Congestion Management Status Report

A status update of congestion and congestion management strategies of the greater Des Moines metropolitan area.

Des Moines Area Metropolitan Planning Organization
May 2010

The Des Moines Area Metropolitan Planning Organization (MPO) has prepared this report with partial funding from the United States Department of Transportation's Federal Highway Administration and Federal Transit Administration, and in part through local matching funds provided by the Des Moines Area MPO member governments.

Table of Contents

Tables and Figures

1 Introduction

A primary function of the transportation system is to provide access to jobs and to other services and amenities. The Des Moines Area Metropolitan Planning Organization (MPO) evaluates the effectiveness of the transportation system through measures of accessibility, connectivity, and mobility. Appendix B: Performance Measures Library of the *Guidebook for Performance-Based Transportation Planning* defines accessibility as the "ability of people and goods to access services, used different modes, and reach different destinations."[1] The appendix states that "connectivity refers to the completeness of a given transportation system," and defines mobility as the "relative ease or difficulty with which the trip is made."

The MPO's long-range multimodal transportation plan, *Horizon Year 2035 Metropolitan Transportation Plan* (HY 2035 MTP), identifies a number of goals and objectives for the transportation system.[2] The first of these two goals, Goal 2, focuses on improving the accessibility, connectivity, and mobility of the transportation system. The second of these goals, Goal 3, focuses on maintaining quality performance of the regional transportation system through efficient congestion management and operations techniques.

The MPO surveys, collects, and summarizes travel data to offer a quantifiable measure of accessibility, connectivity, and mobility as part of the HY 2035 MTP and the *Congestion Management Process* (CMP). This, the *Congestion Management Status Report*, summarizes data from the MPO's annual Travel Time Survey (TTS), Freeway Speed Survey, Vehicle Occupancy Survey (VOS), Transportation Management Association (TMA) incentive programs, and the Des Moines Area Regional Transit Authority (DART) ridership data.

1.1 OVERVIEW

The *Congestion Management Status Report* is divided into six chapters highlighting travel data from MPO documents.

Chapter 1 Introduction

This chapter highlights the purpose and background of the *Congestion Management Status Report*, and provides a summary of the document's contents.

[1] http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_446.pdf
[2] Chapter 4 Goals, Objectives, and Measures of Effectiveness, *Horizon Year 2035 Metropolitan Transportation Plan*.

Chapter 2 Travel Speeds

This chapter highlights background, results, and findings of the MPO's annual TTS and Freeway Speed Survey. The TTS and Freeway Speed Survey evaluate travel times and speeds on the MPO's street and highway system.

Chapter 3 Vehicle Occupancy

This chapter highlights background, results, and findings of the MPO's annual VOS. The VOS evaluates the number of single and passenger occupied vehicles, as well as vehicle classification.

Chapter 4 Rest Your Car

This chapter highlights background, results, and findings of the TMA's Rest Your Car Program. This program tracks and records participant's non single-occupant modes of commuting to work.

Chapter 5 DART Ridership

This chapter highlights background, results, and findings of DART's Ridership data. This data tracks and records ridership of DART's regular and express bus routes.

Chapter 6 Summary

This chapter provides a summary of the *Congestion Management Status Report* and identifies future steps.

2 Travel Speeds

2.1 TRAVEL TIME SURVEY

The MPO's travel time survey (TTS) determines the amount of time (an indicator of congestion) it takes a vehicle to drive between two points along a corridor. The MPO's TTS is part of the MPO's CMP and serves as a method to monitor and evaluate the operational performance of the street and highway system. The MPO's *2009 Travel Time Report* documents the TTS methodology, results, and findings.[3]

2.1.1 BACKGROUND

The MPO conducted the 2009 TTS from September 29, 2009, to October 22, 2009. The MPO performs and records the TTS in the peak direction of travel, toward the Des Moines Central Business District (CBD) during the morning peak hours and away from the Des Moines CBD during the evening peak hours. The MPO defines the morning peak hours as 6:30 a.m. to 8:30 a.m. and defines the evening peak hours as 4:00 p.m. to 6:00 p.m. The MPO conducts the TTS on Tuesdays, Wednesdays, and Thursdays.

The MPO uses Global Positioning System (GPS) technology to record the TTS results. During the 2009 TTS, the MPO surveyed each route four times during both the morning and the evening peak hours on three consecutive days.

The MPO performs the TTS on Principal and Minor Arterial streets and highways defined in the MPO's Federal Functional Classification System (FFCS). The MPO attempts to survey each TTS route at least every 3-4 years. Table 2.1.1 summarizes the MPO's TTS routes, while Figure 2.1.1 illustrates the routes surveyed in 2009.

[3] Copies of the report are available by contacting the MPO office.

TABLE 2.1.1 Summary of Travel Time Survey Routes

Route #	Highway(s)	Street Name(s)	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1	U.S. 6	Hickman Road	x	x			x				x			x
2		22nd Street|86th Street	x	x	x				x		x*		x*	
3	Iowa 28	Merle Hay Road	x	x		x			x	x*		x*		
4	U.S. 6	Douglas Avenue	x	x					x				x	
6	Iowa 28	63rd Street	x	x		x		x				x		
7		Army Post Road|Fleur Drive	x	x		x					x			x
8	U.S. 6	Douglas Avenue|M.L.King, Jr. Parkway|19th Street	x	x		x				x			x	
9	U.S. 6|U.S. 69	Euclid Avenue|Northeast 14th Street	x	x		x				x			x	
11	U.S. 69	Ankeny Boulevard|Northeast14th Street	x	x		x				x		x		
13	U.S. 6	Hubbell Avenue|Euclid Avenue	x	x			x					x		x
14	Iowa 163	East University Avenue	x	x	x			x			x			
15	U.S. 69	Southeast 14th Street|Army Post Road	x	x		x				x			x	
17		University Avenue			x		x		x			x		x
18		Grand Avenue			x		x		x			x		x
19	Iowa 415	State Street|2nd Avenue								x			x	

Note: Route #s 5, 10, 12, and 16 have been removed from the MPO's annual TTS process.
*Mid-day surveys were performed.

