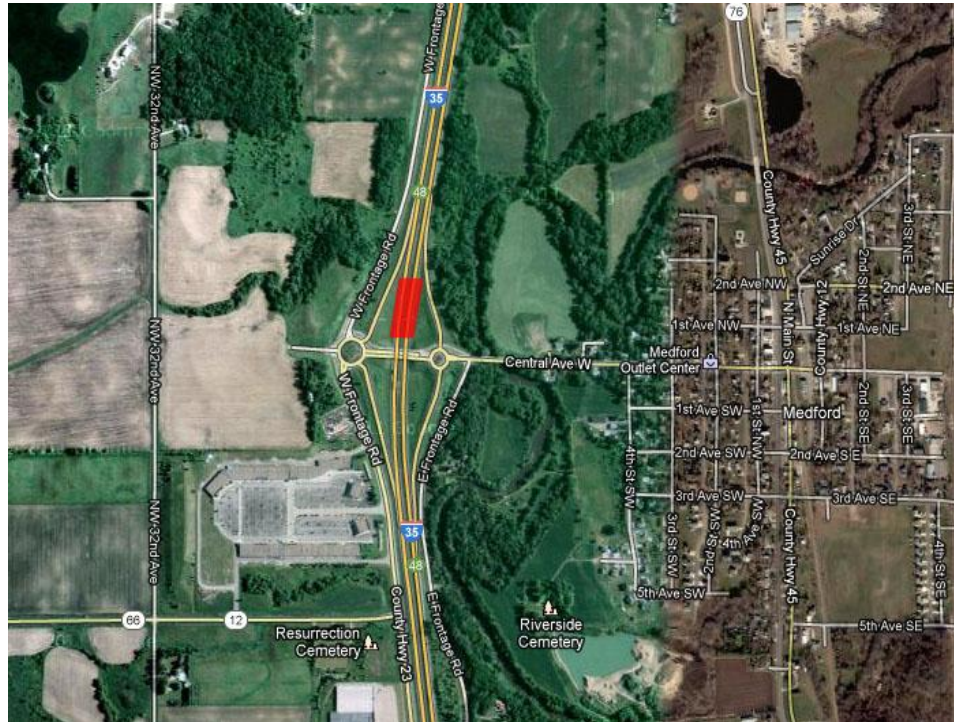
At each location, an aerial image of the surrounding area is shown. The midpoint of the red band highlights the approximate location of the video camera that was used to capture the license plates of passing vehicles.

**Figure A.1 I-35 North at Crossing of County Road 3 near Rush City, MN**



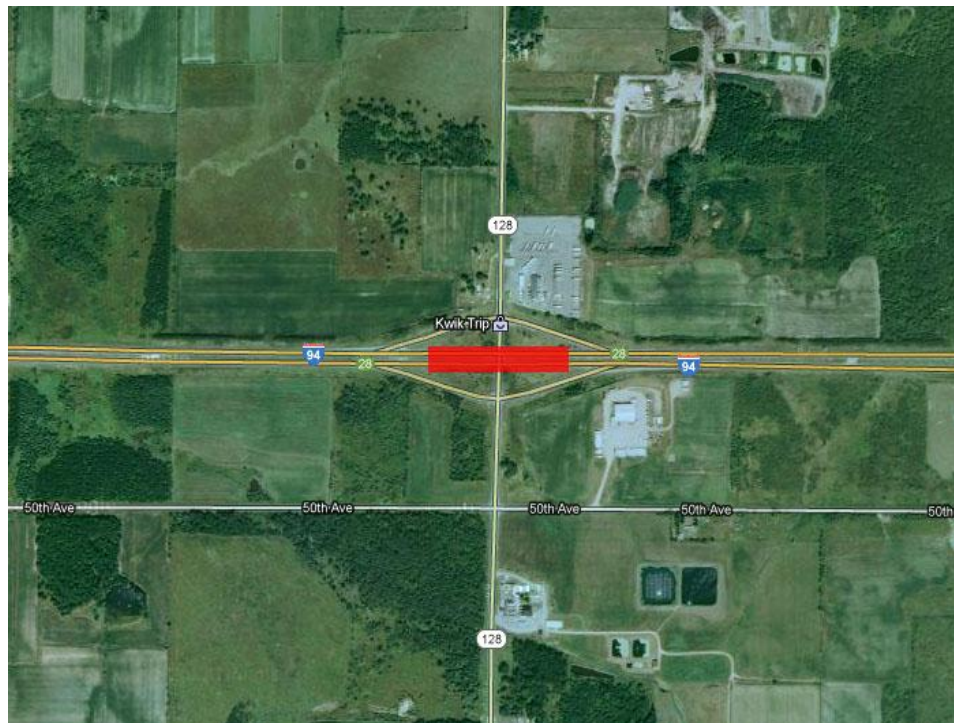
Source: Aerial Imagery Map Developed by MTO.

**Figure A.2 I-35 South at Central Avenue W in Medford, MN**



Source: Aerial Imagery Map Developed by MTO.

**Figure A.3 I-94 East at Crossing of Wisconsin 128 near Hersey, WI**



Source: Aerial Imagery Map Developed by MTO.





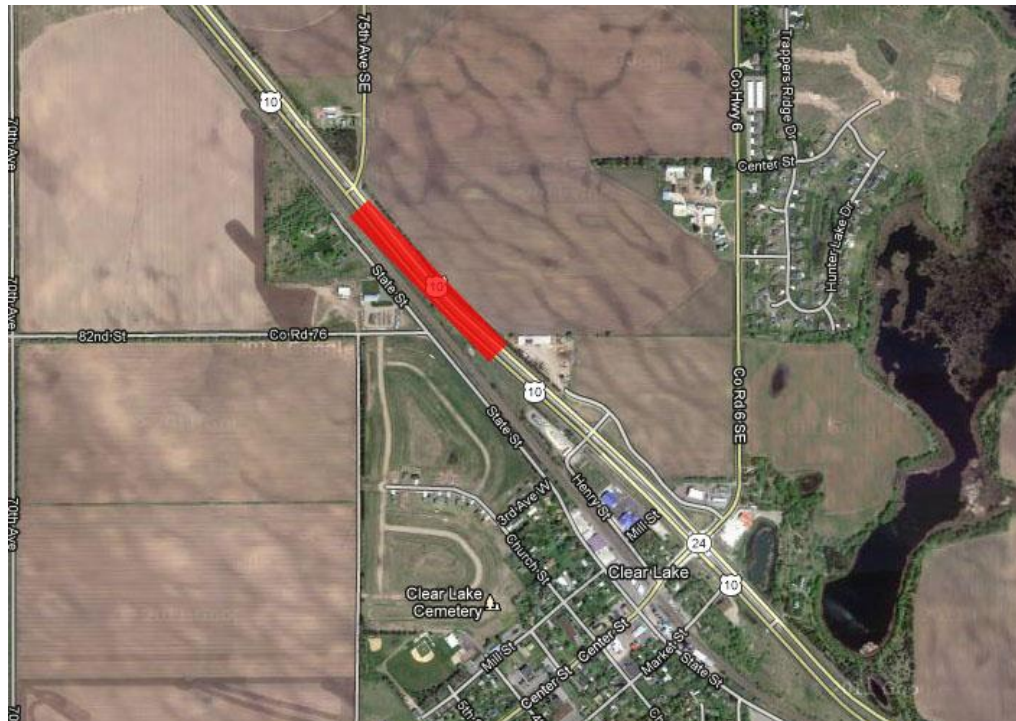


Figure A.8 US-8 West of US-63 at Turtle Lake, WI



Source: Aerial Imagery Map Developed by MTO.

Figure A.9 US-10 East of 75th Avenue SE in Clear Lake, MN



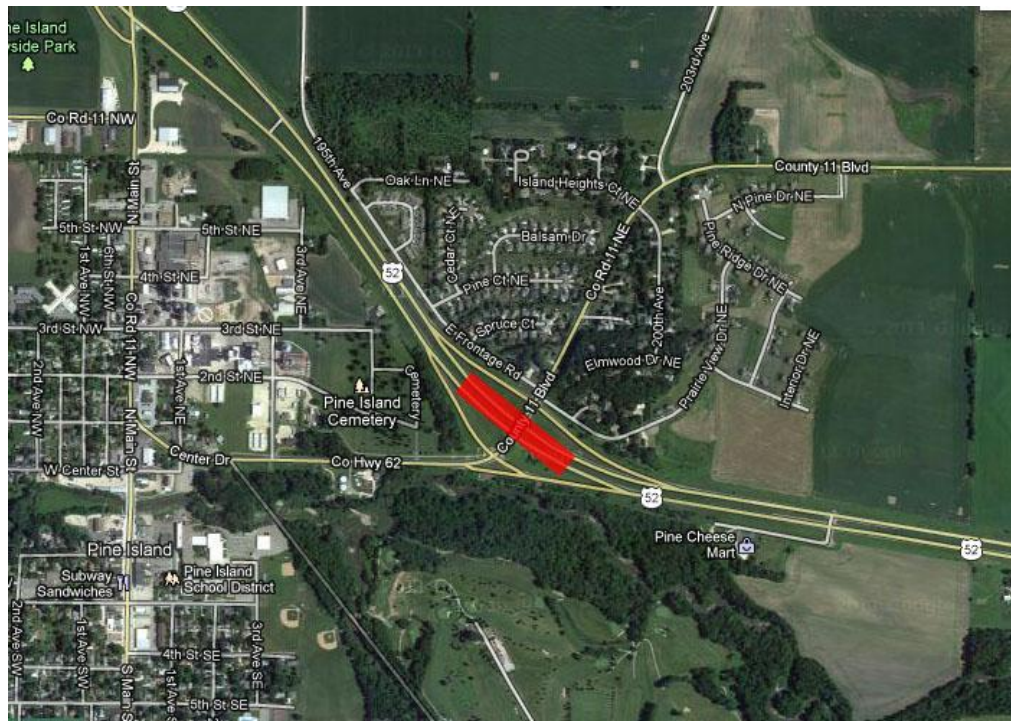
Source: Aerial Imagery Map Developed by MTO.

**Figure A.10 US-12 West of Broadway Avenue N in Cokato, MN**



Source: Aerial Imagery Map Developed by MTO.

**Figure A.11 US-52 at County Highway 62 in Pine Island, MN**



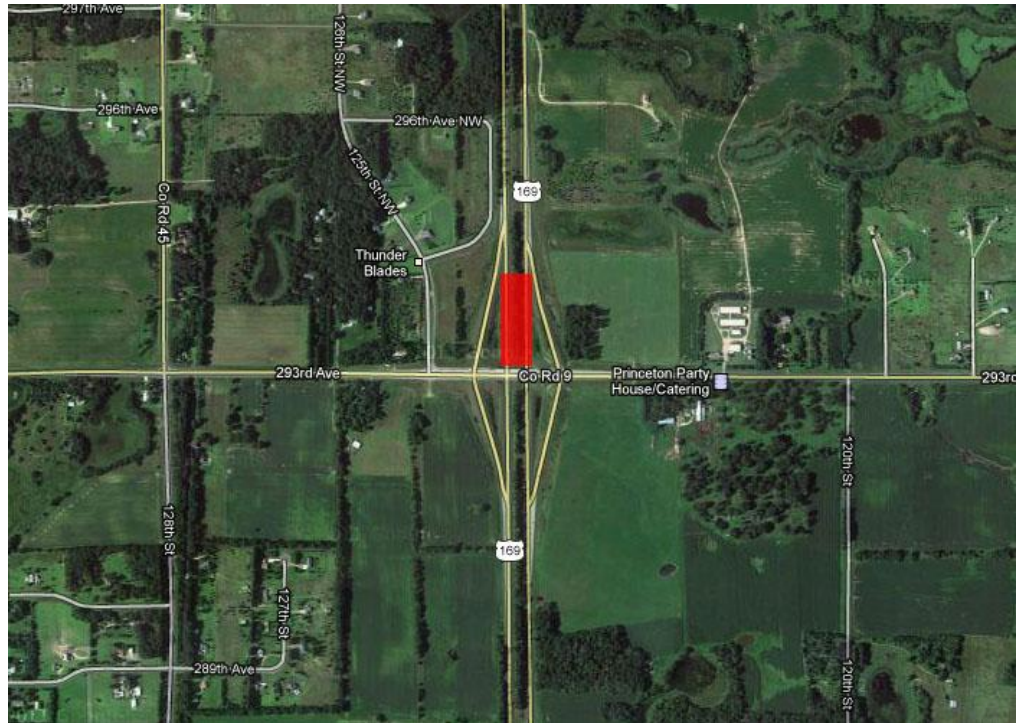
Source: Aerial Imagery Map Developed by MTO.

Figure A.12 US-61 at East Side of Frontenac, MN



Source: Aerial Imagery Map Developed by MTO.

Figure A.13 US-169 North at County Road 9 North of Zimmerman, MN



Source: Aerial Imagery Map Developed by MTO.

**Figure A.14 US-169 South at County Highway 8 near Le Sueur, MN**



Source: Aerial Imagery Map Developed by MTO.

# B. Survey Instruments Customized for Each Intercept Location

Figure B.1 O-D Survey for MN 7 Highway

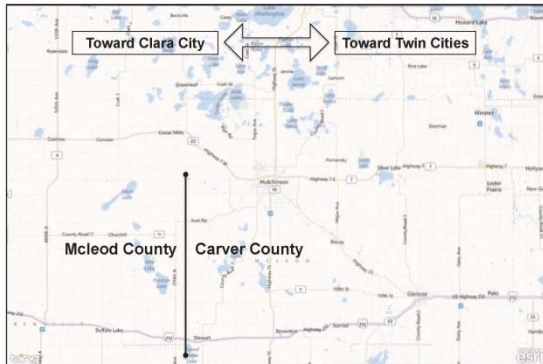


## Travel Behavior Inventory Origin-Destination Survey

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in Mcleod and Carver Counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of *MN State Highway 7*. Please take a few minutes to answer the following questions.

