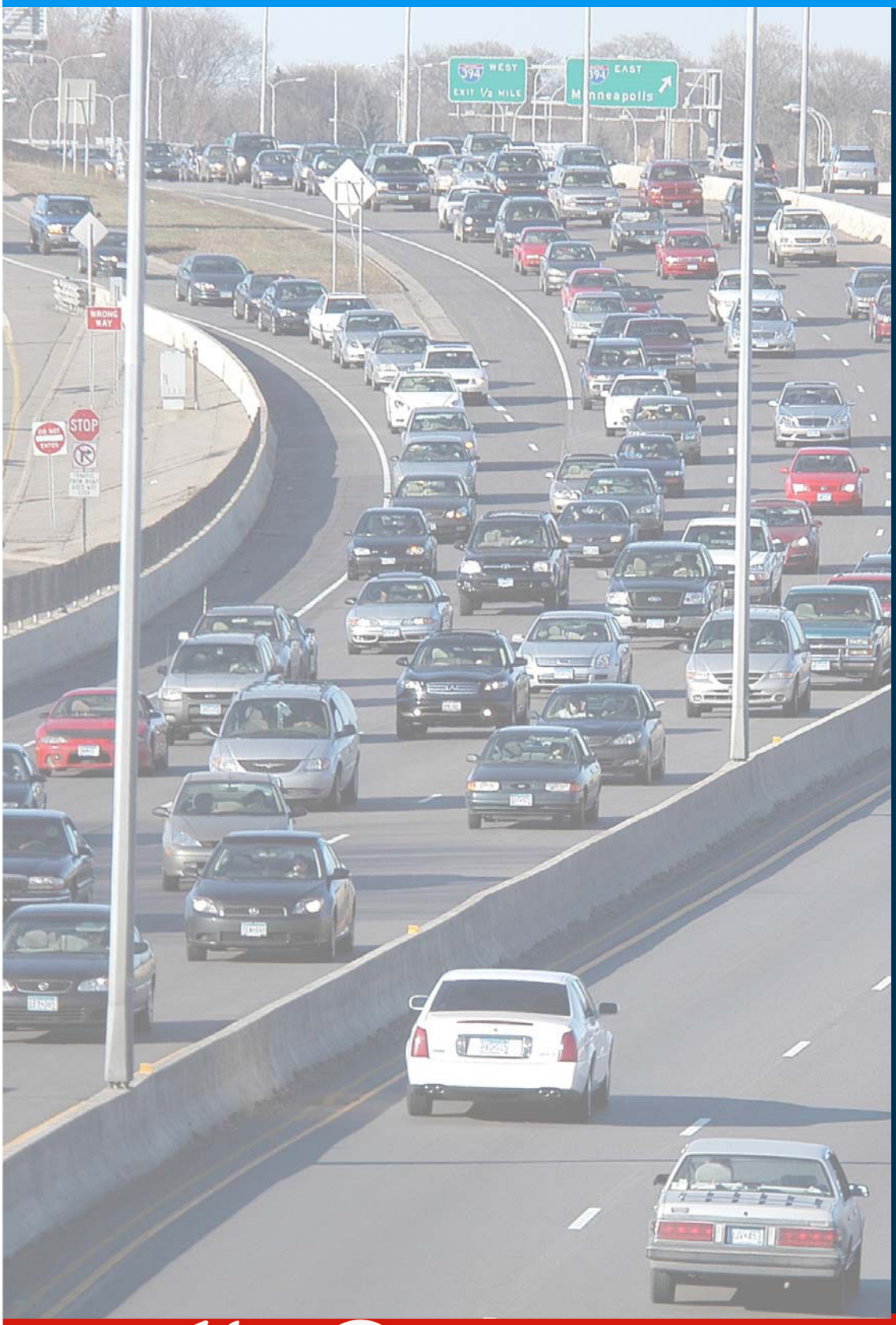

Metropolitan Freeway System 2009 Congestion Report

Metro District Office of Operations and Maintenance

Regional Transportation Management Center

February 2010

Your Destination...Our Priority

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Metropolitan Freeway System 2009 Congestion Report

Purpose and Need

The Metropolitan Freeway System Congestion Report is prepared annually by the Regional Transportation Management Center (RTMC) to monitor congestion growth on the metro area freeway system. This report is prepared for these purposes:

- Identification of locations that experience recurring congestion.
- Support Mn/DOT planning process for making long-term system improvements to the metro freeway system.
- Resource allocation of operational improvements (e.g., RTMC equipment, incident management planning)
- Department performance measures for evaluating the overall trend and extent of congestion on the freeway system in the metro.