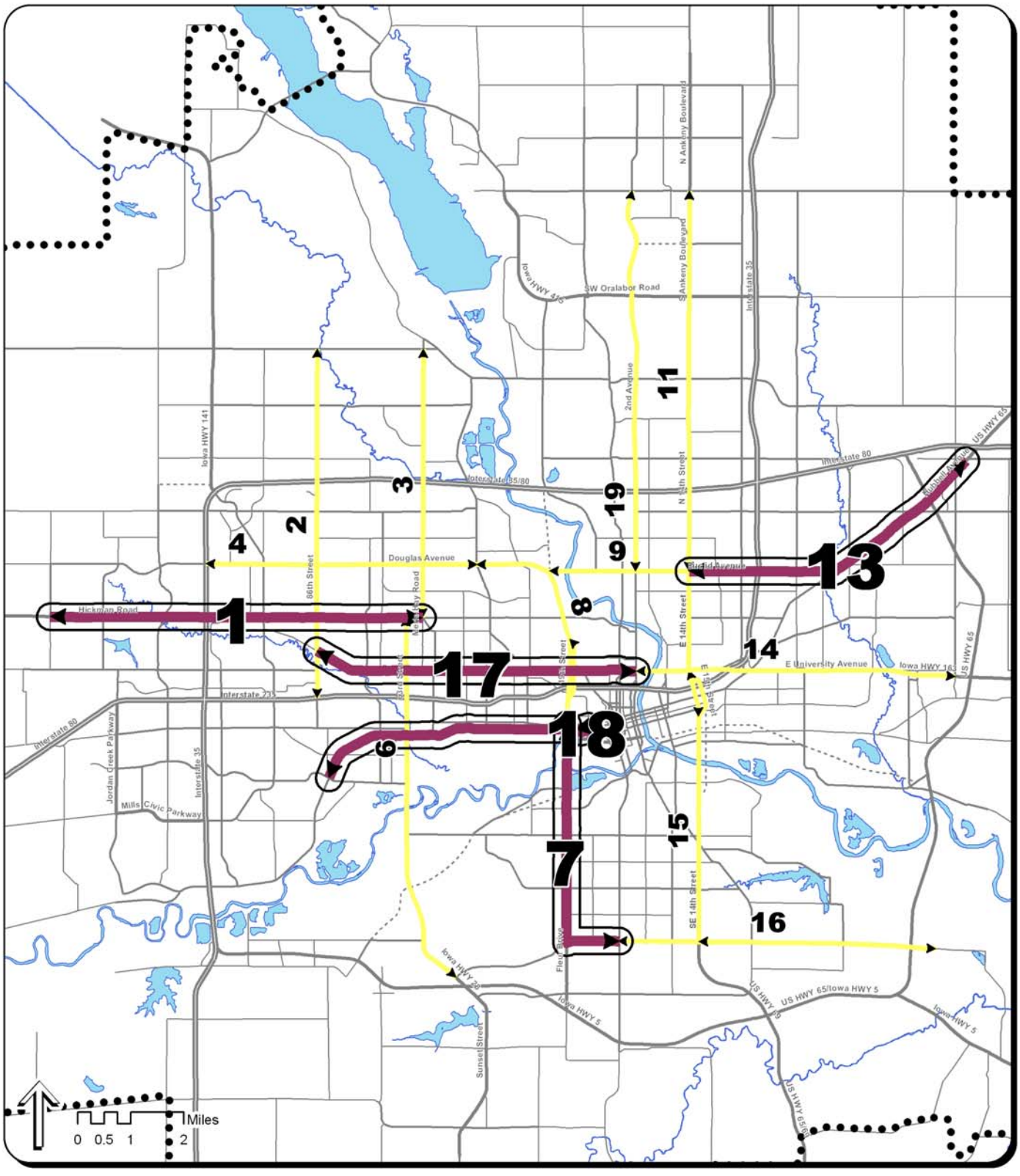

FIGURE 2.1.1

2009 Travel Time Survey Routes

Legend

- Historical TTS Route
- 2009 TTS Route

2.1.2 RESULTS

Table 2.1.2 summarizes displays the 2009 TTS results by peak hour and includes the observed average speed, average travel time, average number of stops, and average stopped time, while Figure 2.1.2 compares the observed speeds for the morning and evening peak hours. The TTS results find the evening peak hour observed the longest average travel time. Figure 2.1.3 displays the 2009 TTS results by observed speed.

TABLE 2.1.2 Travel Time Survey Results: 2009

Route #	Peak Hour	Direction	# of Runs	# of Days	Average Speed (mph)	Average Travel Time (minutes)	Minimum Travel Time (minutes)	Maximum Travel Time (minutes)	Average # of Stops	Average Stopped Time (minutes)
1	morning	east	12	3	31.6	13.3	10.9	15.8	4.1	1.5
1	evening	west	12	3	29.3	15.3	12.6	29.7	4.1	1.6
7	morning	north	12	3	26.7	11.4	9.6	14.7	6.7	1.8
7	evening	south	12	3	26.6	11.6	10.5	14.5	7.9	2.3
13	morning	west	12	3	31.7	11.4	9.7	12.5	2.3	0.5
13	evening	east	12	3	29.1	12.5	10.4	15.2	3.3	1.0
17	morning	east	12	3	25.4	12.0	10.5	13.6	6.6	1.9
17	evening	west	12	3	23.6	12.9	11.1	14.6	6.8	2.1
18	morning	east	12	4[1]	24.7	13.0	11.1	15.4	2.3	0.5
18	evening	west	12	3	23.3	13.6	11.8	17.3	3.8	0.9

[1] Survey included make up runs on separate week.