Thank you for your time.



If you have any questions, please contact:

Jim Henricksen, Minnesota Department of Transportation  
Tel. 651-234-7782 or [jim.henricksen@state.mn.us](mailto:jim.henricksen@state.mn.us)

Please think about the last time you used Minnesota State Highway 7 crossing the Mcleod/Carver County line.

Did you start your trip on MN State Highway 7 at home?  
a. Yes      b. No

If not, where did you start your trip on MN State Highway 7?  
Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What was the destination of your trip?  
Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What day of the week did you make your trip on MN State Highway 7?  
a. Monday   b. Tuesday   c. Wednesday   d. Thursday   e. Friday

When did you make this trip on MN State Highway 7?  
a. Before 4 AM      e. 12 Noon – 3 PM  
b. 4 AM – 6 AM      f. 3 PM – 6 PM  
c. 6 AM – 9 AM      g. 6 PM – 9 PM  
d. 9 AM – 12 Noon      h. 9 PM – 12 Midnight

What was the primary purpose of your trip?  
a. Commute to work or work-related  
b. Shopping or leisure  
c. School or University  
d. Other \_\_\_\_\_

Did you make this trip alone?  
a. Yes      b. No

If no, how many passengers were traveling with you? \_\_\_\_\_

Did you make a return trip on MN State Highway 7 on the same day?  
a. Yes      b. No

When did you make your return trip on MN State Highway 7?  
a. Before 4 AM      e. 12 Noon – 3 PM  
b. 4 AM – 6 AM      f. 3 PM – 6 PM  
c. 6 AM – 9 AM      g. 6 PM – 9 PM  
d. 9 AM – 12 Noon      h. 9 PM – 12 Midnight

Figure B.2 O-D Survey for US 61 Highway



**Travel Behavior Inventory Origin-Destination Survey**

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in Wabasha and Goodhue Counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of *US Highway 61*. Please take a few minutes to answer the following questions.

Thank you for your time.



If you have any questions, please contact:

Jim Henricksen, Minnesota Department of Transportation  
Tel. 651-234-7782 or [jim.henricksen@state.mn.us](mailto:jim.henricksen@state.mn.us)

Please think about the last time you used **US Highway 61** crossing the Wabasha/Goodhue County line.

Did you start your trip on US Highway 61 at home?

- a. Yes      b. No

If not, where did you start your trip on US Highway 61?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_

City or Place name: \_\_\_\_\_

What was the destination of your trip?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_

City or Place name: \_\_\_\_\_

What day of the week did you make your trip on US Highway 61?

- a. Monday   b. Tuesday   c. Wednesday   d. Thursday   e. Friday

When did you make this trip on US Highway 61?

- |                   |                       |
|-------------------|-----------------------|
| a. Before 4 AM    | e. 12 Noon – 3 PM     |
| b. 4 AM – 6 AM    | f. 3 PM – 6 PM        |
| c. 6 AM – 9 AM    | g. 6 PM – 9 PM        |
| d. 9 AM – 12 Noon | h. 9 PM – 12 Midnight |

What was the primary purpose of your trip?

- a. Commute to work or work-related  
b. Shopping or leisure  
c. School or University  
d. Other \_\_\_\_\_

Did you make this trip alone?

- a. Yes      b. No

If no, how many passengers were traveling with you? \_\_\_\_\_

Did you make a return trip on US Highway 61 on the same day?

- a. Yes      b. No

When did you make your return trip on US Highway 61?

- |                   |                       |
|-------------------|-----------------------|
| a. Before 4 AM    | e. 12 Noon – 3 PM     |
| b. 4 AM – 6 AM    | f. 3 PM – 6 PM        |
| c. 6 AM – 9 AM    | g. 6 PM – 9 PM        |
| d. 9 AM – 12 Noon | h. 9 PM – 12 Midnight |



Figure B.3 O-D Survey for US 8 Highway

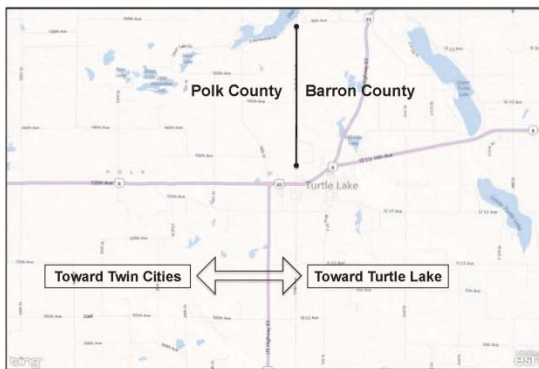


**Travel Behavior Inventory Origin-Destination Survey**

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in Barron and Polk Counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of *US Highway 8*. Please take a few minutes to answer the following questions.

Thank you for your time.



If you have any questions, please contact:

Jim Henricksen, Minnesota Department of Transportation  
Tel. 651-234-7782 or [jim.henricksen@state.mn.us](mailto:jim.henricksen@state.mn.us)

Please think about the last time you used **US Highway 8** crossing the Barron/Polk County line.

Did you start your trip on US Highway 8 at home?  
a. Yes      b. No

If not, where did you start your trip on US Highway 8?  
Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What was the destination of your trip?  
Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What day of the week did you make your trip on US Highway 8?  
a. Monday   b. Tuesday   c. Wednesday   d. Thursday   e. Friday

When did you make this trip on US Highway 8?  
a. Before 4 AM      e. 12 Noon – 3 PM  
b. 4 AM – 6 AM      f. 3 PM – 6 PM  
c. 6 AM – 9 AM      g. 6 PM – 9 PM  
d. 9 AM – 12 Noon      h. 9 PM – 12 Midnight

What was the primary purpose of your trip?  
a. Commute to work or work-related  
b. Shopping or leisure  
c. School or University  
d. Other \_\_\_\_\_

Did you make this trip alone?  
a. Yes      b. No

If no, how many passengers were traveling with you? \_\_\_\_\_

Did you make a return trip on US Highway 8 on the same day?  
a. Yes      b. No

When did you make your return trip on US Highway 8?  
a. Before 4 AM      e. 12 Noon – 3 PM  
b. 4 AM – 6 AM      f. 3 PM – 6 PM  
c. 6 AM – 9 AM      g. 6 PM – 9 PM  
d. 9 AM – 12 Noon      h. 9 PM – 12 Midnight

## Figure B.4 O-D Survey for MN 65 Highway

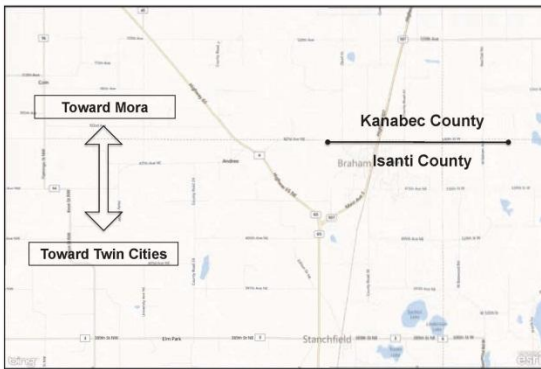


### Travel Behavior Inventory Origin-Destination Survey

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in Kanabec and Isanti Counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of *MN State Highway 65*. Please take a few minutes to answer the following questions.

Thank you for your time.



If you have any questions, please contact:

Jim Henricksen, Minnesota Department of Transportation  
Tel. 651-234-7782 or [jim.henricksen@state.mn.us](mailto:jim.henricksen@state.mn.us)

Please think about the last time you used **MN State Highway 65** crossing the Kanabec/Isanti County line.

Did you start your trip on MN State Highway 65 at home?

- a. Yes      b. No

If not, where did you start your trip on MN State Highway 65?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_

City or Place name: \_\_\_\_\_

What was the destination of your trip?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_

City or Place name: \_\_\_\_\_

What day of the week did you make your trip on MN State Highway 65?

- a. Monday   b. Tuesday   c. Wednesday   d. Thursday   e. Friday

When did you make this trip on MN State Highway 65?

- |                   |                       |
|-------------------|-----------------------|
| a. Before 4 AM    | e. 12 Noon – 3 PM     |
| b. 4 AM – 6 AM    | f. 3 PM – 6 PM        |
| c. 6 AM – 9 AM    | g. 6 PM – 9 PM        |
| d. 9 AM – 12 Noon | h. 9 PM – 12 Midnight |

What was the primary purpose of your trip?

- a. Commute to work or work-related  
b. Shopping or leisure  
c. School or University  
d. Other \_\_\_\_\_

Did you make this trip alone?

- a. Yes      b. No

If no, how many passengers were traveling with you? \_\_\_\_\_

Did you make a return trip on MN State Highway 65 on the same day?

- a. Yes      b. No

When did you make your return trip on MN State Highway 65?

- |                   |                       |
|-------------------|-----------------------|
| a. Before 4 AM    | e. 12 Noon – 3 PM     |
| b. 4 AM – 6 AM    | f. 3 PM – 6 PM        |
| c. 6 AM – 9 AM    | g. 6 PM – 9 PM        |
| d. 9 AM – 12 Noon | h. 9 PM – 12 Midnight |

Figure B.5 O-D Survey for I-35 N



**Travel Behavior Inventory Origin-Destination Survey**

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in Pine and Chisago Counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of *Interstate 35*. Please take a few minutes to answer the following questions.

Thank you for your time.



If you have any questions, please contact:

Jim Henriksen, Minnesota Department of Transportation  
Tel. 651-234-7782 or [jim.henriksen@state.mn.us](mailto:jim.henriksen@state.mn.us)

Please think about the last time you used **Interstate 35** crossing the Pine/Chisago County line.

Did you start your trip on Interstate 35 at home?

- a. Yes      b. No

If not, where did you start your trip on Interstate 35?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What was the destination of your trip?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What day of the week did you make your trip on Interstate 35?

- a. Monday   b. Tuesday   c. Wednesday   d. Thursday   e. Friday

When did you make this trip on Interstate 35?

- |                   |                       |
|-------------------|-----------------------|
| a. Before 4 AM    | e. 12 Noon – 3 PM     |
| b. 4 AM – 6 AM    | f. 3 PM – 6 PM        |
| c. 6 AM – 9 AM    | g. 6 PM – 9 PM        |
| d. 9 AM – 12 Noon | h. 9 PM – 12 Midnight |

What was the primary purpose of your trip?

- a. Commute to work or work-related  
b. Shopping or leisure  
c. School or University  
d. Other \_\_\_\_\_

Did you make this trip alone?

- a. Yes      b. No

If no, how many passengers were traveling with you? \_\_\_\_\_

Did you make a return trip on Interstate 35 on the same day?

- a. Yes      b. No

When did you make your return trip on Interstate 35?

- |                   |                       |
|-------------------|-----------------------|
| a. Before 4 AM    | e. 12 Noon – 3 PM     |
| b. 4 AM – 6 AM    | f. 3 PM – 6 PM        |
| c. 6 AM – 9 AM    | g. 6 PM – 9 PM        |
| d. 9 AM – 12 Noon | h. 9 PM – 12 Midnight |

Figure B.6 O-D Survey for I-35 S

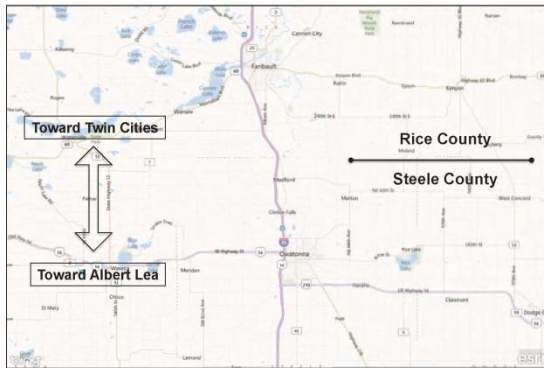


**Travel Behavior Inventory Origin-Destination Survey**

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in Steele and Rice counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of *Interstate 35*. Please take a few minutes to answer the following questions.

Thank you for your time.



If you have any questions, please contact:

Jim Henricksen, Minnesota Department of Transportation  
Tel. 651-234-7782 or [jim.henricksen@state.mn.us](mailto:jim.henricksen@state.mn.us)

Please think about the last time you used Interstate 35 crossing the Steele/Rice County line.