Introduction

What is Congestion?

Mn/DOT defines congestion as traffic flowing at speeds less than or equal to 45 Miles per Hour (MPH). This definition does not include delays that may occur at speeds greater than 45 MPH. The 45 MPH speed limit was selected since it is the speed where "shock waves" can propagate. These conditions also pose higher risks of crashes. Although shock waves can occur above 45 MPH there is a distinct difference in traffic flow above and below the 45 MPH limit.

What is a shock wave?

A shock wave is a phenomenon where the majority of vehicles brake in a traffic stream. Situations that can create shock waves include:

- Changes in the characteristics of the roadway, such as a lane ending, a change in grade or curvature, narrowing of shoulders, or an entrance ramp where large traffic volumes enter the freeway.
- Large volumes of traffic at major intersections with high weaving volumes and entrance ramps causing the demand on the freeway to reach or exceed design capacity.
- Traffic incidents, such as crashes, stalled vehicles, animals or debris on the roadway, adverse weather conditions and special events.

Drivers' habits can also contribute to shock waves. Drivers' inattentiveness can result in minor speed variations in dense traffic or sudden breaking in more general conditions. In these situations, shock waves move upstream toward oncoming traffic at rates varying according to the density and speed of traffic. As the rate of movement of the shock wave increases, the potential for rear end or sideswipe collisions increases. Multiple shock waves can spread

from one instance of a slowdown in traffic flow and blend together with other extended periods of "stop-and-go" traffic upstream. This condition is referred to as a "breakdown" in traffic.

Usually it lasts the remainder of the peak period if traffic volumes are close to or above design capacity. These types of breakdowns are typical in bottleneck locations on the freeway system.

Methodology

Mn/DOT began collecting and processing congestion data in 1993. Since this time, Mn/DOT has improved its data processing and changes in methodology have occurred. These changes as well as variables affecting localized and region-wide traffic volumes, such as ramp metering algorithms, make it difficult to compare congestion from one year to the next. The following are key dates on the progression of developing congestion information in the metro area:

- 1989: Mn/DOT formed a committee to evaluate congestion on Twin Cities metro freeways
- 1993 – 2003: Rapid expansion of the freeway management systems
- Late 1990's: Change in approach from "reducing" congestion to "slowing projected increases" in congestion
- 2001 – 2003: Evaluation and adjustments of ramp metering
- 2002: Completion of detection calibration

How is Congestion Measured?

For this report, Mn/DOT derived its congestion data using two processes:

- Surveillance detectors in roadways
- Field observations

Electronic surveillance systems exist on about 90% of the metro area freeway system. For this report, the Regional Transportation Management Center collected October 2009 data from 2,950 detectors embedded in the mainline roadway (there are 5,200 surveillance detectors, which includes ramps) on Twin Cities freeways.

Generally, the month of October is used for congestion reports since it reflects regular patterns of traffic. With summer vacation season over and school back in session, commuter traffic flows return to normal levels. During the month of October, most summer road construction projects are completed and weather conditions are still generally favorable.

The RTMC evaluates the 758 directional miles of the Twin Cities urban freeway system to develop the AM Plus PM % of Directional Metro Freeway Miles Congested. It tracks the percentage of miles

that operate at speeds below 45 MPH for any length of time during the AM and PM peak periods (758 miles AM and 758 miles PM). Mainline detectors are located in each lane of a freeway at approximately one-half mile intervals. Individual lane detectors located at a given location along the same direction of the freeway constitute a station. For the purpose of this report, if any station's detectors experience congestion at any given time, the station is identified as congested.

Speed data is based on the median value of data collected at detector locations. Median values are calculated for each five-minute interval for the periods of 5:00 AM to 10:00 AM and 2:00 PM to 7:00 PM for the fourteen midweek days in October. Mn/DOT uses medians, rather than averages, to minimize the effects of extremes in the data. This process mitigates those occasions of roadwork lane closures, significant traffic incidents, and one-time traffic events not related to daily commuting patterns.

Historical Data

Large construction projects dramatically change traffic patterns. These patterns can be highly variable due to ongoing changes to the roadway and these projects often remove surveillance detectors from operation. Therefore this report uses data from before a project began in some instances. These areas are described in a map in Appendix B (along with the areas without detection) and this year includes only the "Crosstown" project at the interchange of Interstate 35W and Highway 62.