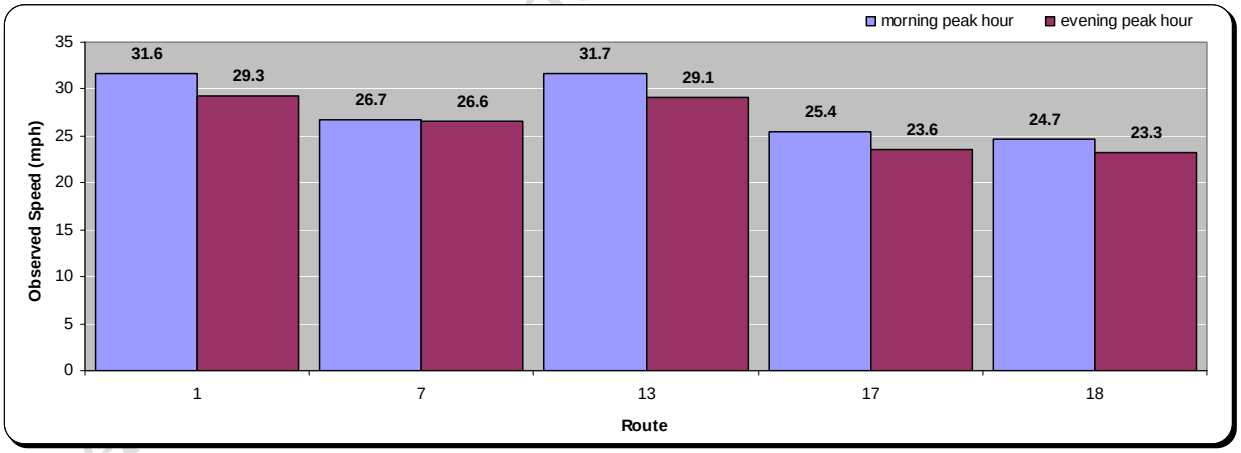

FIGURE 2.1.2 Travel Time Survey Results: 2009

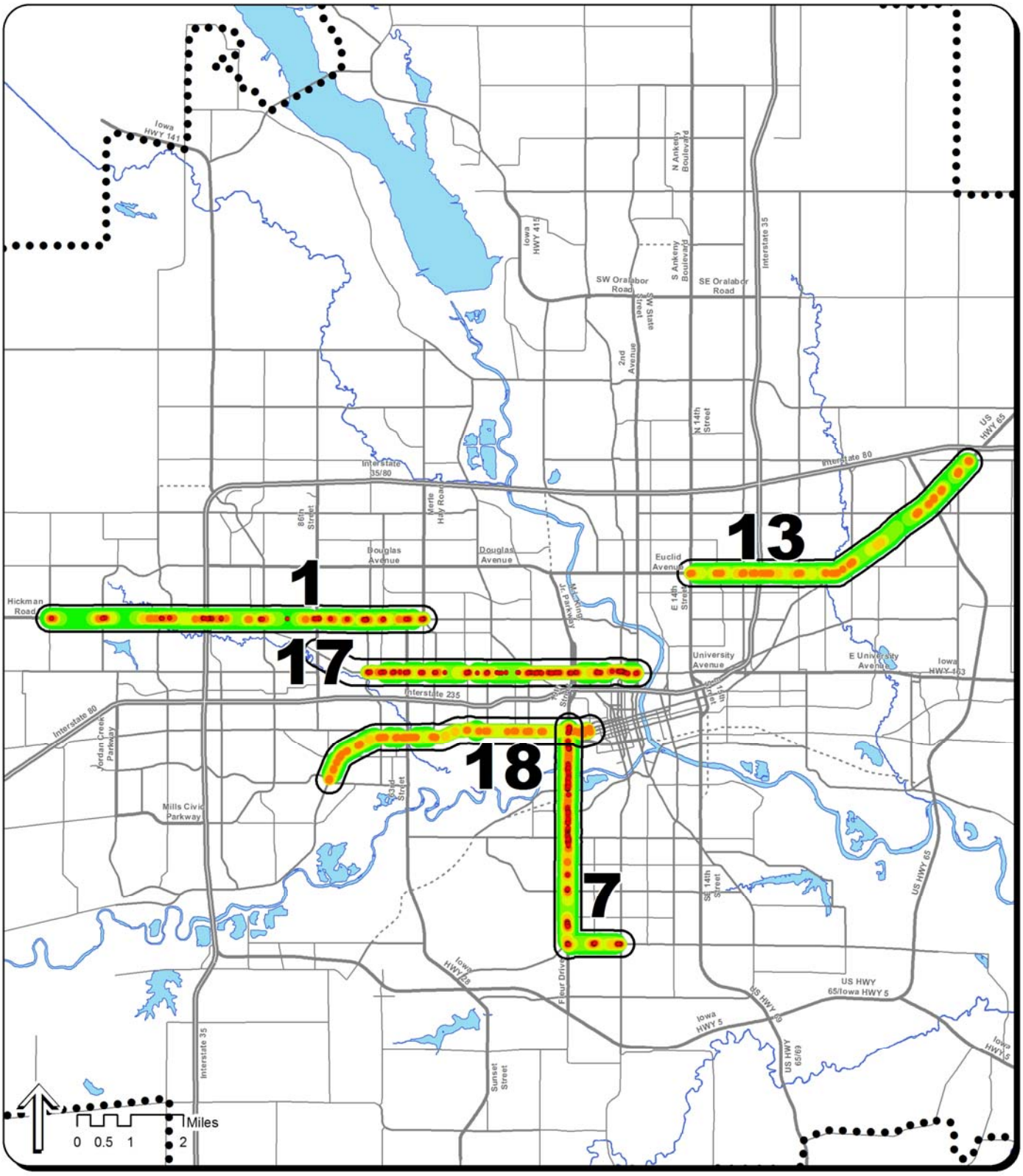

FIGURE 2.1.3

2009 Travel Time Survey Results

2.1.3 FINDINGS

An analysis of TTS data collected during this survey found that corridor travel times vary by time of day. The *2009 Travel Time Report* finds that the evening peak hour observed a lower average speed, longer travel time, higher number of stops, and a longer amount of stopped time when compared to the morning peak hour. TTS segments with posted speed limits of 30 miles per hour observed speeds closest to free flow speeds. Likewise, TTS segments with traffic volumes between 7,101 and 21,900 average daily traffic observed performance closest to free flow speeds. Additionally, minor arterial segments experienced better performance than principal arterial segments when comparing average observed segment speeds to free flow speeds.

2.2 FREEWAY SPEED SURVEY

The MPO's Freeway speed survey implements Intelligent Transportation Systems (ITS) technologies to document travel speeds along the freeway system. Like the TTS, the Freeway speed survey is part of the CMP and functions as a means of assessing the operational performance of the freeway system. The MPO's *2009 Freeway Speed Report* documents the Freeway speed survey's methodology, results, and findings.[4]

2.2.1 BACKGROUND

The MPO acquired 2009 freeway speed data from the Iowa Department of Transportation's (DOT) Traffic Management Center (TMC), which collected the data between Tuesday, October 6, 2009, and Thursday, October 8, 2009. The TMC obtained speed data for both directions of travel during the morning and evening peak hours.

In order to collect such data, the Iowa DOT elaborated an extensive ITS network within the MPO's Metropolitan Planning Area (MPA). The ITS network is comprised of cameras, sensors, dynamic messages signs (DMS), Highway Helper, and traveler information systems. The TMC receives data from network components located along Interstate Highway 35 (I-35), Interstate Highway 80 (I-80), Interstate 235 (I-235), Interstate Highways 35/80 (I-35|80), Iowa Highway 5 (IA 5), and United States Highway 65 (U.S. 65).

The TMC collects speed data in continuous 30-second intervals before averaging this data to derive a value for a 15-minute period. The MPO then aggregates the 15-minute interval data into peak hours. Figure 2.2.1 illustrates the MPO MPA's freeway system.

[4] Copies of the report are available by contacting the MPO office.