Did you start your trip on Interstate 35 at home?  
a. Yes      b. No

If not, where did you start your trip on Interstate 35?  
Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What was the destination of your trip?  
Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What day of the week did you make your trip on Interstate 35?  
a. Monday   b. Tuesday   c. Wednesday   d. Thursday   e. Friday

When did you make this trip on Interstate 35?  
a. Before 4 AM                      e. 12 Noon – 3 PM  
b. 4 AM – 6 AM                      f. 3 PM – 6 PM  
c. 6 AM – 9 AM                      g. 6 PM – 9 PM  
d. 9 AM – 12 Noon                    h. 9 PM – 12 Midnight

What was the primary purpose of your trip?  
a. Commute to work or work-related  
b. Shopping or leisure  
c. School or University  
d. Other \_\_\_\_\_

Did you make this trip alone?  
a. Yes      b. No

If no, how many passengers were traveling with you? \_\_\_\_\_

Did you make a return trip on Interstate 35 on the same day?  
a. Yes      b. No

When did you make your return trip on Interstate 35?  
a. Before 4 AM                      e. 12 Noon – 3 PM  
b. 4 AM – 6 AM                      f. 3 PM – 6 PM  
c. 6 AM – 9 AM                      g. 6 PM – 9 PM  
d. 9 AM – 12 Noon                    h. 9 PM – 12 Midnight

Figure B.7 O-D Survey for MN 55 Highway

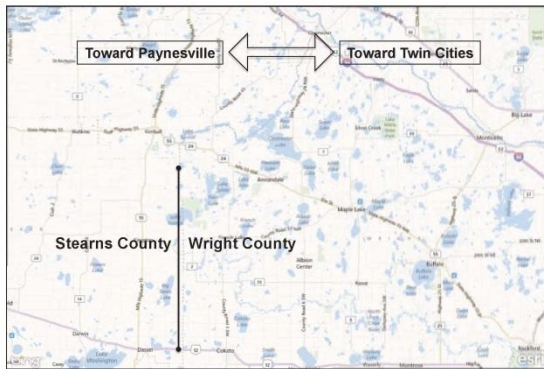


**Travel Behavior Inventory Origin-Destination Survey**

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in Stearns and Wright counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of *MN State Highway 55*. Please take a few minutes to answer the following questions.

Thank you for your time.



If you have any questions, please contact:

Jim Henricksen, Minnesota Department of Transportation  
Tel. 651-234-7782 or [jim.henricksen@state.mn.us](mailto:jim.henricksen@state.mn.us)

Please think about the last time you used **MN State Highway 55** crossing the Stearns/Wright County line.

Did you start your trip on MN State Highway 55 at home?

- a. Yes
- b. No

If not, where did you start your trip on MN State Highway 55?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What was the destination of your trip?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What day of the week did you make your trip on MN State Highway 55?

- a. Monday
- b. Tuesday
- c. Wednesday
- d. Thursday
- e. Friday

When did you make this trip on MN State Highway 55?

- a. Before 4 AM
- b. 4 AM – 6 AM
- c. 6 AM – 9 AM
- d. 9 AM – 12 Noon
- e. 12 Noon – 3 PM
- f. 3 PM – 6 PM
- g. 6 PM – 9 PM
- h. 9 PM – 12 Midnight

What was the primary purpose of your trip?

- a. Commute to work or work-related
- b. Shopping or leisure
- c. School or University
- d. Other \_\_\_\_\_

Did you make this trip alone?

- a. Yes
- b. No

If no, how many passengers were traveling with you? \_\_\_\_\_

Did you make a return trip on MN State Highway 55 on the same day?

- a. Yes
- b. No

When did you make your return trip on MN State Highway 55?

- a. Before 4 AM
- b. 4 AM – 6 AM
- c. 6 AM – 9 AM
- d. 9 AM – 12 Noon
- e. 12 Noon – 3 PM
- f. 3 PM – 6 PM
- g. 6 PM – 9 PM
- h. 9 PM – 12 Midnight

Figure B.8 O-D Survey for I-US 169 N Highway

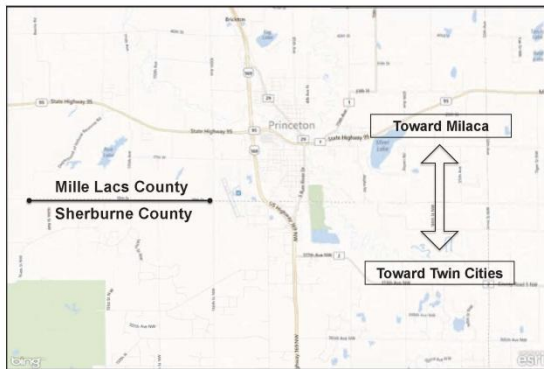


**Travel Behavior Inventory Origin-Destination Survey**

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in Mille Lacs and Sherburne Counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of *US Highway 169*. Please take a few minutes to answer the following questions.

Thank you for your time.



If you have any questions, please contact:

Jim Henriksen, Minnesota Department of Transportation  
Tel. 651-234-7782 or [jim.henriksen@state.mn.us](mailto:jim.henriksen@state.mn.us)

Please think about the last time you used **US Highway 169** crossing the Mille Lacs/Sherburne County line.

Did you start your trip on US Highway 169 at home?

- a. Yes
- b. No

If not, where did you start your trip on US Highway 169?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What was the destination of your trip?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What day of the week did you make your trip on US Highway 169?

- a. Monday
- b. Tuesday
- c. Wednesday
- d. Thursday
- e. Friday

When did you make this trip on US Highway 169?

- a. Before 4 AM
- b. 4 AM – 6 AM
- c. 6 AM – 9 AM
- d. 9 AM – 12 Noon
- e. 12 Noon – 3 PM
- f. 3 PM – 6 PM
- g. 6 PM – 9 PM
- h. 9 PM – 12 Midnight

What was the primary purpose of your trip?

- a. Commute to work or work-related
- b. Shopping or leisure
- c. School or University
- d. Other \_\_\_\_\_

Did you make this trip alone?

- a. Yes
- b. No

If no, how many passengers were traveling with you? \_\_\_\_\_

Did you make a return trip on US Highway 169 on the same day?

- a. Yes
- b. No

When did you make your return trip on US Highway 169?

- a. Before 4 AM
- b. 4 AM – 6 AM
- c. 6 AM – 9 AM
- d. 9 AM – 12 Noon
- e. 12 Noon – 3 PM
- f. 3 PM – 6 PM
- g. 6 PM – 9 PM
- h. 9 PM – 12 Midnight

Figure B.9 O-D Survey for I-94 W



**Travel Behavior Inventory Origin-Destination Survey**

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in Stearns and Wright Counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of *Interstate 94*. Please take a few minutes to answer the following questions.

Thank you for your time.



If you have any questions, please contact:

Jim Henricksen, Minnesota Department of Transportation  
Tel. 651-234-7782 or [jim.henricksen@state.mn.us](mailto:jim.henricksen@state.mn.us)

Please think about the last time you used **Interstate 94** crossing the Stearns/Wright County line.

Did you start your trip on Interstate 94 at home?  
a. Yes      b. No

If not, where did you start your trip on Interstate 94?  
Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What was the destination of your trip?  
Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What day of the week did you make your trip on Interstate 94?  
a. Monday   b. Tuesday   c. Wednesday   d. Thursday   e. Friday

When did you make this trip on Interstate 94?  
a. Before 4 AM      e. 12 Noon – 3 PM  
b. 4 AM – 6 AM      f. 3 PM – 6 PM  
c. 6 AM – 9 AM      g. 6 PM – 9 PM  
d. 9 AM – 12 Noon      h. 9 PM – 12 Midnight

What was the primary purpose of your trip?  
a. Commute to work or work-related  
b. Shopping or leisure  
c. School or University  
d. Other \_\_\_\_\_

Did you make this trip alone?  
a. Yes      b. No

If no, how many passengers were traveling with you? \_\_\_\_\_

Did you make a return trip on Interstate 94 on the same day?  
a. Yes      b. No

When did you make your return trip on Interstate 94?  
a. Before 4 AM      e. 12 Noon – 3 PM  
b. 4 AM – 6 AM      f. 3 PM – 6 PM  
c. 6 AM – 9 AM      g. 6 PM – 9 PM  
d. 9 AM – 12 Noon      h. 9 PM – 12 Midnight

Figure B.10 O-D Survey for I-94 E

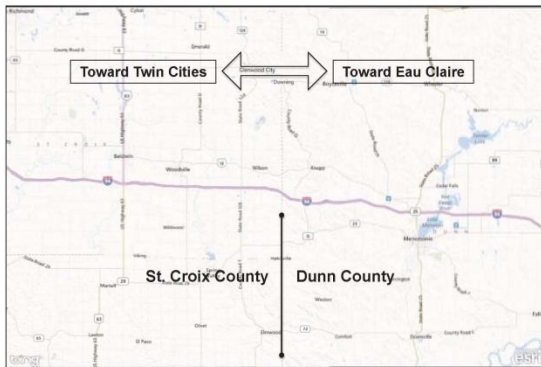


**Travel Behavior Inventory Origin-Destination Survey**

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in St. Croix and Dunn Counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of *Interstate 94*. Please take a few minutes to answer the following questions.

Thank you for your time.



If you have any questions, please contact:

Jim Henricksen, Minnesota Department of Transportation  
Tel. 651-234-7782 or [jim.henricksen@state.mn.us](mailto:jim.henricksen@state.mn.us)

Please think about the last time you used **Interstate 94** crossing the St. Croix/Dunn County line.

Did you start your trip on Interstate 94 at home?

- a. Yes                      b. No

If not, where did you start your trip on Interstate 94?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_

City or Place name: \_\_\_\_\_

What was the destination of your trip?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_

City or Place name: \_\_\_\_\_

What day of the week did you make your trip on Interstate 94?

- a. Monday   b. Tuesday   c. Wednesday   d. Thursday   e. Friday

When did you make this trip on Interstate 94?

- |                   |                       |
|-------------------|-----------------------|
| a. Before 4 AM    | e. 12 Noon – 3 PM     |
| b. 4 AM – 6 AM    | f. 3 PM – 6 PM        |
| c. 6 AM – 9 AM    | g. 6 PM – 9 PM        |
| d. 9 AM – 12 Noon | h. 9 PM – 12 Midnight |

What was the primary purpose of your trip?

- a. Commute to work or work-related  
b. Shopping or leisure  
c. School or University  
d. Other \_\_\_\_\_

Did you make this trip alone?

- a. Yes                      b. No

If no, how many passengers were traveling with you? \_\_\_\_\_

Did you make a return trip on Interstate 94 on the same day?

- a. Yes                      b. No

When did you make your return trip on Interstate 94?

- |                   |                       |
|-------------------|-----------------------|
| a. Before 4 AM    | e. 12 Noon – 3 PM     |
| b. 4 AM – 6 AM    | f. 3 PM – 6 PM        |
| c. 6 AM – 9 AM    | g. 6 PM – 9 PM        |
| d. 9 AM – 12 Noon | h. 9 PM – 12 Midnight |



Figure B.11 O-D Survey for US 12 Highway

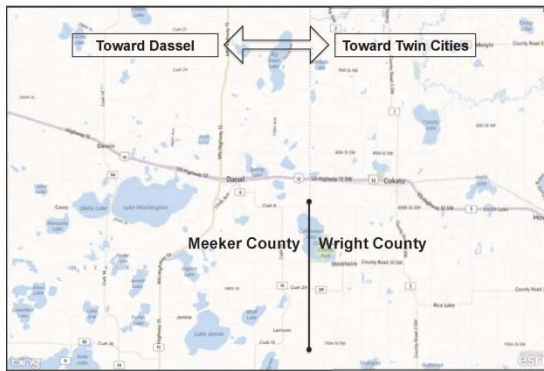


**Travel Behavior Inventory Origin-Destination Survey**

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in Meeker and Wright Counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of *US Highway 12*. Please take a few minutes to answer the following questions.

Thank you for your time.



If you have any questions, please contact:

Jim Henriksen, Minnesota Department of Transportation  
Tel. 651-234-7782 or [jim.henriksen@state.mn.us](mailto:jim.henriksen@state.mn.us)

Please think about the last time you used **US Highway 12** crossing the Meeker/Wright County line.

Did you start your trip on US Highway 12 at home?

- a. Yes
- b. No

If not, where did you start your trip on US Highway 12?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What was the destination of your trip?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_  
City or Place name: \_\_\_\_\_

What day of the week did you make your trip on US Highway 12?

- a. Monday
- b. Tuesday
- c. Wednesday
- d. Thursday
- e. Friday

When did you make this trip on US Highway 12?

- a. Before 4 AM
- b. 4 AM – 6 AM
- c. 6 AM – 9 AM
- d. 9 AM – 12 Noon
- e. 12 Noon – 3 PM
- f. 3 PM – 6 PM
- g. 6 PM – 9 PM
- h. 9 PM – 12 Midnight

What was the primary purpose of your trip?

- a. Commute to work or work-related
- b. Shopping or leisure
- c. School or University
- d. Other \_\_\_\_\_

Did you make this trip alone?

- a. Yes
- b. No

If no, how many passengers were traveling with you? \_\_\_\_\_

Did you make a return trip on US Highway 12 on the same day?

- a. Yes
- b. No

When did you make your return trip on US Highway 12?

- a. Before 4 AM
- b. 4 AM – 6 AM
- c. 6 AM – 9 AM
- d. 9 AM – 12 Noon
- e. 12 Noon – 3 PM
- f. 3 PM – 6 PM
- g. 6 PM – 9 PM
- h. 9 PM – 12 Midnight

Figure B.12 O-D Survey for US 10 Highway

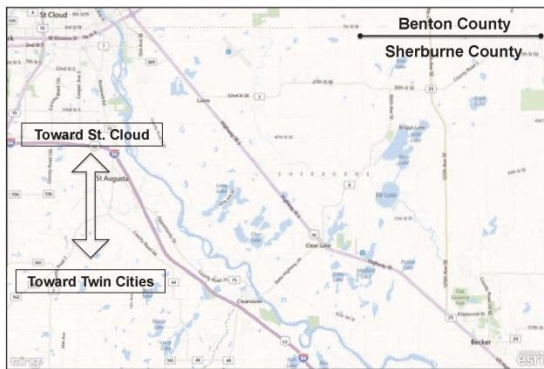


**Travel Behavior Inventory Origin-Destination Survey**

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in Benton and Sherburne Counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of *US Highway 10*. Please take a few minutes to answer the following questions.