2009 Results

In 2009, the Twin Cities freeways saw an increase in congestion, from 17.3% in 2008 to 18.2%. Congestion increased for only the second time in the past six years. The other year which saw an increase in congestion was 2007, when the I-35W Bridge collapsed. It is expected that, in the next few years, congestion will plateau or be limited to small increases as current and planned projects are completed. However, future plans include fewer capacity-adding projects. Mn/DOT expects this will lead to a long-term trend of growing congestion. Given finite resources and the growth in the region's population, Mn/DOT's goal is to slow the growth of congestion.

In the past year, completed construction projects have helped with the recent overall trend of declining congestion. These projects include:

- Completion of the Urban Partnership Agreement project on I-35W which includes areas of increased capacity, a High Occupancy Toll lane, and expanded transit service.

- New bridge carrying Interstate 35W over the Mississippi River in Minneapolis
- Addition of lanes and separation of movements at the interchange of Interstate 35E and Interstate 694 in Vadnais Heights and Little Canada

Future Congestion Growth

Mn/DOT is working closely with the Metropolitan Council and other partners on a wide range of solutions to manage congestion – including cost-effective construction projects to improve traffic flow, freeway management technologies to speed traffic flow, Northstar commuter rail, Central Corridor light rail, bus shoulder bypass lanes, bus rapid transit projects, telecommuting and expanded bike routes.

Strategies to improve congestion on Twin Cities freeways range from expensive major construction projects, such as adding lanes, to less costly operational solutions, such as rapid clearing of incidents, electronic message signs and ramp meters.

Projects that will provide congestion relief in the coming years include:

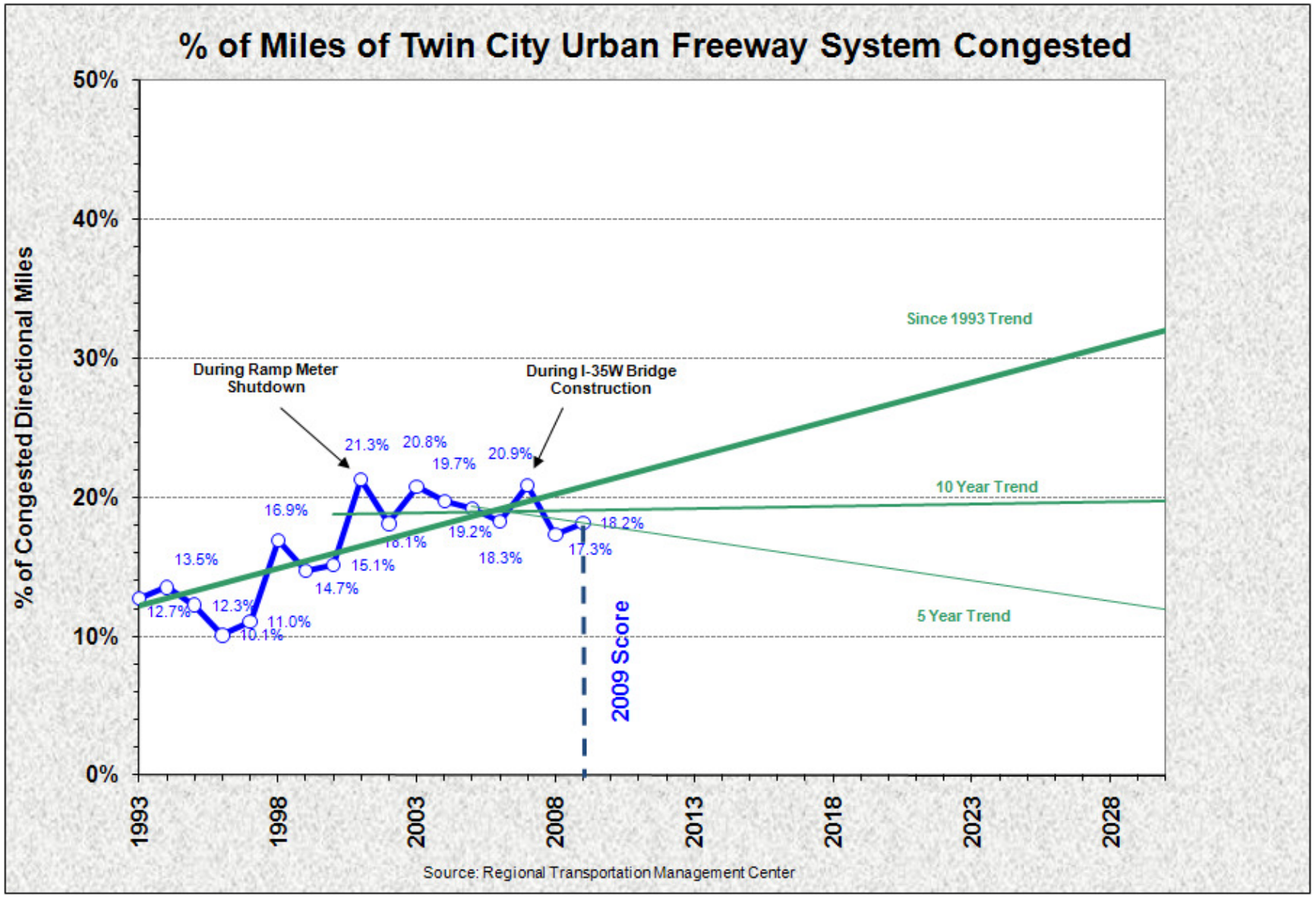
- Traditional costly major projects to relieve bottlenecks and add capacity, such as the Crosstown Highway 62 project and the Highway 610 extension in Brooklyn Park.