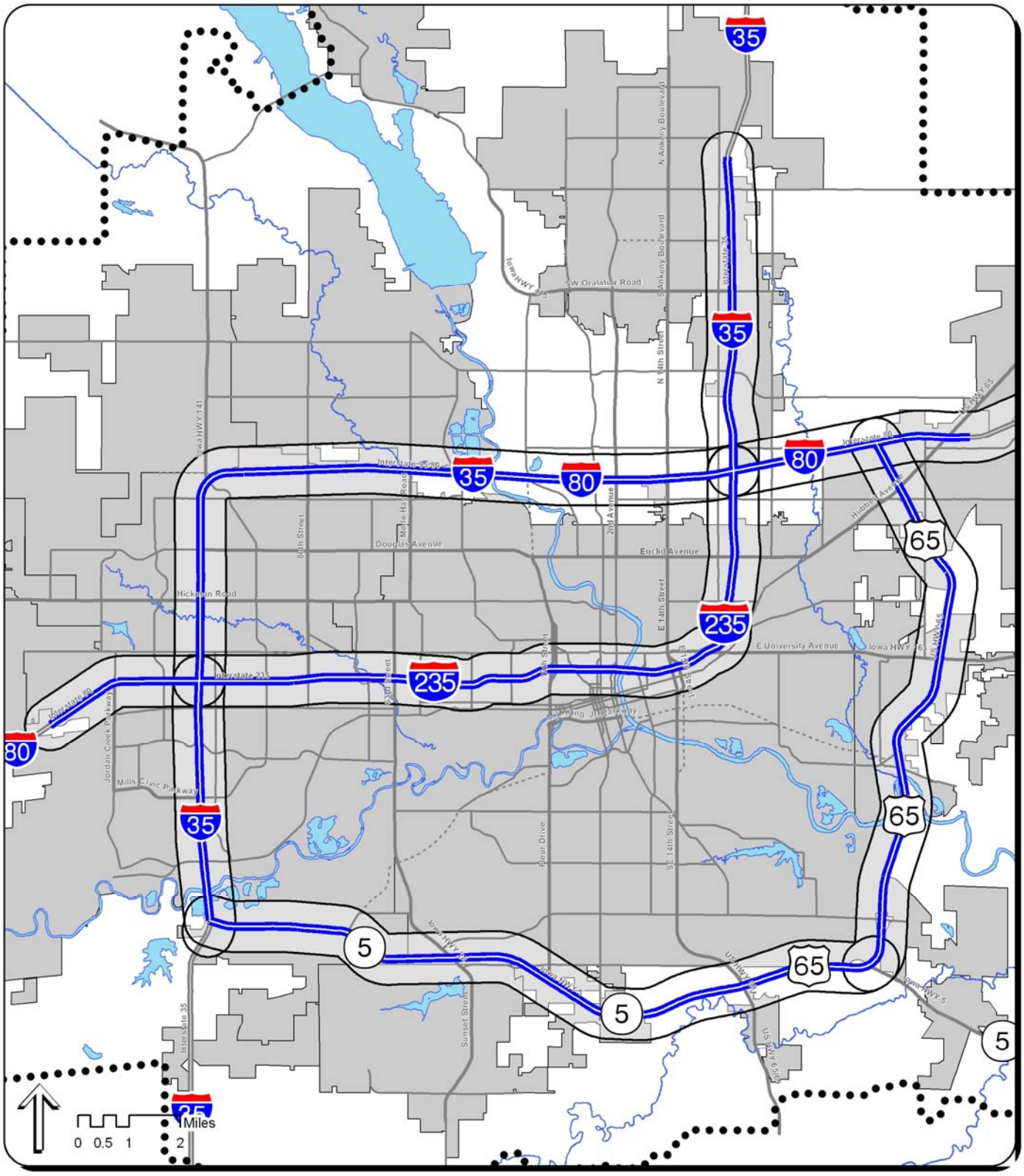

FIGURE 2.2.1

Freeway System Routes

Legend

Freeway Route

2.2.2 RESULTS

Table 2.2.1 summarizes and Figure 2.2.2 displays the 2009 Freeway speed survey results by peak hours and includes the recorded average speed. Table 2.2.1 also includes the average 15-minute traffic volume.

TABLE 2.2.1 Freeway Speed Survey Summary: 2009

Freeway	Peak Hours	Direction	Average Speed (mph)	Average 15-Minute Volume (veh)
I-235	morning	east/north	58.1	952.9
I-235	evening	east/north	63.5	1,152.7
I-235	morning	south/west	61.5	1,181.3
I-235	evening	south/west	61.1	1,258.2
I-35	morning	north	63.3	571.5
I-35	evening	north	65.0	659.0
I-35	morning	south	65.3	605.8
I-35	evening	south	67.7	718.3
I-35/80	morning	north/east	64.5	733.7
I-35/80	evening	north/east	65.5	1,077.7
I-35/80	morning	west/south	67.4	1,002.6
I-35/80	evening	west/south	69.8	1,063.8
I-80	morning	east	66.1	505.8
I-80	evening	east	65.3	523.9
I-80	morning	west	50.9	338.6
I-80	evening	west	58.0	470.9
IA 5	morning	east	55.6	170.3
IA 5	evening	east	66.8	389.7
IA 5	morning	west	69.4	378.5
IA 5	evening	west	68.0	240.2
U.S. 65	morning	east/north	56.0	227.7
U.S. 65	evening	east/north	59.2	222.4
U.S. 65	morning	south/west	56.7	182.5
U.S. 65	evening	south/west	61.3	259.8

Source: Iowa DOT's Traffic Management Center, Des Moines, Iowa.

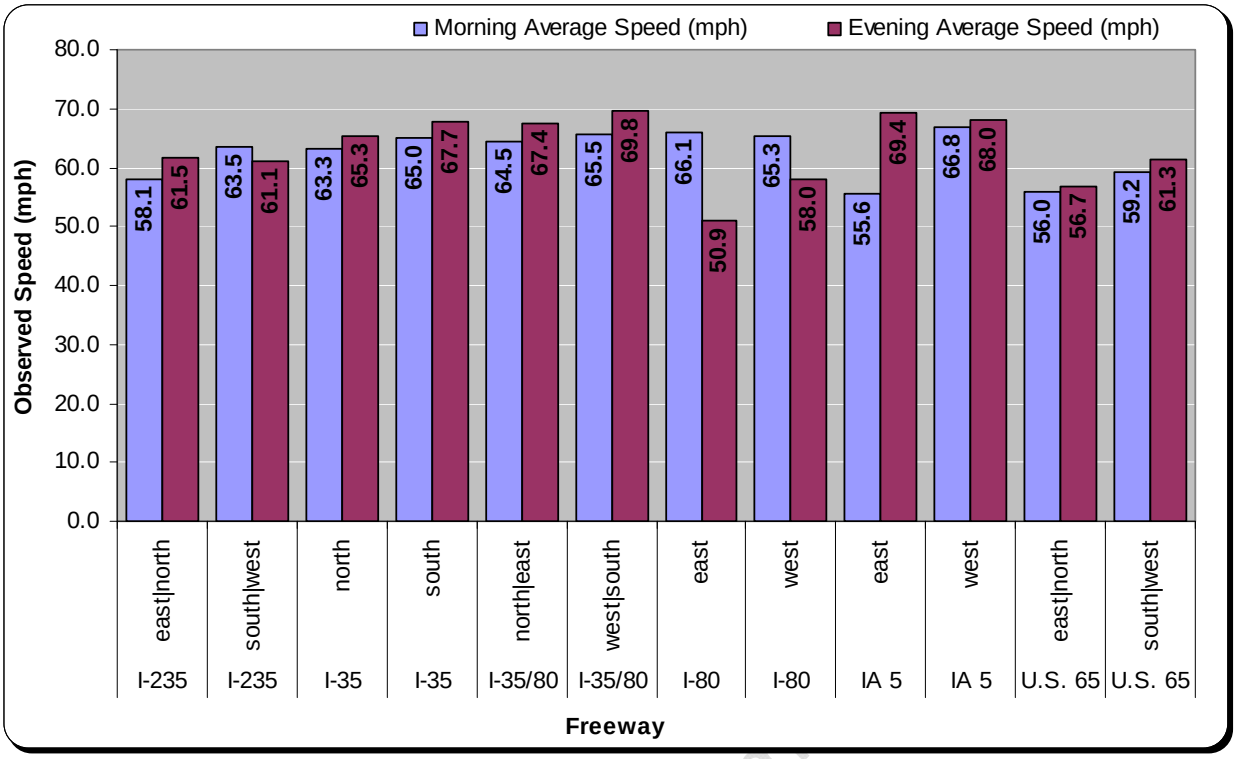

FIGURE 2.2.2 Freeway Speed Survey Results: 2009

2.2.3 FINDINGS

An analysis of the Freeway speed survey data finds that the evening peak hours experienced both a higher average speed and average traffic volume. Eight of the ten highest average traffic volumes occurred on I-235, reflecting the inflow and outflow to and from the CBD. Despite heavier traffic volumes, traffic on I-235 ran approximately 6 miles per hours above the posted speed limit. The average speeds on I-80 and U.S. 65 ran approximately 5 and 7 miles per hour below the average posted speed limit, respectively. The highest average speeds, in excess of 70 miles per hour, existed on IA 5. Conversely, four of the five lowest average speeds occurred on westbound I-80 during the morning peak hours, with speeds under 50 miles per hour.

3 Vehicle Occupancy

The MPO's vehicle occupancy survey (VOS) enumerates the average number of persons per vehicle and offers a distribution of the number of single occupant and passenger occupied vehicles. The VOS is another component of the MPO's CMP and provides an assessment of the MPO's transportation demand management strategy. The MPO's *2009 Vehicle Occupancy Report* documents the vehicle occupancy survey's methodology, results, and findings.[5]

3.1 BACKGROUND

The MPO performed the 2009 VOS from September 29, 2009, through October 22, 2009. The MPO documented VOS in the peak travel direction. The MPO established the peak direction of travel as toward the Des Moines CBD during the morning peak hours and away from the Des Moines CBD during the evening peak hours.