Thank you for your time.



If you have any questions, please contact:

Jim Henricksen, Minnesota Department of Transportation  
Tel. 651-234-7782 or [jim.henricksen@state.mn.us](mailto:jim.henricksen@state.mn.us)

Please think about the last time you used **US Highway 10** crossing the Benton/Sherburne County line.

Did you start your trip on US Highway 10 at home?

- a. Yes
- b. No

If not, where did you start your trip US Highway 10?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_

City or Place name: \_\_\_\_\_

What was the destination of your trip?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_

City or Place name: \_\_\_\_\_

What day of the week did you make your trip on US Highway 10?

- a. Monday
- b. Tuesday
- c. Wednesday
- d. Thursday
- e. Friday

When did you make this trip on US Highway 10?

- a. Before 4 AM
- b. 4 AM – 6 AM
- c. 6 AM – 9 AM
- d. 9 AM – 12 Noon
- e. 12 Noon – 3 PM
- f. 3 PM – 6 PM
- g. 6 PM – 9 PM
- h. 9 PM – 12 Midnight

What was the primary purpose of your trip?

- a. Commute to work or work-related
- b. Shopping or leisure
- c. School or University
- d. Other \_\_\_\_\_

Did you make this trip alone?

- a. Yes
- b. No

If no, how many passengers were traveling with you? \_\_\_\_\_

Did you make a return trip on US Highway 10 on the same day?

- a. Yes
- b. No

When did you make your return trip on US Highway 10?

- a. Before 4 AM
- b. 4 AM – 6 AM
- c. 6 AM – 9 AM
- d. 9 AM – 12 Noon
- e. 12 Noon – 3 PM
- f. 3 PM – 6 PM
- g. 6 PM – 9 PM
- h. 9 PM – 12 Midnight

Figure B.13 O-D Survey for US 52 Highway

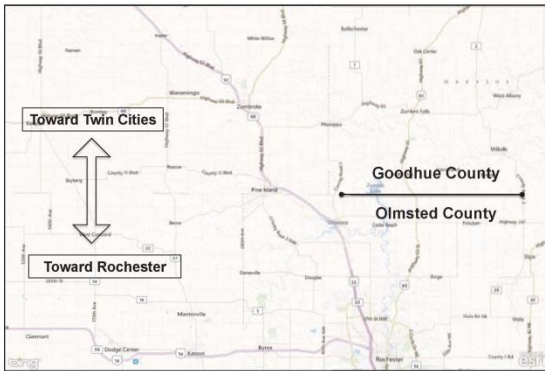


**Travel Behavior Inventory Origin-Destination Survey**

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in Olmsted and Goodhue counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of *US Highway 52*. Please take a few minutes to answer the following questions.

Thank you for your time.



If you have any questions, please contact:

Jim Henricksen, Minnesota Department of Transportation  
Tel. 651-234-7782 or [jim.henricksen@state.mn.us](mailto:jim.henricksen@state.mn.us)

Please think about the last time you used **US Highway 52** crossing the Olmsted/Goodhue County line.

Did you start your trip on US Highway 52 at home?

- a. Yes      b. No

If not, where did you start your trip on US Highway 52?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_

City or Place name: \_\_\_\_\_

What was the destination of your trip?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_

City or Place name: \_\_\_\_\_

What day of the week did you make your trip on US Highway 52?

- a. Monday   b. Tuesday   c. Wednesday   d. Thursday   e. Friday

When did you make this trip on US Highway 52?

- |                   |                       |
|-------------------|-----------------------|
| a. Before 4 AM    | e. 12 Noon – 3 PM     |
| b. 4 AM – 6 AM    | f. 3 PM – 6 PM        |
| c. 6 AM – 9 AM    | g. 6 PM – 9 PM        |
| d. 9 AM – 12 Noon | h. 9 PM – 12 Midnight |

What was the primary purpose of your trip?

- a. Commute to work or work-related  
b. Shopping or leisure  
c. School or University  
d. Other \_\_\_\_\_

Did you make this trip alone?

- a. Yes      b. No

If no, how many passengers were traveling with you? \_\_\_\_\_

Did you make a return trip on US Highway 52 on the same day?

- a. Yes      b. No

When did you make your return trip on US Highway 52?

- |                   |                       |
|-------------------|-----------------------|
| a. Before 4 AM    | e. 12 Noon – 3 PM     |
| b. 4 AM – 6 AM    | f. 3 PM – 6 PM        |
| c. 6 AM – 9 AM    | g. 6 PM – 9 PM        |
| d. 9 AM – 12 Noon | h. 9 PM – 12 Midnight |

Figure B.14 O-D Survey for US 169 S Highway

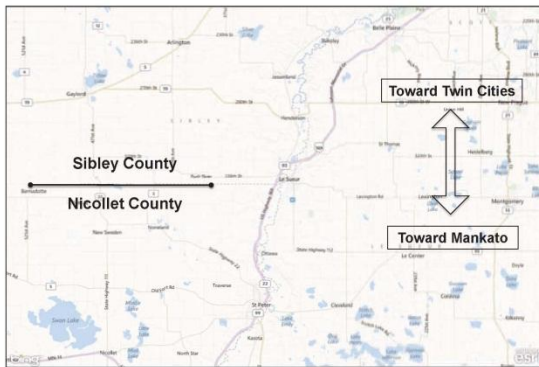


**Travel Behavior Inventory Origin-Destination Survey**

The Minnesota and Wisconsin Departments of Transportation are surveying drivers in several counties surrounding the Twin Cities metro area. The purpose of this survey is to better understand the needs of the transportation system users to prepare for future demand in Nicollet and Sibley Counties and the greater region.

Your household has been selected to participate in a brief survey as a potential user of *US Highway 169*. Please take a few minutes to answer the following questions.

Thank you for your time.



If you have any questions, please contact:

Jim Henricksen, Minnesota Department of Transportation  
Tel. 651-234-7782 or [jim.henricksen@state.mn.us](mailto:jim.henricksen@state.mn.us)

Please think about the last time you used **US Highway 169** crossing the Nicollet/Sibley County line.

Did you start your trip on US Highway 169 at home?

- a. Yes
- b. No

If not, where did you start your trip on US Highway 169?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_

City or Place name: \_\_\_\_\_

What was the destination of your trip?

Nearest cross streets: \_\_\_\_\_ at \_\_\_\_\_

City or Place name: \_\_\_\_\_

What day of the week did you make your trip on US Highway 169?

- a. Monday
- b. Tuesday
- c. Wednesday
- d. Thursday
- e. Friday

When did you make this trip on US Highway 169?

- a. Before 4 AM
- b. 4 AM – 6 AM
- c. 6 AM – 9 AM
- d. 9 AM – 12 Noon
- e. 12 Noon – 3 PM
- f. 3 PM – 6 PM
- g. 6 PM – 9 PM
- h. 9 PM – 12 Midnight

What was the primary purpose of your trip?

- a. Commute to work or work-related
- b. Shopping or leisure
- c. School or University
- d. Other \_\_\_\_\_

Did you make this trip alone?

- a. Yes
- b. No

If no, how many passengers were traveling with you? \_\_\_\_\_

Did you make a return trip on US Highway 169 on the same day?

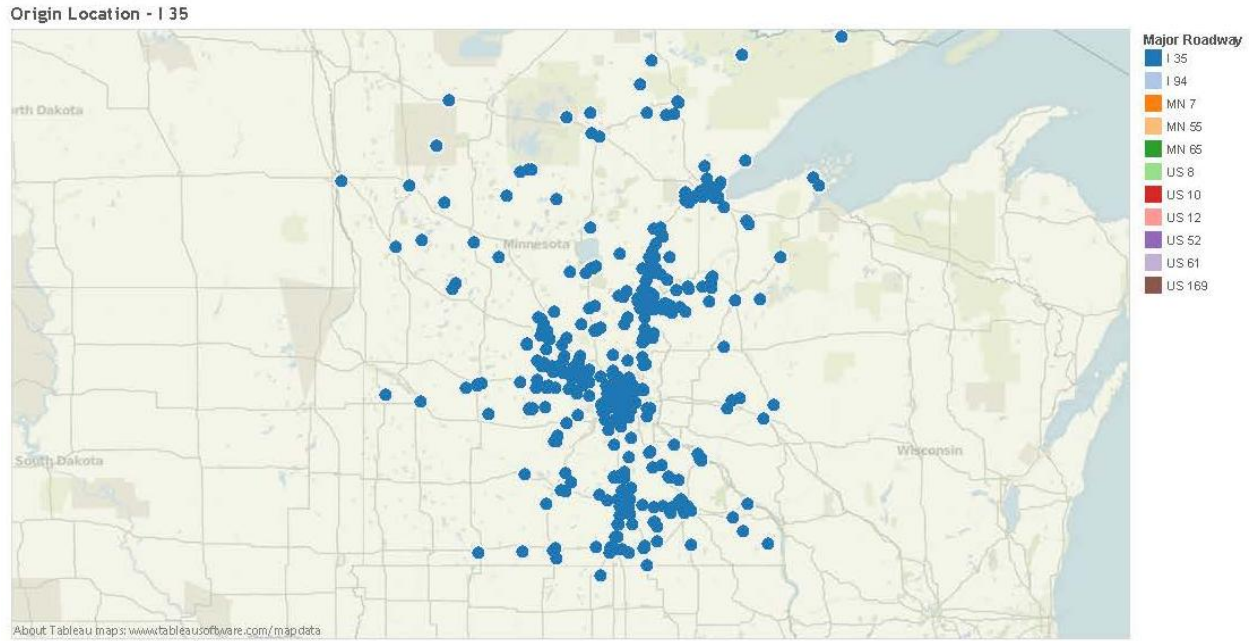
- a. Yes
- b. No

When did you make your return trip on US Highway 169?

- a. Before 4 AM
- b. 4 AM – 6 AM
- c. 6 AM – 9 AM
- d. 9 AM – 12 Noon
- e. 12 Noon – 3 PM
- f. 3 PM – 6 PM
- g. 6 PM – 9 PM
- h. 9 PM – 12 Midnight

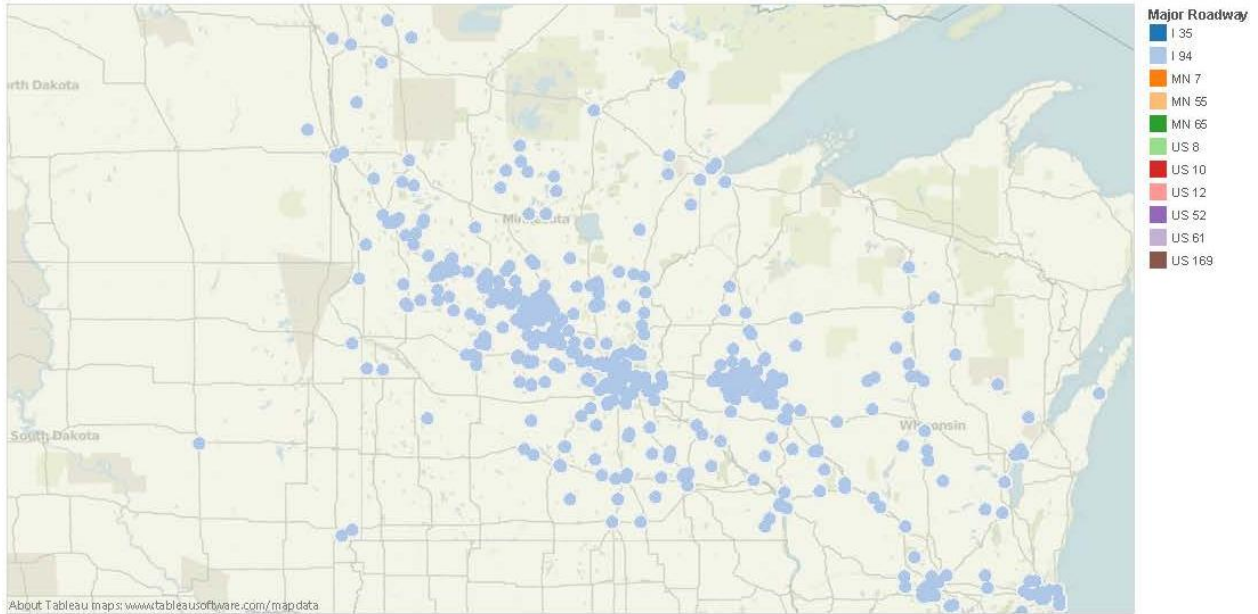
# C. Origins of Trips that Are Intercepted at Each Location