- Potential low-cost projects with a high benefit, such as recent improvements on TH 10 in Coon Rapids at Hanson Blvd and I-35W across the Minnesota River.

Many factors affect congestion levels such as the local economy, population growth, gas prices, transit ridership and vehicle miles traveled (VMT). 2008 saw a decrease in VMT largely due to economic conditions which helped decrease the amount of congestion occurring on metro freeways.

Explanation of % Miles of Twin City Urban Freeway System Congested Graph

Mitigating congestion is critical to the traveling public. Mn/DOT has limited resources to slow projected increases in congestion. The graph that follows represents historical levels of congestion along with projected trend lines based on the past 5 years, 10 years and 15 years of data. In the short term the congestion trend might continue to be flat or downward due to the completion of projects. However, the long run trend of increased VMT and increasing construction costs are expected to cause congestion to grow in the future.


% of Miles of Twin City Urban Freeway System Congested
% of Congested Directional Miles
50%
40%
30%
20%
10%
0%
1993
1998
2003
2008
2013
2018
2023
2028
Since 1993 Trend
10 Year Trend
5 Year Trend
During Ramp Meter Shutdown
During I-35W Bridge Construction
2009 Score
12.7%
13.5%
12.3%
10.1%
11.0%
16.9%
14.7%
15.1%
21.3%
16.1%
20.8%
19.7%
19.2%
18.3%
20.9%
17.3%
18.2%
Source: Regional Transportation Management Center