The MPO employed a roadside windshield survey to collect VOS data. This method requires an observer stationed at a specific point to record the number of vehicles and the number of vehicle occupants passing the observation point. Observers also noted vehicle classification (passenger car, truck, or bus) during collection periods.

The MPO conducted the 2009 VOS along principal and minor arterial streets and highways, as defined in the MPO's Federal Functional Classification System (FFCS). Table 3.1 outlines the historical VOS locations.

[5] Copies of the report are available by contacting the MPO office.

TABLE 3.1 Summary of Vehicle Occupancy Survey Locations

Location#	Highway(s)	Street Name(s)	2007	2008	2009
1		2nd Avenue	x	x	x
2	U.S. Highway 69	Northeast 14th Street	x	x	x
3	Iowa Highway 28	63rd Street	x	x	x
4		Grand Avenue	x	x	x
5		Hickman Road	x	x	x
6		Jordan Creek Parkway	x	x	x
7		Keosaqua Way	x	x	x
8	Iowa Highway 28	Merle Hay Road	x	x	x
9		Southwest 3rd Street	x	x	x
10		University Avenue	x	x	x
11		Martin Luther King, Jr. Parkway		x	
12		Ashworth Road		x	

Figure 3.1 highlights the 2009 VOS locations as well as the historical VOS locations.

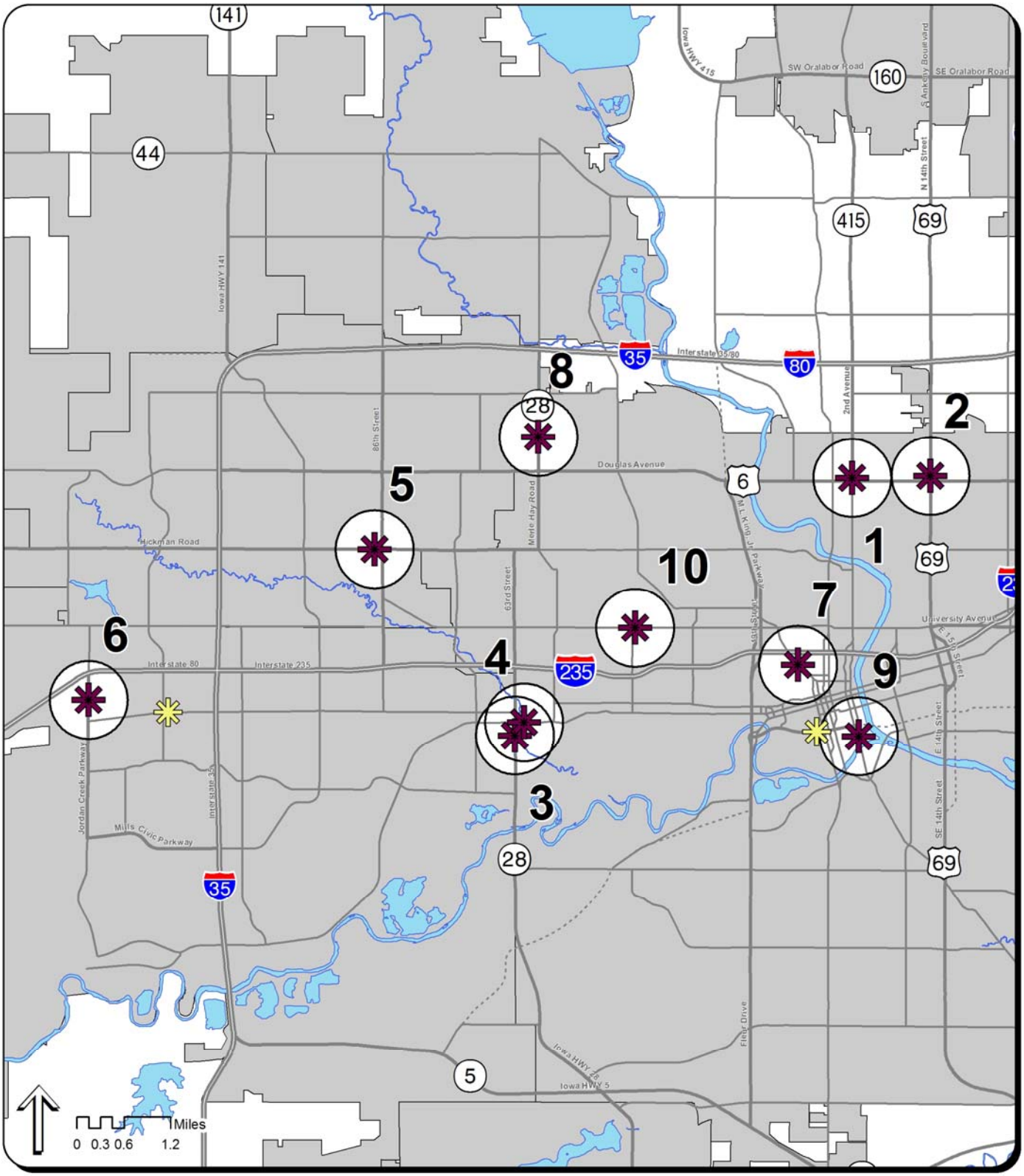

FIGURE 3.1

2009 Vehicle Occupancy Survey Locations

Legend

Historical VOS Location

2009 VOS Location

3.2 RESULTS

Over the course of the 2009 VOS, the MPO observed a total of 44,858 vehicles and 51,287 vehicle passengers, equating to an average vehicle occupancy (AVO) of 1.14. Table 3.2 encapsulates the AVO for the morning, evening, and combined peak hours.

TABLE 3.2 Vehicle Occupancy Results

Peak Hour	Total Passenger Cars Counted	Total Passengers Counted	AVO
morning peak hours	21,916	24,311	1.11
evening peak hours	22,942	26,976	1.18
combined peak hours	44,858	51,287	1.14

Figure 3.2 demonstrates that, during the peak hours, the predominance of vehicles carried only one occupant.