Figure C.1 Origins of I-35 Drivers



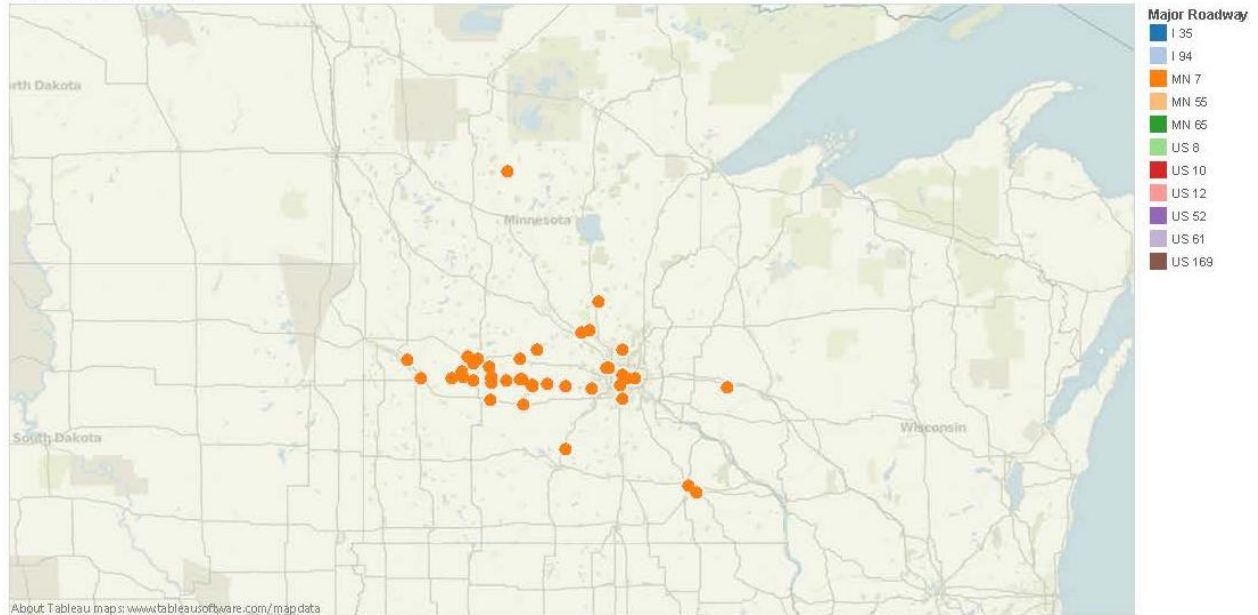
**Figure C.2** Origins of I-94 Drivers

Origin Location - I 94



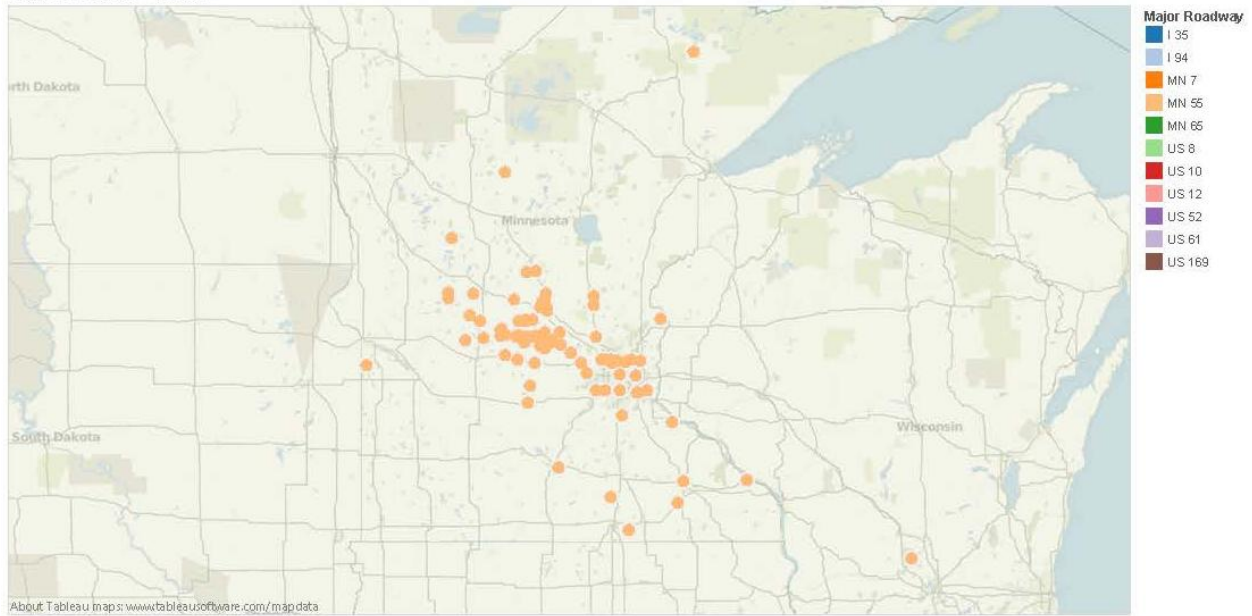
**Figure C.3** Origins of MN 7 Drivers

Origin Location - MN 7



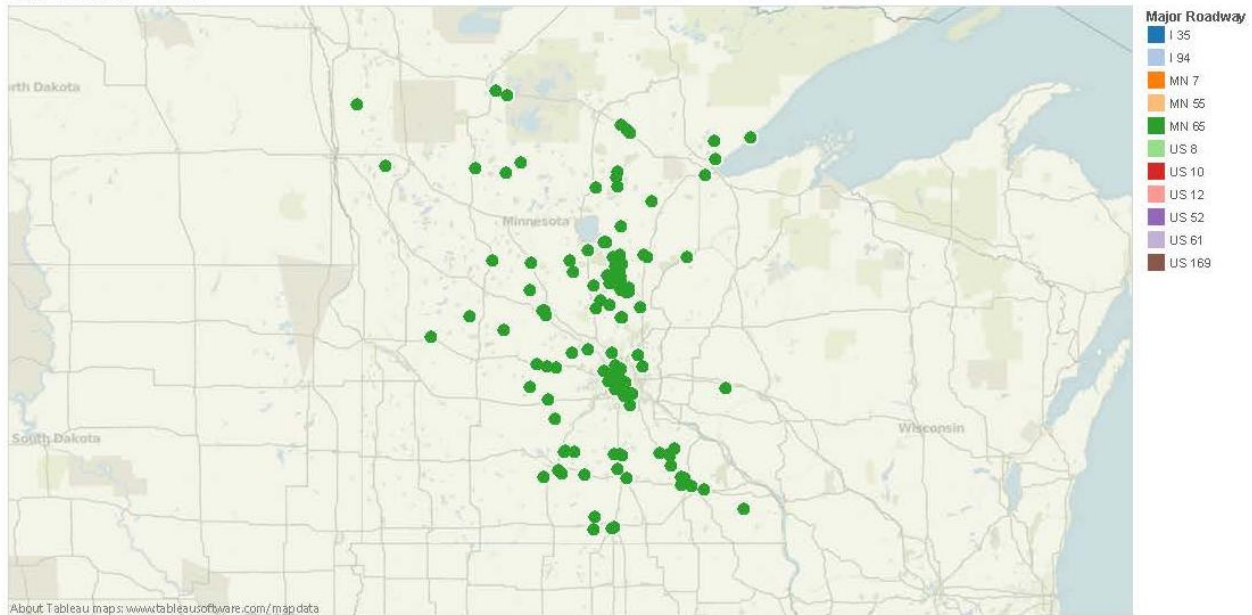
**Figure C.4 Origins of MN 55 Drivers**

Origin Location - MN 55



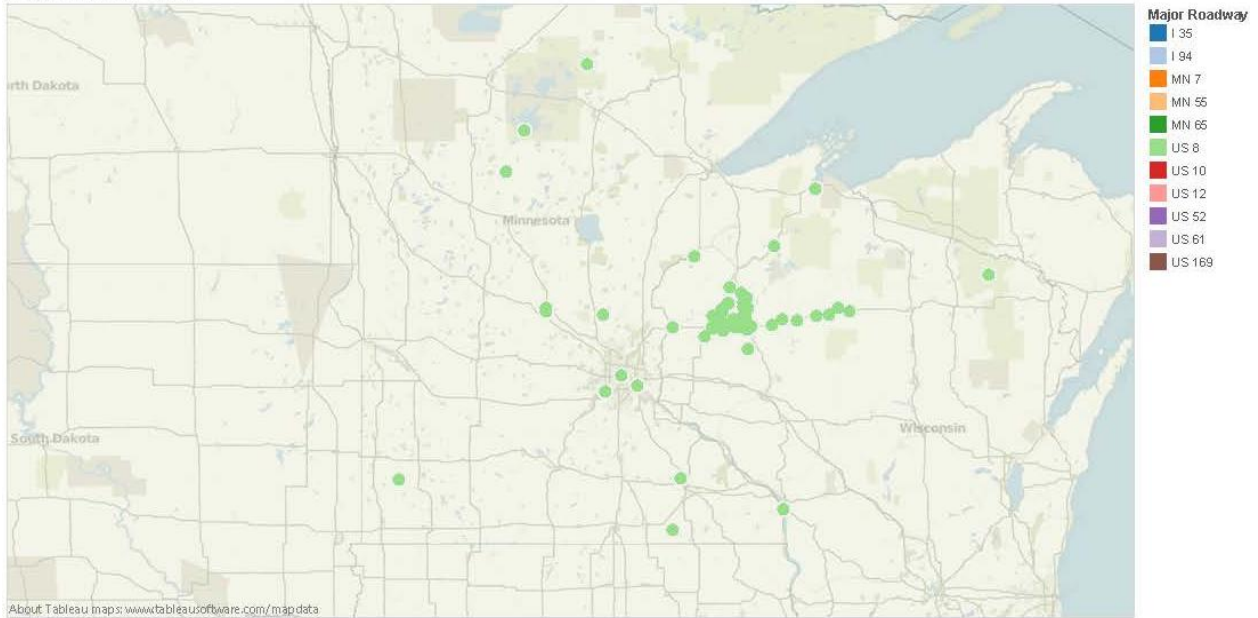
**Figure C.5 Origins of MN 65 Drivers**

Origin Location - MN 65



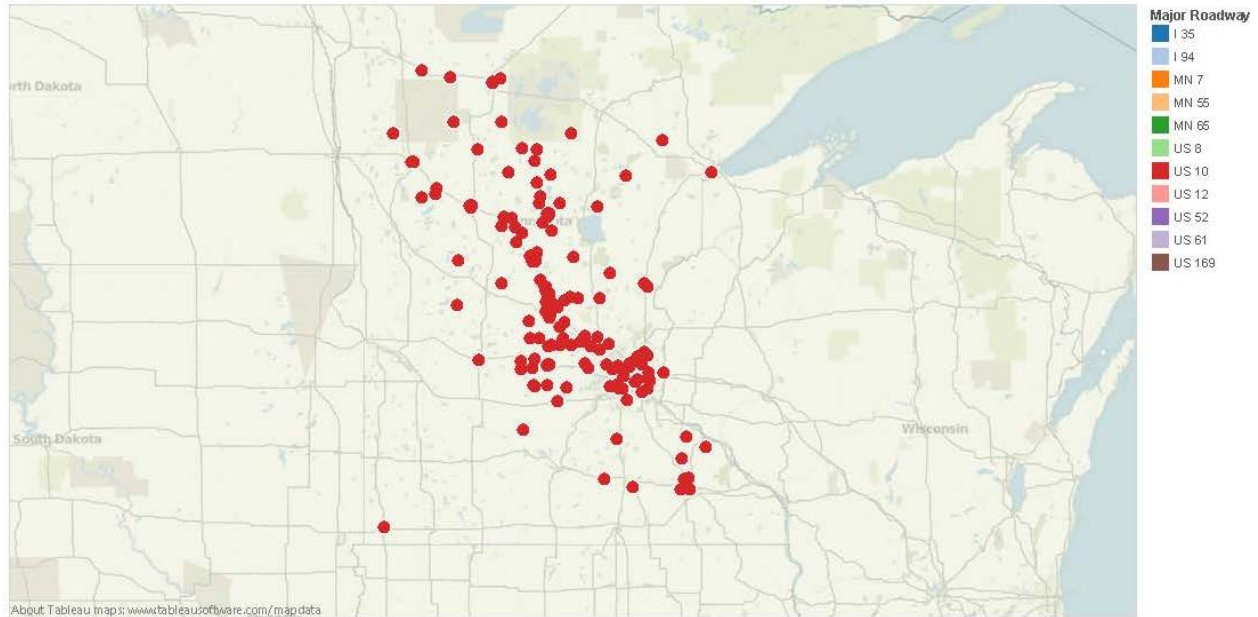
**Figure C.6** Origins of US 8 Drivers

Origin Location - US 8