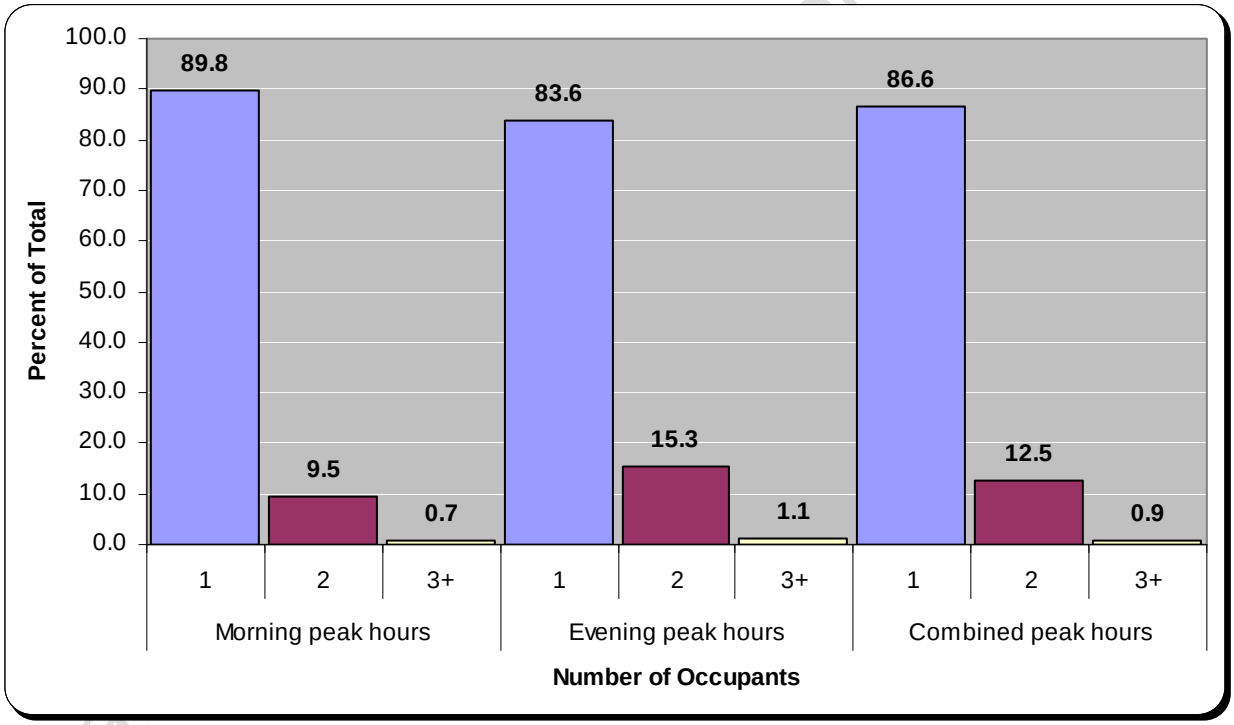

FIGURE 3.2 Distribution of Vehicle Occupancy: 2009

3.3 FINDINGS

An analysis of vehicle occupancy data shows vehicle occupancy rates vary by time of day, by roadway facility, and by geographic area. The 2009 VOS rates decreased from previous years. Based upon a comparison with 2001 National Household Travel Survey, it may be inferred that fewer people shared rides to work in 2009. Furthermore, vehicles traveling on minor arterials had lower occupancy rates than those vehicles traveling along principal arterials.

4 Rest Your Car

4.1 BACKGROUND

The Transportation Management Association's (TMA) Rest Your Car Program encourages Des Moines area commuters to utilize other modes of transportation besides driving alone for work commutes, including carpooling, vanpooling, mass transit, walking, biking, and telecommuting. Rest Your Car participants log such commutes online, and those who use an alternative commute type at least four times per month are eligible for rewards and incentives.

4.2 RESULTS

In 2009, Rest Your Car participants reported over 6.3 million miles of non-single occupancy vehicle commutes. There were approximately 150,000 trips of these commutes, resulting in an average of 42.3 miles per report. Nearly 1,300 participants logged their commutes each month. It is important to note, however, that not all commuters participate in the Rest Your Car program.

Figure 4.1 evaluates the proportion of miles reported by commute type. Vanpools accounted for approximately 2.7 million reported miles, followed by carpools and mass transit at 2.2 million and 1.2 million reported miles, respectively. Telecommuting, a new option added in 2009, accounted for only 2 percent of the total reported miles but averaged nearly 60 miles per report.

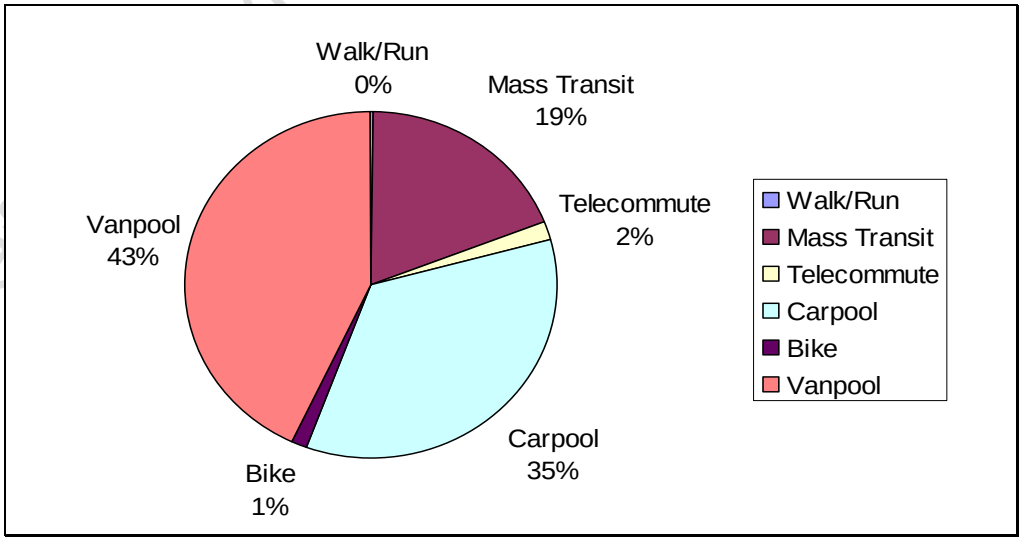

FIGURE 4.1 Proportion of Total Miles Reported by Commute Type
Source: TMA.

4.3 FINDINGS

In 2009, the miles per report figures remained nearly the same as those reported in 2008, while the number of miles reported slid 13 percent. At the same time, the number of active participants dropped by 11 percent. One can conclude, then, that the decrease in miles reported likely reflects decreased participation, not necessarily a decrease in the distance traveled per commute nor a decrease in the number of reports made by active participants.

The decrease in reporting for the Rest Your Car program may be due to several factors. First, the incentive to participate in the program may not be enough to encourage some participants to self-report their commutes. Second, some participants may have relocated, making some types of alternative commutes less feasible or not possible. Third, fuel prices may have played a factor in decreased Rest Your Car participation. One may assume that, for some commuters, there is a point at which the price of fuel causes a shift from one mode, such as driving alone, to another mode, such as public transportation.

Figure 4.2 compares the number of active Rest Your Car participants to average monthly fuel prices. One may note that, when fuel prices trended downward, the number of Rest Your Car participants also trended downward. However, while this correlation is statistically significant, it is only a moderate correlation.