**Figure C.7** Origins of US 10 Drivers

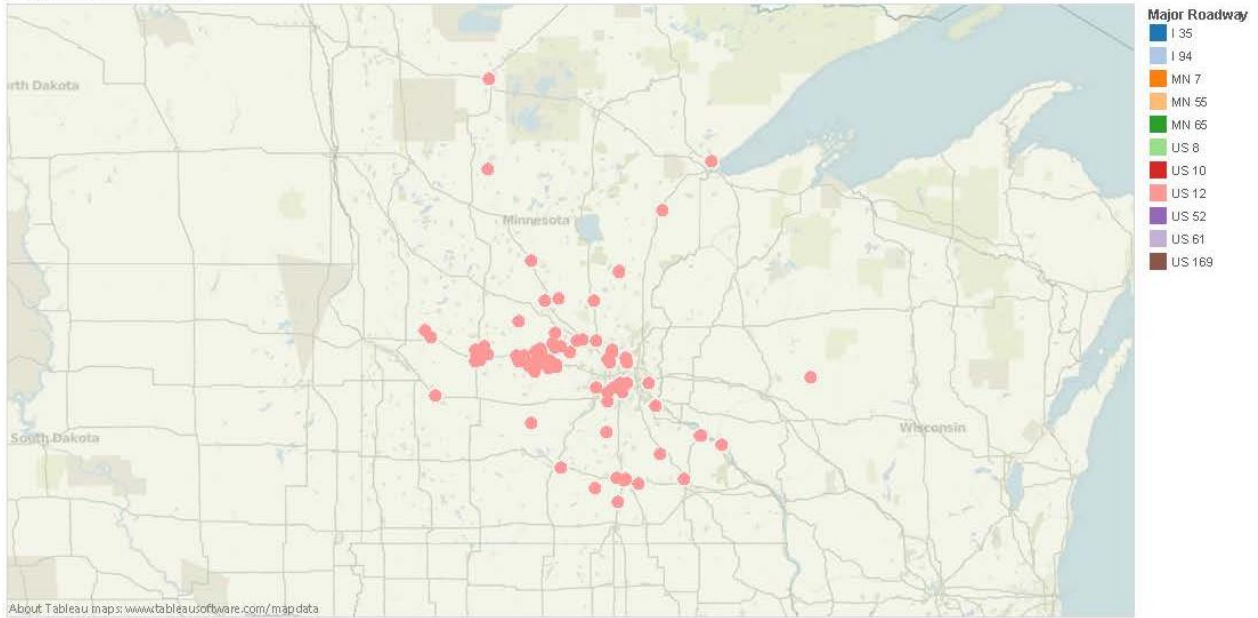
Origin Location - US 10





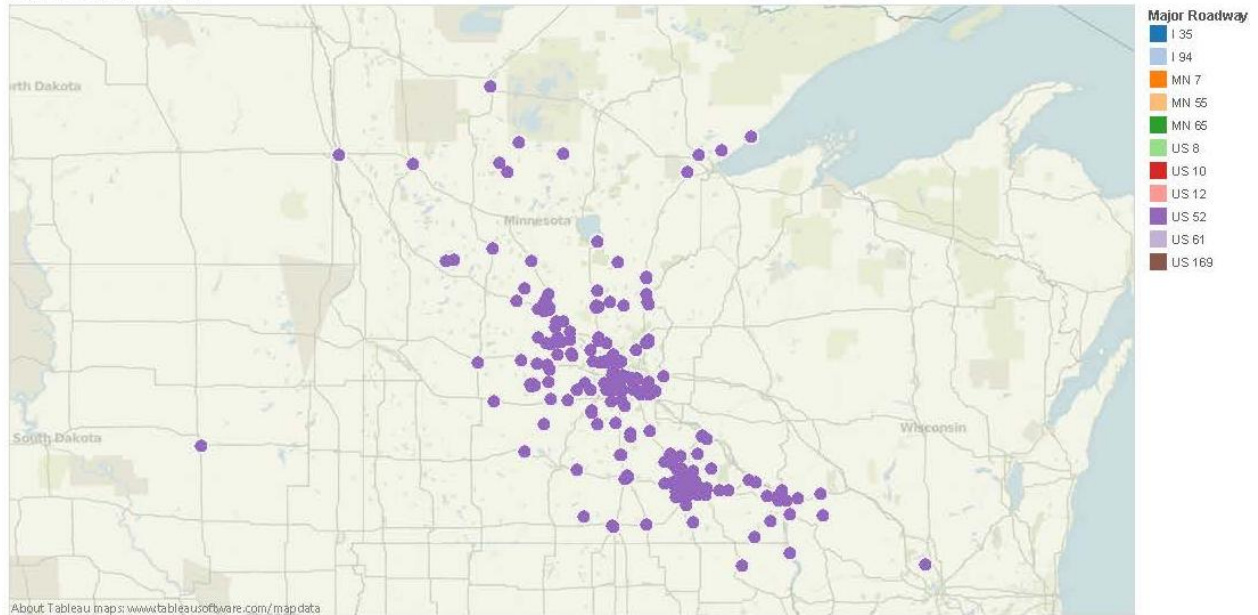
**Figure C.8** Origins of US 12 Drivers

Origin Location - US 12



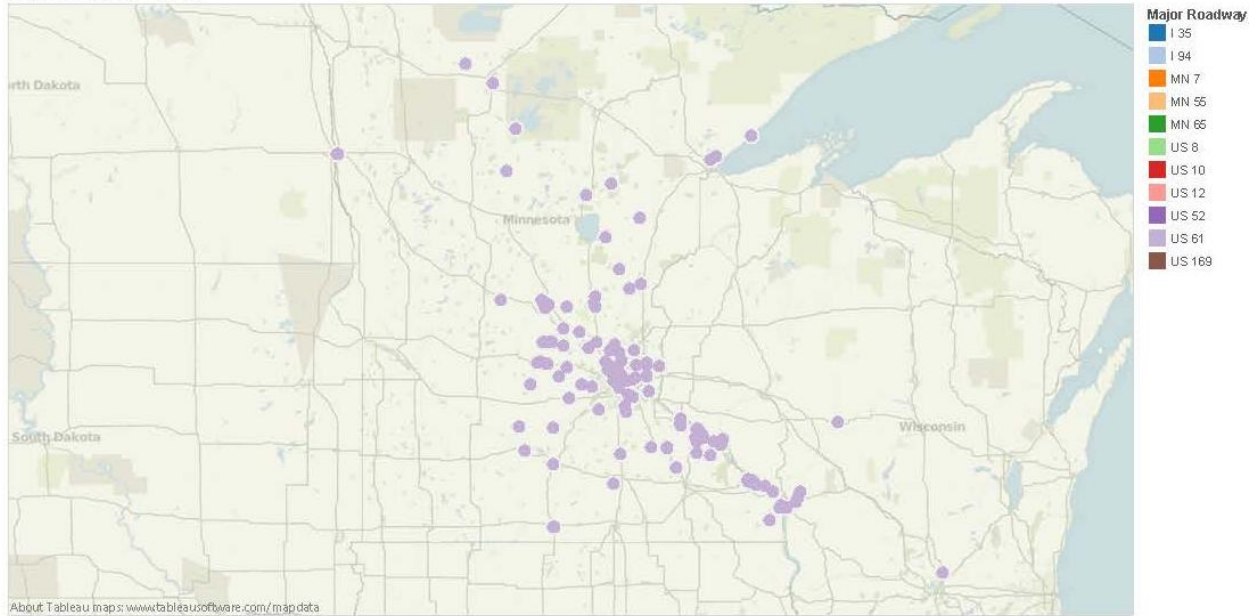
**Figure C.9** Origins of US 52 Drivers

Origin Location - US 52



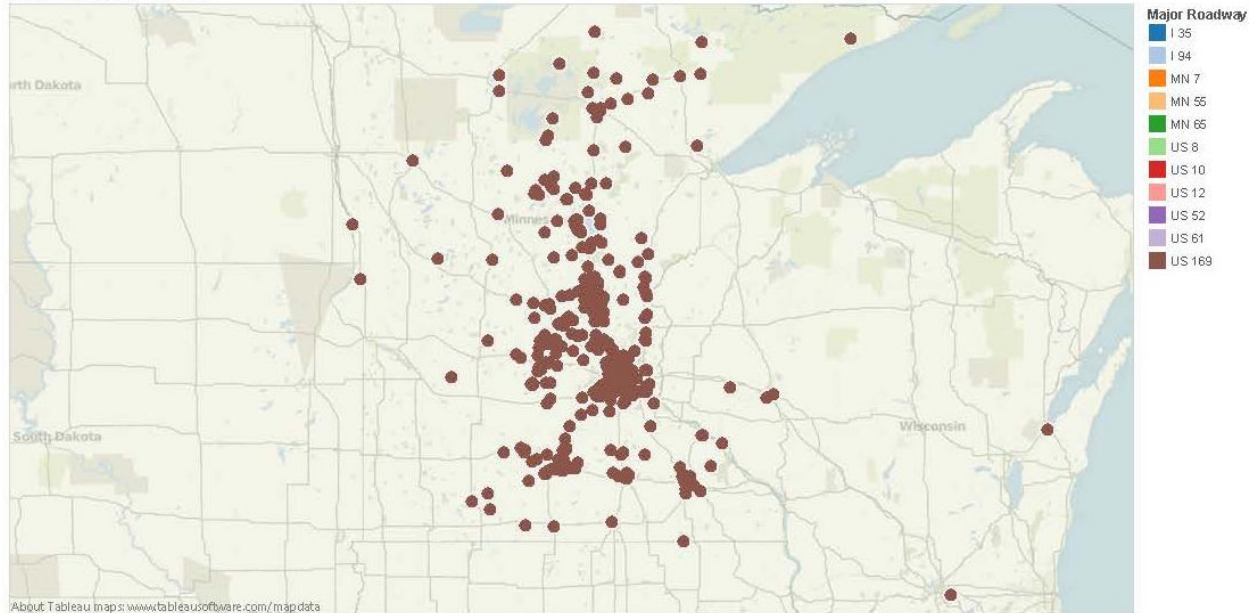
**Figure C.10 Origins of US 61 Drivers**

Origin Location - US 61



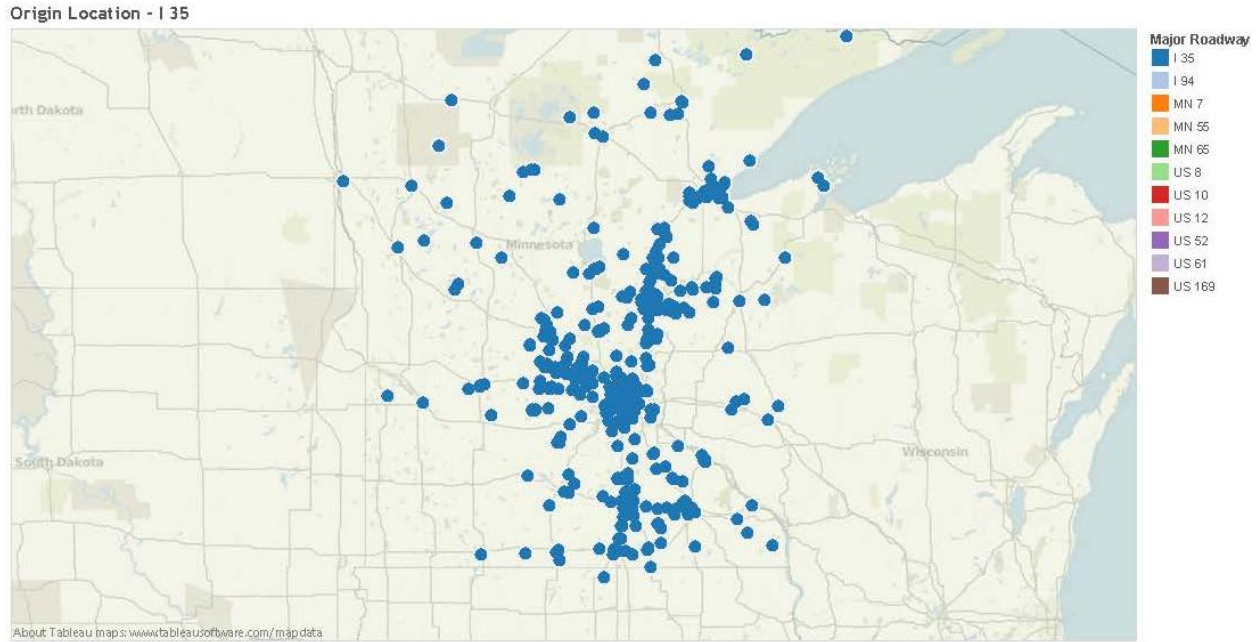
**Figure C.11 Origins of US 169 Drivers**

Origin Location - US 169

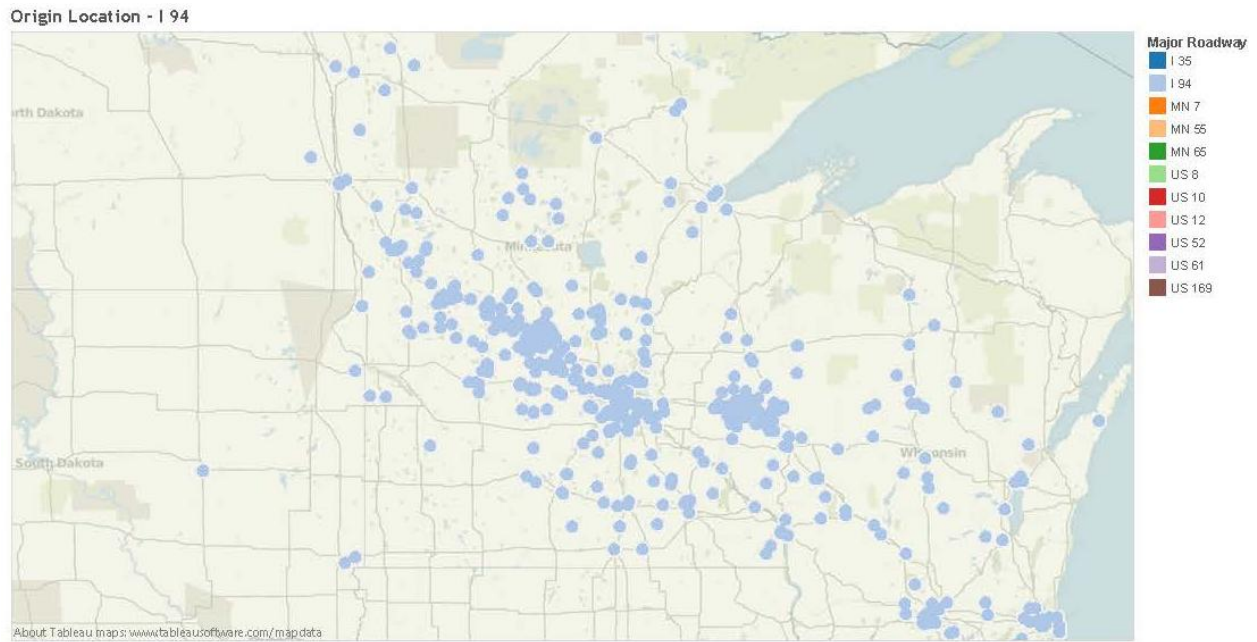


# D. Destinations of Trips Intercepted at Each Location

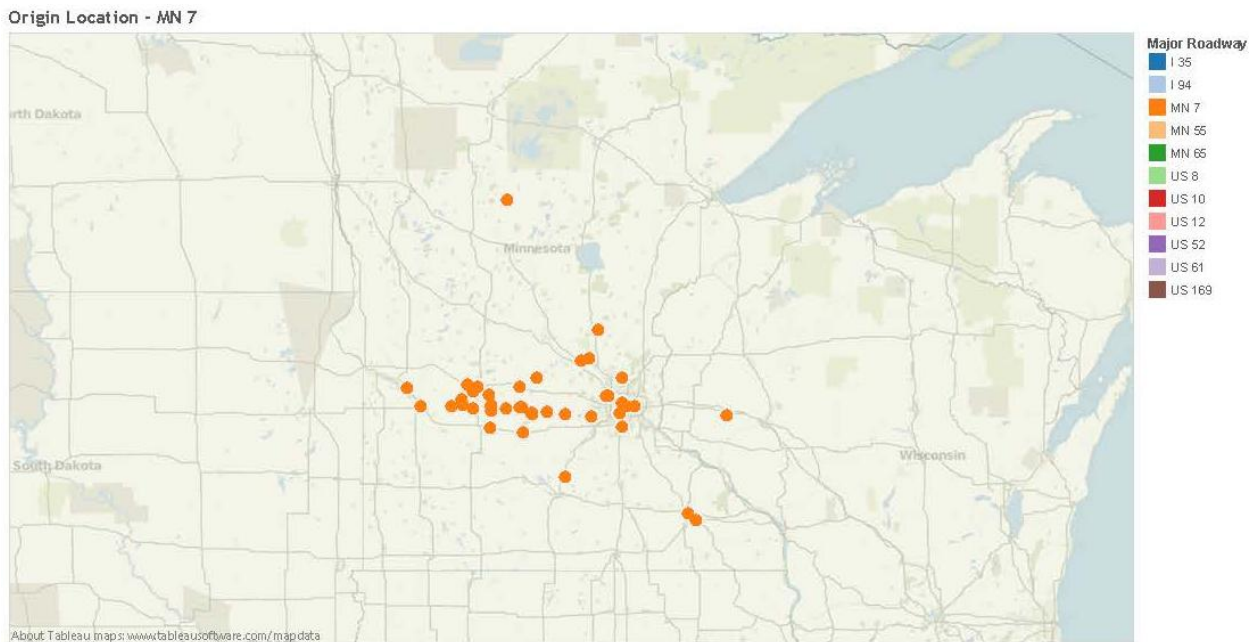
Figure D.1 Destinations of I-35 Drivers



**Figure D.2 Destinations of I-94 Drivers**

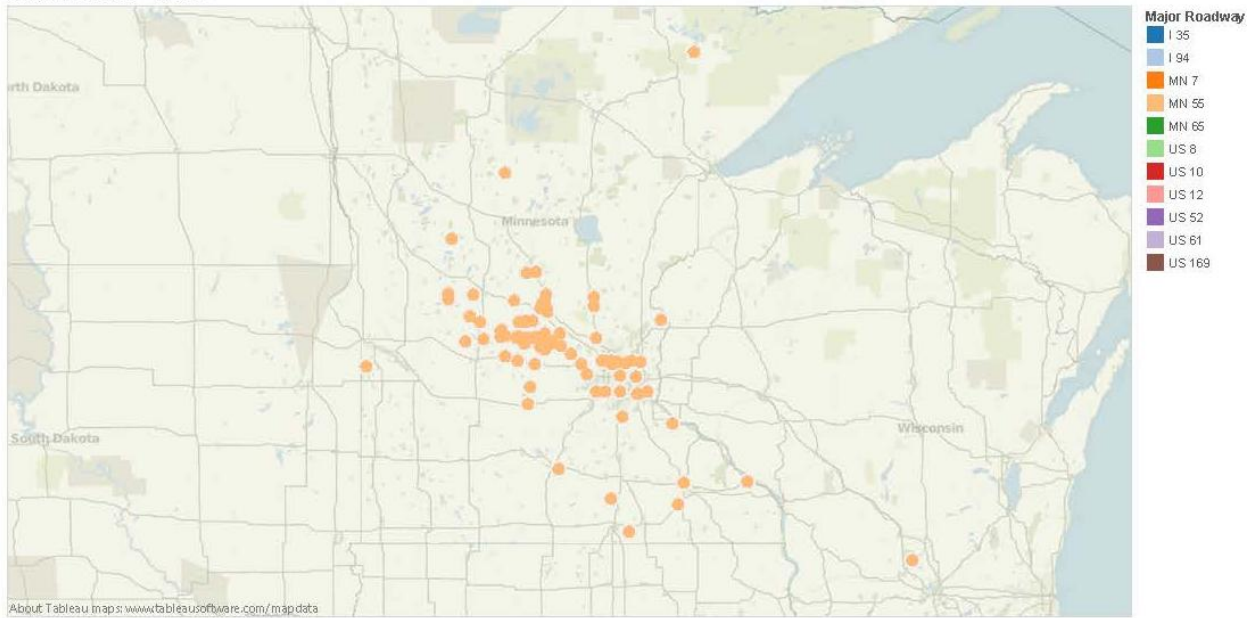


**Figure D.3 Destinations of MN 7 Drivers**



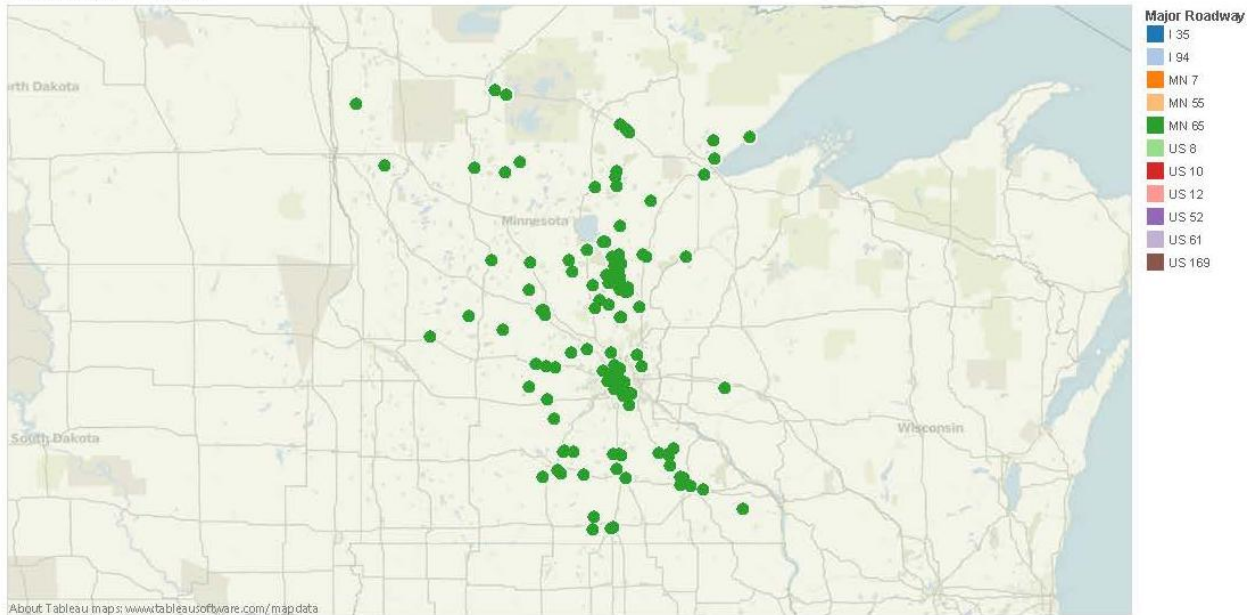
**Figure D.4 Destinations of MN 55 Drivers**