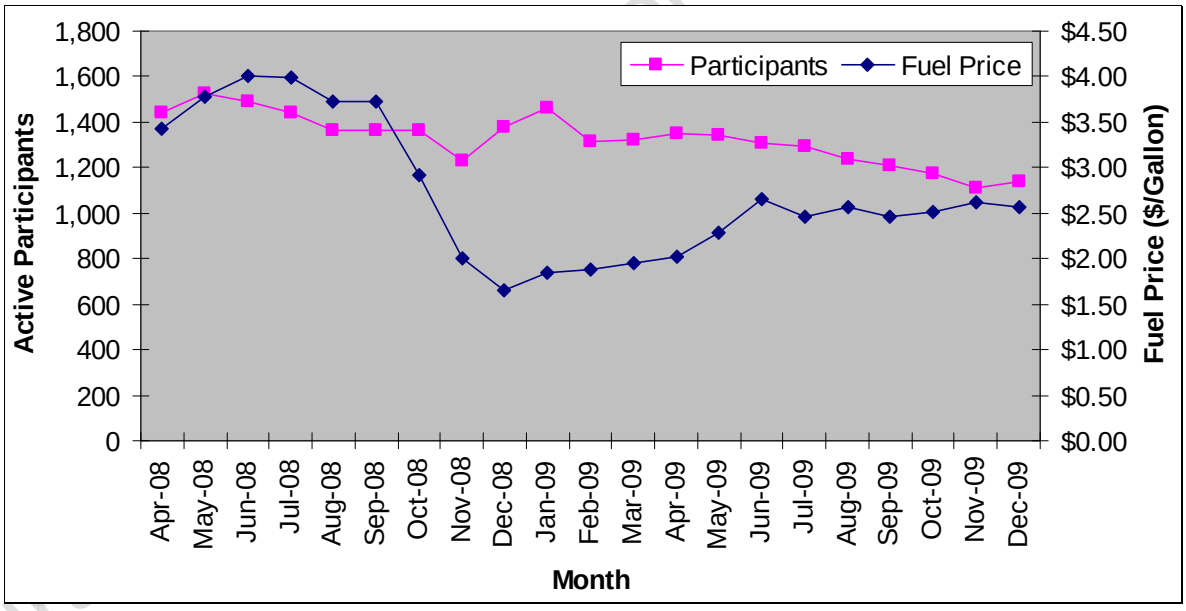

FIGURE 4.2 Rest Your Car Active Participants vs. Fuel Price

Source: TMA; U.S. Energy Information Administration, Weekly Midwest All Grades Conventional Retail Gasoline Prices.

Note: Rest Your Car figures for January, February, and March 2008 are not available.

Finally, unemployment rates could have been a factor in reduced Rest Your Car participation. Between 2008 and 2009, the average unemployment rate increased by 42 percent, which likely resulted in fewer people needing transportation for work trips. In turn, fewer trips were made by alternative commuting types.

Because the Rest Your Car program does not measure single occupancy vehicle use nor the specific roadways utilized for commuting, this data in and of itself does not allow one to measure changes in single occupancy vehicle usage; it must be used in conjunction with the other performance measures contained in this report. Additionally, Rest Your Car program data is self-reported. As such, it should be considered a sample of commuting practices within the Des Moines metropolitan area.

5 DART Ridership

5.1 BACKGROUND

As noted in the previous section, mass transit and vanpools were among the top alternative commute types reported by Rest Your Car participants. The Des Moines Area Regional Transit Authority (DART) is the public transportation provider for Polk County and offers several commuting options in the Des Moines metropolitan area. These commuting options include local route service, express route service, and RideShare (vanpool) service. DART also offers paratransit service, on-call services (operated by paratransit), bike and ride, and shuttle routes.

5.2 RESULTS

During calendar year 2009, DART provided nearly 3.4 million rides. Route #3, which travels along the University Avenue corridor from Valley West Mall to Park Fair Mall, was utilized most heavily during 2009, providing approximately 830,000 rides. Overall, local route ridership decreased 5.8 percent from 2008 to 2009, while express route ridership decreased 23.8 percent.

However, several routes experienced significant ridership gains from 2008 to 2009; Route #93, for example, provides service along Northwest 86th Street. This route's ridership increased nearly 200 percent from 2008 to 2009. Figure 5.1 illustrates the changes in local route ridership by route between 2008 and 2009, while Figure 5.2 depicts the changes in express route ridership.

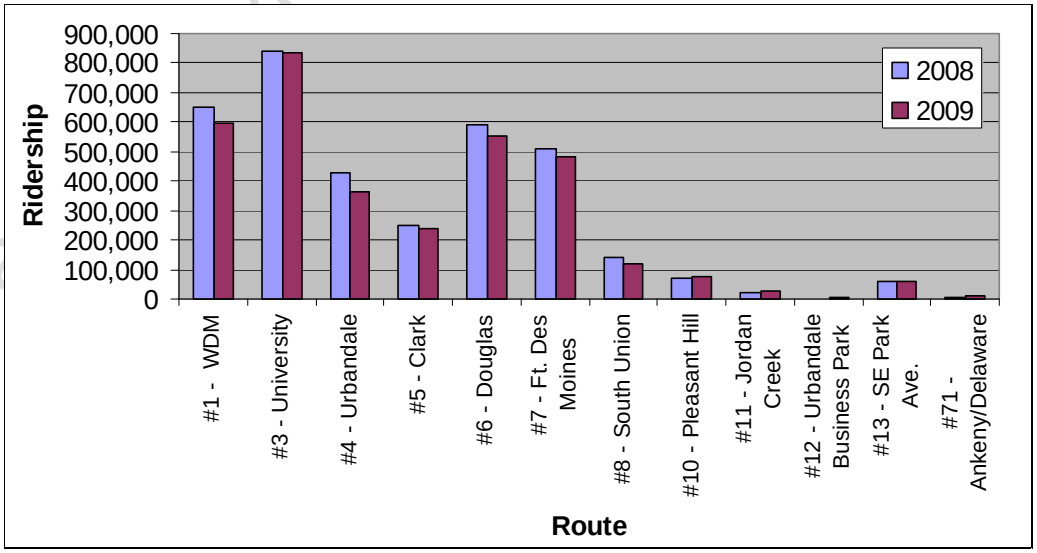

FIGURE 5.1 Local Route Annual Ridership by Route, 2008 vs. 2009
Source: DART.

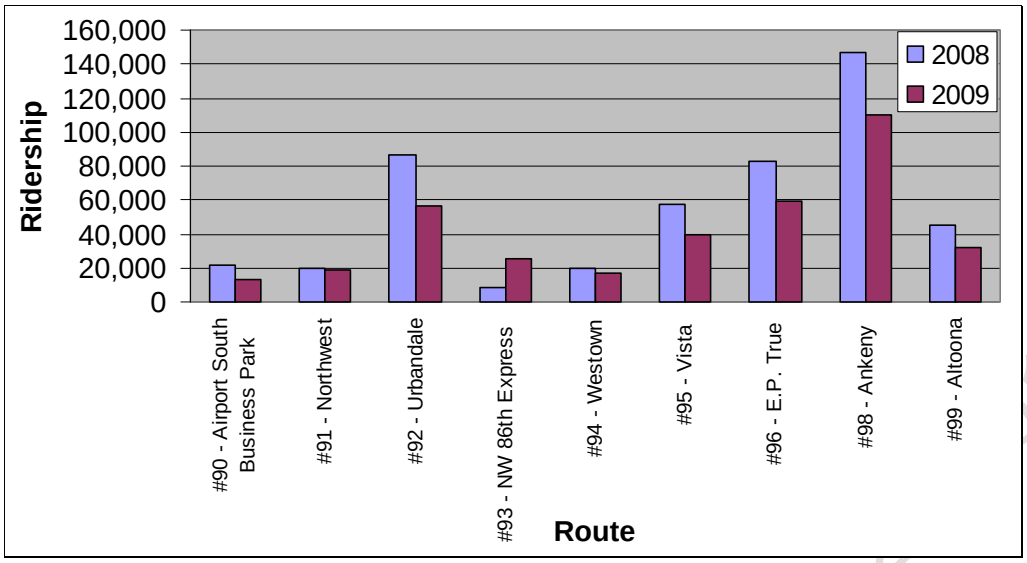

FIGURE 5.2 Express Route Annual Ridership by Route, 2008 vs. 2009
Source: DART.