Origin Location - MN 55

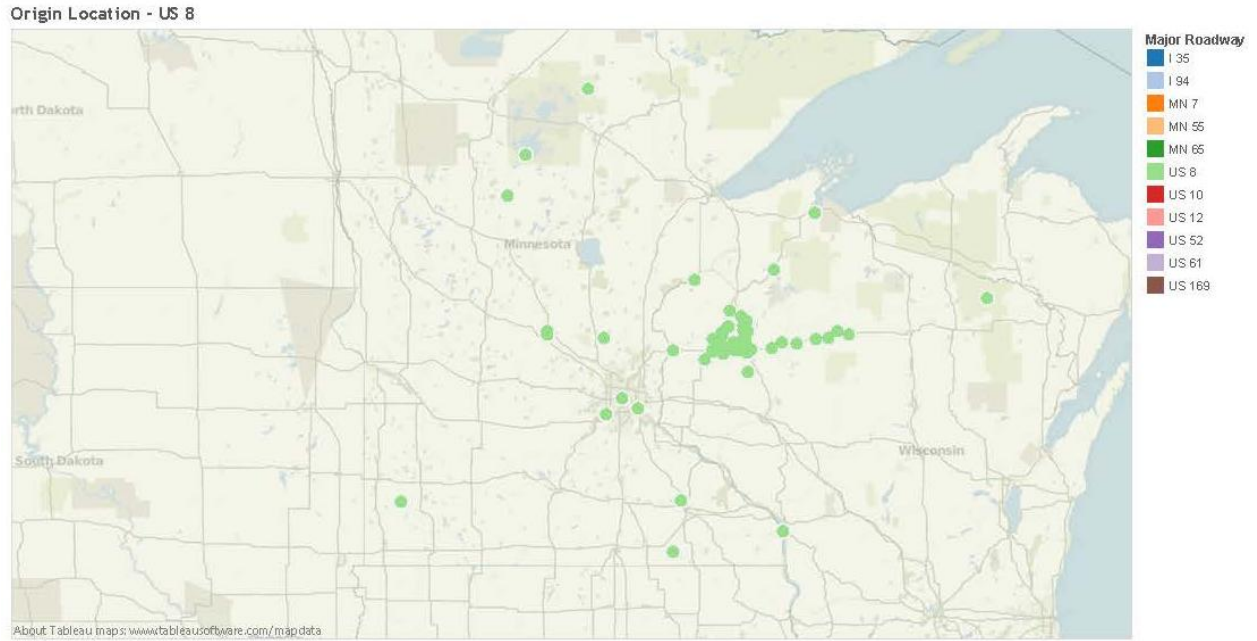


**Figure D.5 Destinations of MN 65 Drivers**

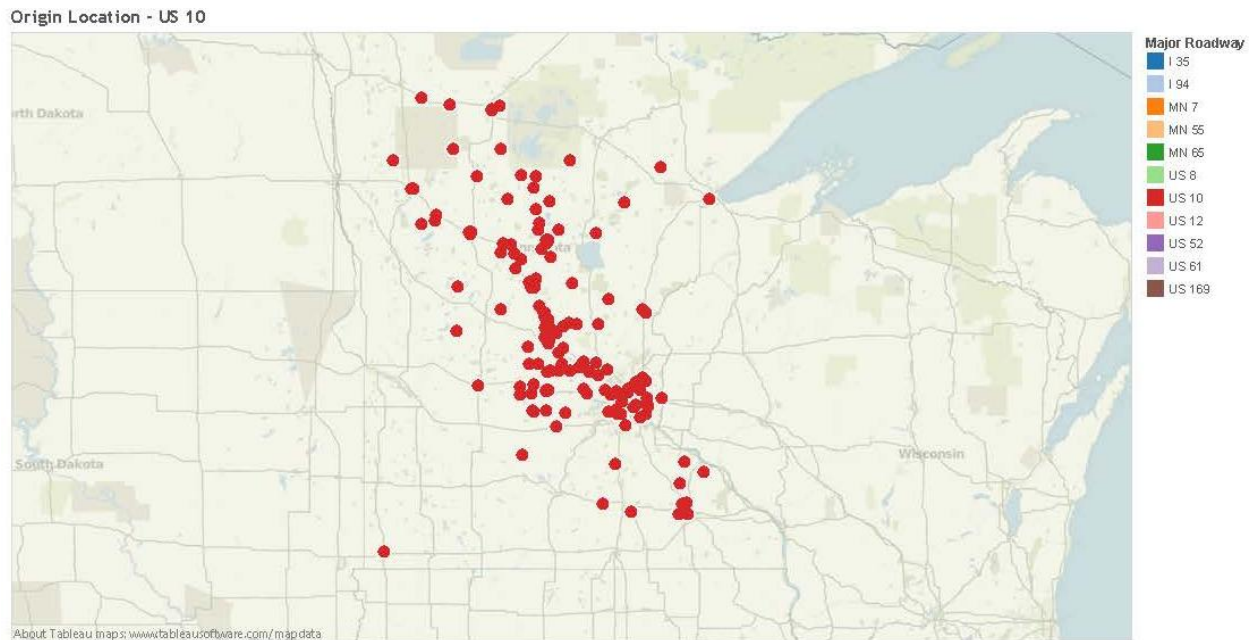
Origin Location - MN 65



**Figure D.6 Destinations of US 8 Drivers**

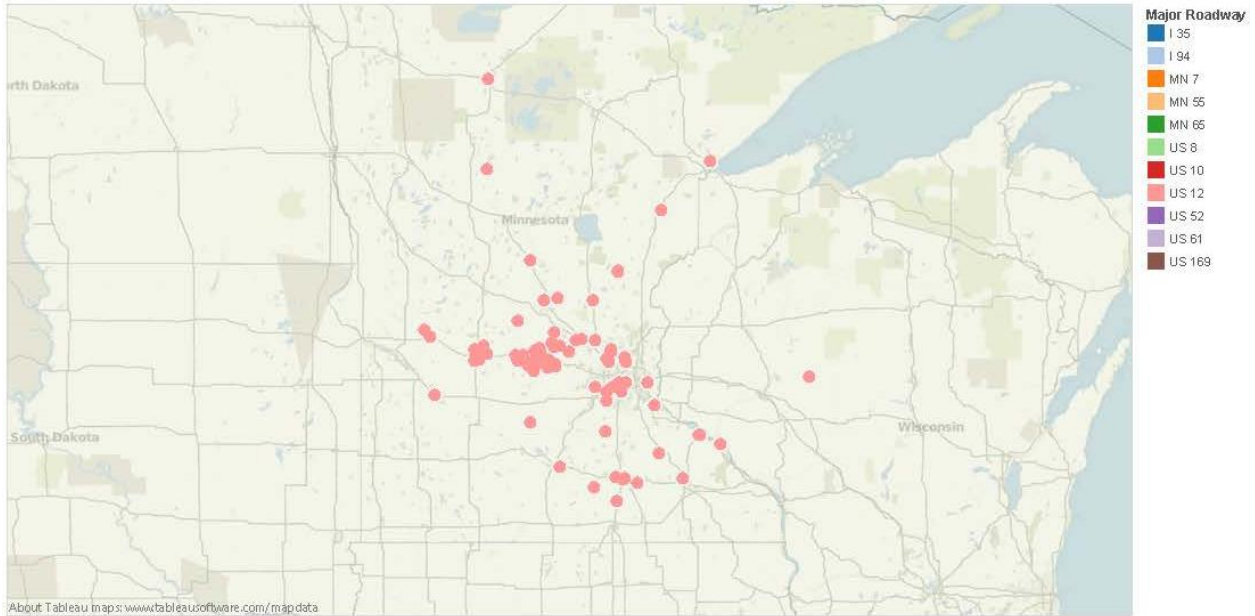


**Figure D.7 Destinations of US 10 Drivers**



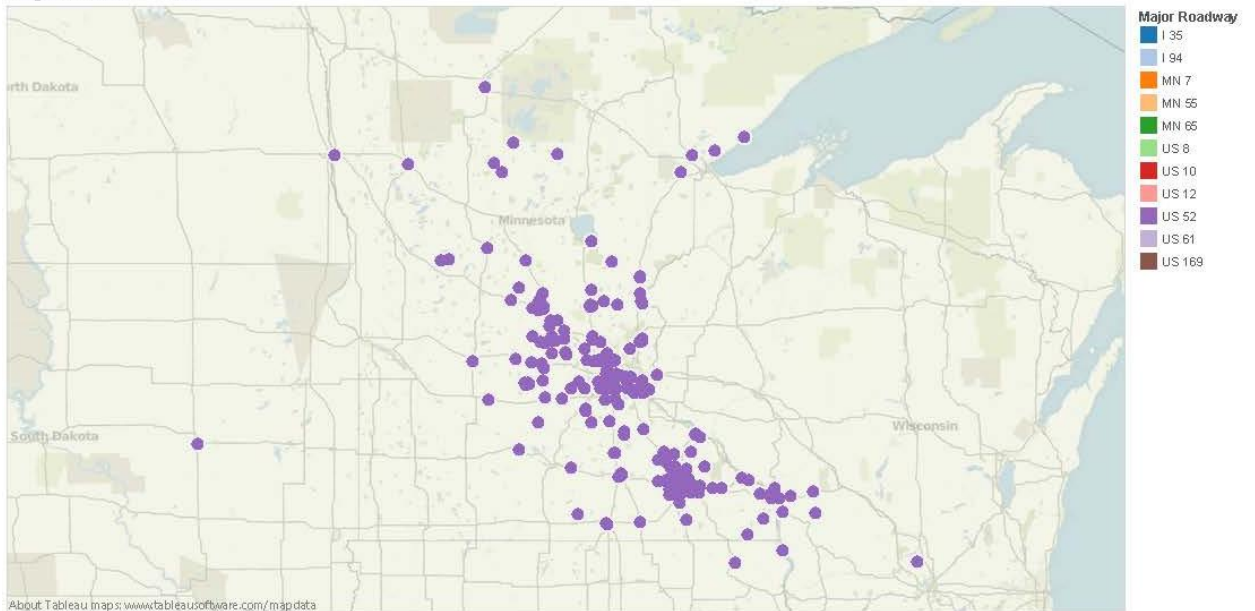
**Figure D.8 Destinations of US 12 Drivers**

Origin Location - US 12



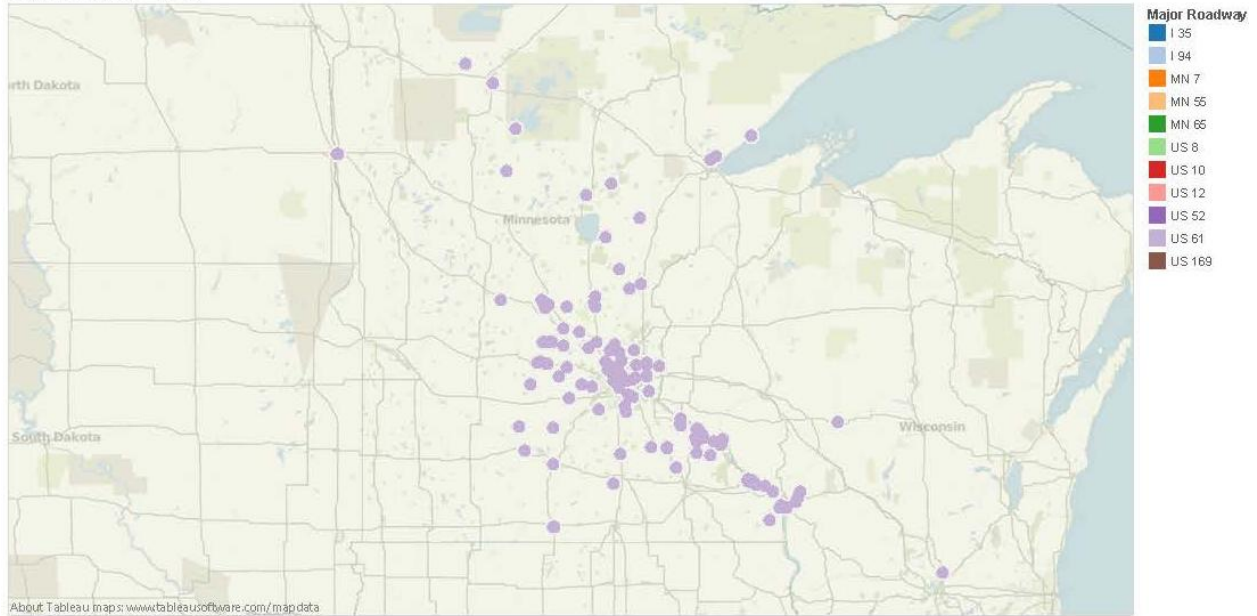
**Figure D.9 Destinations of US 52 Drivers**

Origin Location - US 52



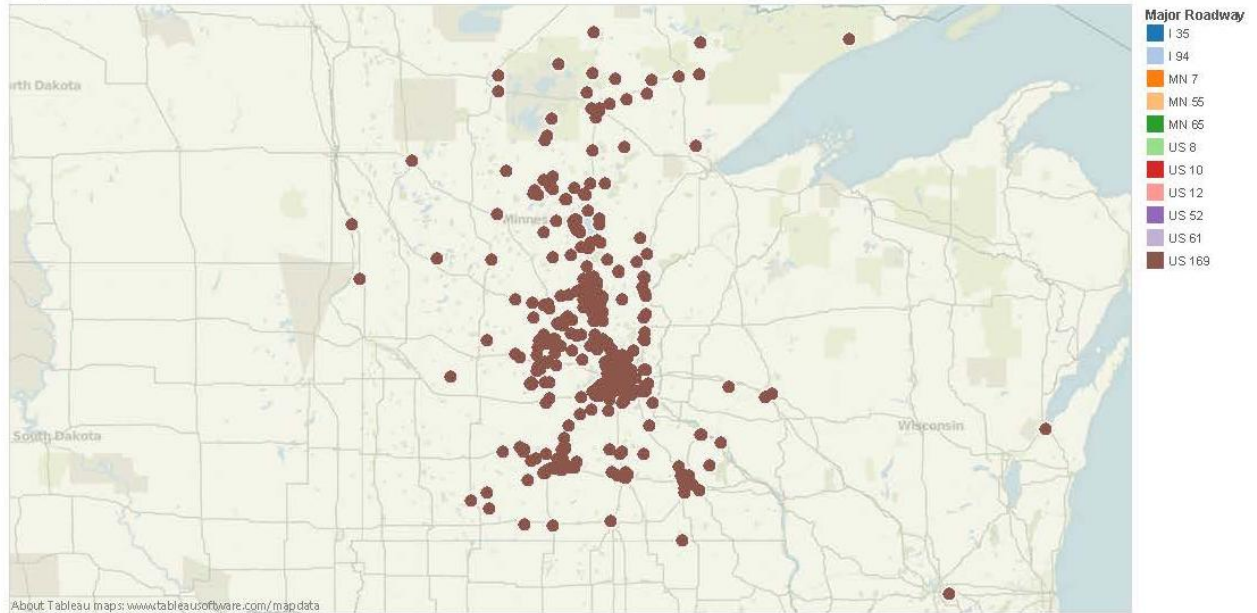
**Figure D.10 Destinations of US 61 Drivers**

Origin Location - US 61



**Figure D.11 Destinations of US 169 Drivers**

Origin Location - US 169





## E. O-D Survey Dictionary

	Description	Values
SurveyMonkeyID	unique ID assigned in data entry software	1896609195-1925199342
FlyerID	unique ID assigned in printed survey	s100-s25000
Major Roadway	primary roadway used for trip	I 94
		I 35
		MN 65
		MN 55
		MN 7
		US 8
		US 10
		US 12
		US 52
		US 61
CountyLine	county border crossed in trip	US 169
		Barron/Polk
		Benton/Sherburne
		Kanabec/Isanti
		McLeod/Carver
		Meeker/Wright
		Mille Lacs/Sherburne
		Nicollet/Sibley
		Olmsted/Goodhue
		Pine/Chisago
		St.Croix/Dunn
		Stearns/Wright
		Steele/Rice
Wabasha/Goodhue		
OriginateHome	trip originated at driver's residence	Yes
		No
OXSt1	origin intersection cross-street 1	[various]
OXSt2	origin intersection cross-street 2	[various]
OCity	origin city	[various]

Description		Values
OPlace	origin placename or description	[various]
Origin_Latitude	origin latitude	[various]
Origin_Longitude	origin longitude	[various]
DXSt1	destination intersection cross-street 1	[various]
DXSt2	destination intersection cross-street 2	[various]
DCity	destination city	[various]
DPlace	destination placename or description	[various]
Destination_Latitude	destination latitude	[various]
Destination_Longitude	destination longitude	[various]
Trip_Monday	first trip on Monday	Yes No
Trip_Tuesday	first trip on Tuesday	Yes No
Trip_Wednesday	first trip on Wednesday	Yes No
Trip_Thursday	first trip on Thursday	Yes No
Trip_Friday	first trip on Friday	Yes No
Trip1_Before 4 AM	first trip between midnight and 4 am	Yes No
Trip1_4AM to 6 AM	first trip between 4 and 6 am	Yes No
Trip1_6AM to 9 AM	first trip between 6 and 9 am	Yes No
Trip1_9AM to 12PM	first trip between 9 am and noon	Yes No
Trip1_12PM to 3 PM	first trip between noon and 3 pm	Yes No
Trip1_3PM to 6PM	first trip between 3 and 6 pm	Yes No
Trip1_6PM to 9PM	first trip between 6 and 9 pm	Yes No

Description		Values
Trip1_9PM to 12 AM	first trip between 9 pm and midnight	Yes
		No
Trip_Purpose	trip purpose is recorded	commute to work; shopping or leisure; school or university; other
OtherPurpose_Defined	user-generated (free response) purpose	[various]
Trip_Alone	trip made with no passengers	Yes
		No
Reported_Passengers	number of passengers driven	(blank)
		0
		1
		2
		3
		4
		5
		6
		7
		15
		28
ReturnTripReported?	a return trip occurred	Yes
		No
Trip2_Before 4 AM	second trip between midnight and 4 am	Yes
		No
Trip2_4to6AM	second trip between 4 and 6 am	Yes
		No
Trip2_6to9AM	second trip between 6 and 9 am	Yes
		No
Trip2_9AMto12PM	second trip between 9 am and noon	Yes
		No
Trip2_12PM to 3 PM	second trip between noon and 3 pm	Yes
		No

Description		Values
Trip2_3PM to 6PM	second trip between 3 and 6 pm	Yes
		No
Trip2_6PM to 9PM	second trip between 6 and 9 pm	Yes
		No
Trip2_9PM to 12 AM	second trip between 9 pm and midnight	Yes
		No
Home Address	home address of respondent is reported	Various
weights	Weights have been prepared accordingly to make the sample representative of the traffic movement across the study area	Various