5.3 FINDINGS

Like the Rest Your Car data, DART ridership data provides an indication of how well the Des Moines area is meeting its commitment to reduce single occupancy vehicle use on area roadways. Data from 2009 indicates that local route ridership, express route ridership, and RideShare usage all decreased from the previous year.

Statistical analysis confirms that neither fuel price nor the unemployment rate is correlated with the change in local route ridership from 2008 to 2009. This is likely because many local route riders either do not have other transportation options or choose not to drive an automobile. A 2005 transit rider survey found that only 38 percent of such riders had a vehicle available; therefore, many local route riders rely upon DART.

Unlike local route ridership, express route ridership had a significant statistical correlation with fuel prices and unemployment rates, as reflected in Figures 5.3 and 5.4. The previously mentioned 2005 transit rider survey found that 85 percent of express route riders had a vehicle available and tend to have higher incomes than local route riders. Thus, the majority of express route riders can more easily change from riding public transportation to driving personal automobiles.

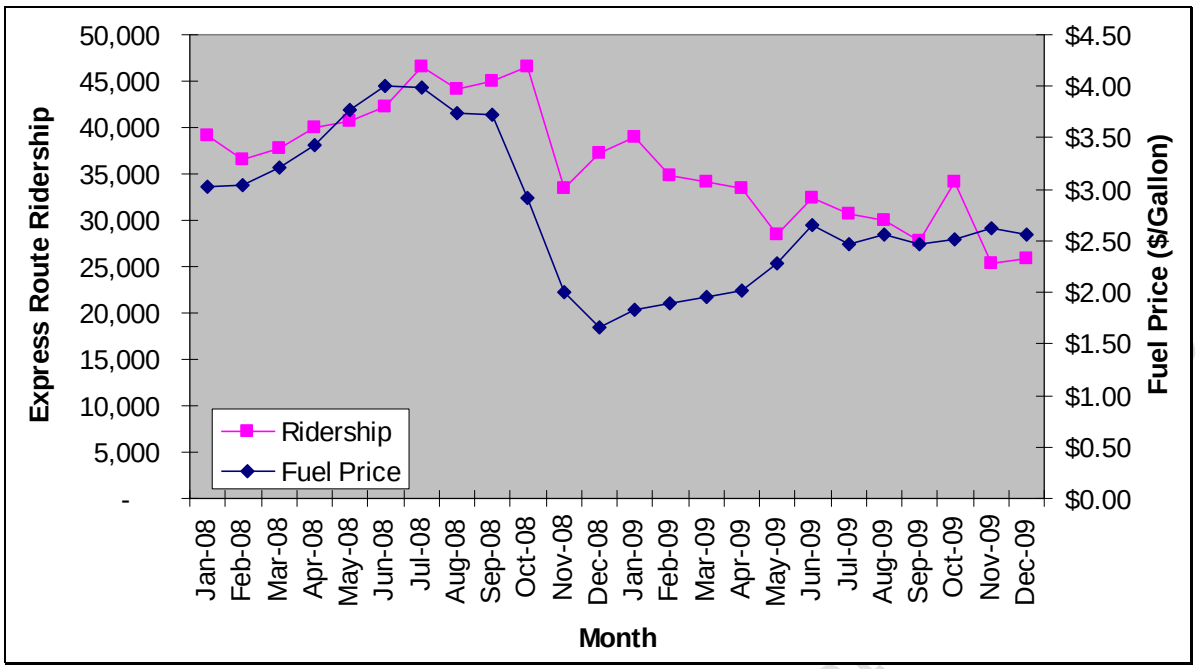

FIGURE 5.3 Express Route Ridership vs. Fuel Price

Source: DART; U.S. Energy Information Administration, Weekly Midwest All Grades Conventional Retail Gasoline Prices.

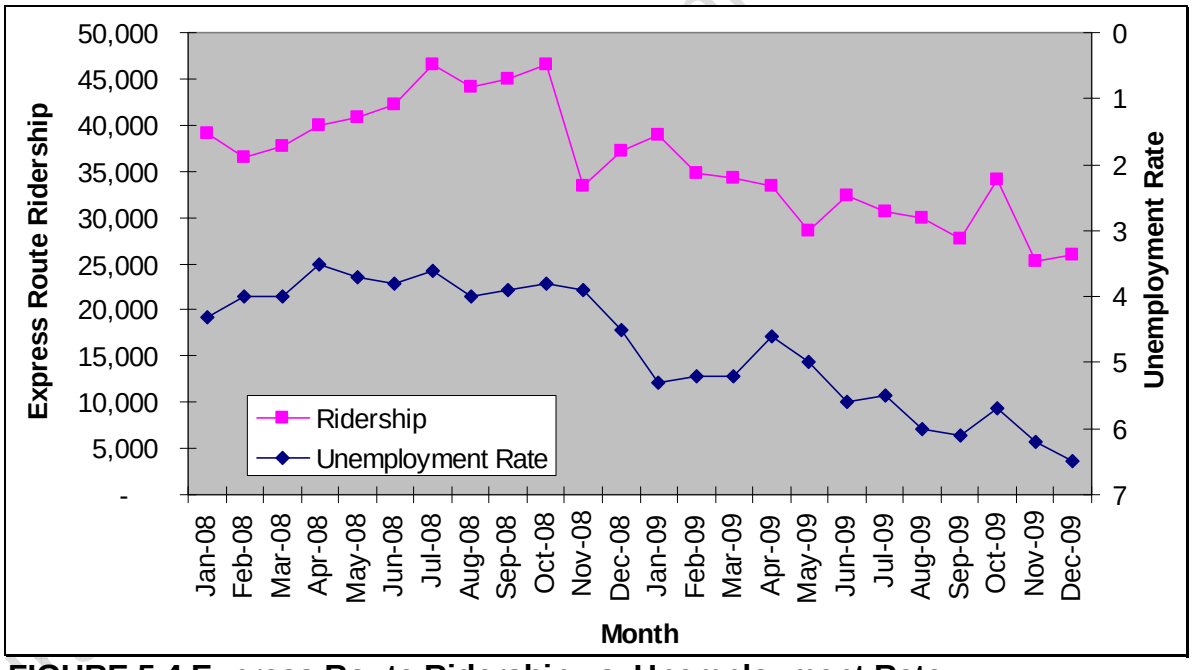

FIGURE 5.4 Express Route Ridership vs. Unemployment Rate

Source: DART; U.S. Bureau of Labor Statistics, Local Area Unemployment Statistics, Des Moines-West Des Moines Metropolitan Statistical Area.

Changes in fuel prices did not statistically account for the slight decrease in RideShare trips between 2008 and 2009. With vanpool commuters traveling an average of 42 miles one-way, driving alone may be too expensive, regardless of the fuel price, for some RideShare users. Additionally, the unemployment rate did not have any statistical correlation with RideShare trips. Although some RideShare users may have lost their jobs and discontinued their use of the service, new customers may have taken their place.

6 Summary

As previously noted, the MPO evaluates the effectiveness of the transportation system through measures of accessibility, connectivity, and mobility. During evaluation of the MPO's HY 2035 MTP goals and objectives for the transportation system and evaluation of the CMP, the MPO will continue to survey, collect, and summarize travel data to offer quantifiable measures of accessibility, connectivity, and mobility. The MPO's annual TTS, Freeway Speed Survey, VOS, TMA incentive programs, and DART ridership data are valuable aspects in evaluating where surface transportation improvements need to be made to enhance the street and highway system.