AM Plus PM Miles of Directional Congestion

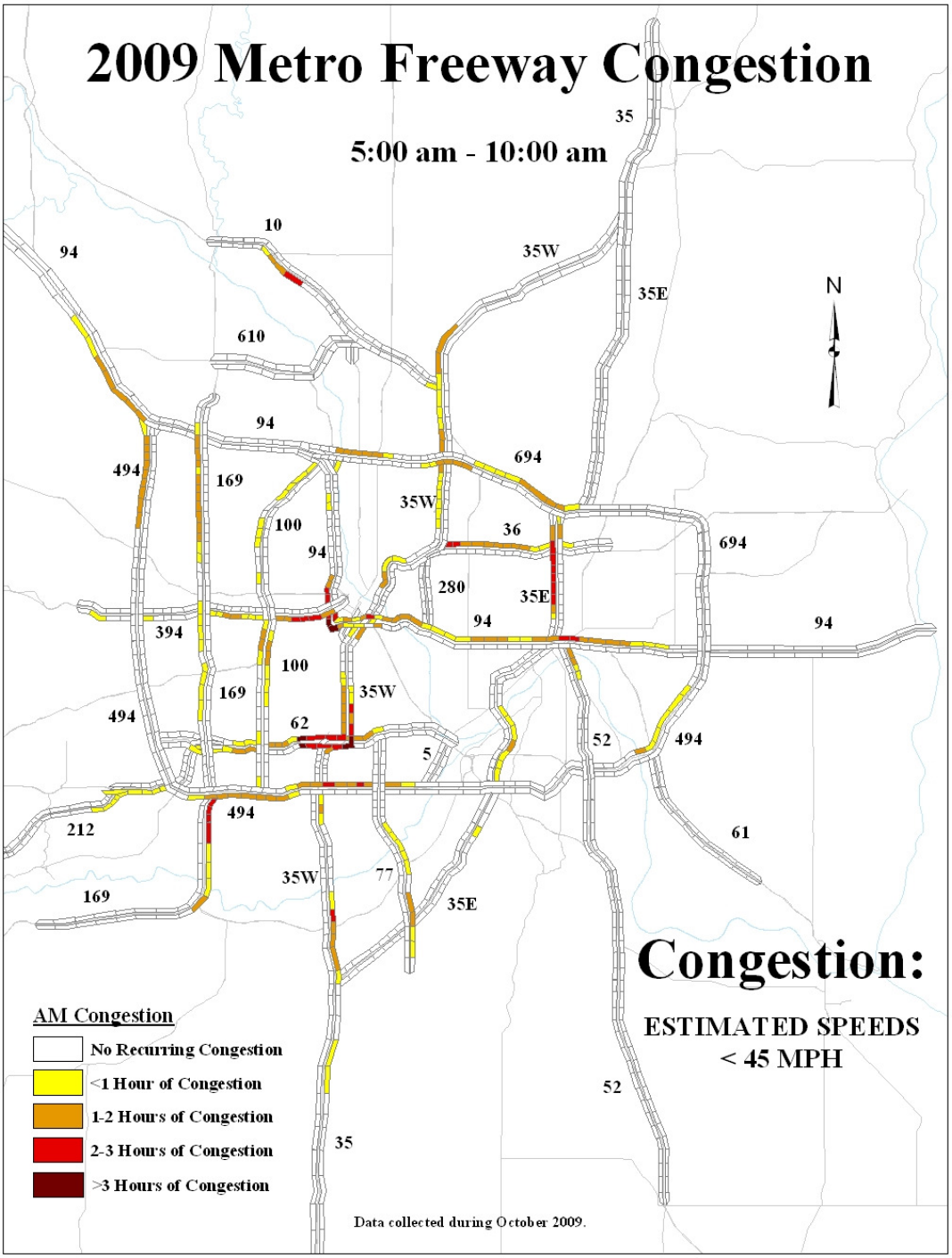
	Early 2000	Late 2000	2002	2003	2004	2005	2006	2007	2008	2009
Severe	41	125	70	83	72	83	64	82	51	55
Moderate	68	93	84	105	105	94	97	112	104	107
Low	105	82	101	106	104	101	107	111	108	114
Total	213	300	255	293	280	277	267	305	263	276

AM Plus PM Percent of Miles of Directional Congestion

	Early 2000	Late 2000	2002	2003	2004*	2005*	2006*	2007	2008*	2009
Severe	3.2%	9.8%	5.5%	6.4%	5.5%	6.4%	4.9%	6.3%	3.9%	4.2%
Moderate	5.3%	7.3%	6.6%	8.2%	8.1%	7.3%	7.5%	8.6%	8.0%	8.3%
Low	8.2%	6.4%	7.9%	8.2%	8.0%	7.8%	8.2%	8.6%	8.3%	8.8%
Total	15.1%	21.3%	18.1%	20.8%	19.7%	19.2%	18.3%	20.9%	17.3%	18.2%

For years prior to 2004, Percent of miles of directional congestion = am + pm miles (table above) / 1280 miles. 1408 miles = 352 centerline miles X 2 (directional miles) X 2 (am and pm)

*** In 2004, 2005, 2006 and 2008 new freeways were completed which brought the total to 379 centerline miles, see Appendix A for details.**


2009 Metro Freeway Congestion
5:00 am - 10:00 am
N
Congestion:
ESTIMATED SPEEDS
< 45 MPH
AM Congestion
No Recurring Congestion
<1 Hour of Congestion
1-2 Hours of Congestion
2-3 Hours of Congestion
>3 Hours of Congestion
Data collected during October 2009.
35
10
94
35W
35E
610
694
494
169
100
36
280
394
62
5
212
77
61
52
Congestion:

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Directional Metro Freeway Miles Congested 5:00 AM - 10:00 AM

Congested Interstate Miles (AM) 1

Highway	1999	Early 2000	Late 2000	2002	2003	2004	2005	2006	2007	2008	2009
I-35	0	0	0	0	0	0	0	0	1	1	1
I-35E	6.5	7.5	10	10	9	9.5	15	12.5	13	9	9.5
I-35W	24	27	33.5	25.5	25	23	26.5	27	22	17	24
I-94	17.5	16	26	23.5	23	23.5	24.5	26	24.5	23	25.5
I-394/TH 12	8.5	6.5	6	7	8.5	8.5	4	6.5	6	8.5	7.5
I-494	15.5	20	23	15.5	19	18.5	13	13	16.5	24.5	17.5
I-694	8.5	8	9	9	9.5	9.5	12.5	10.5	12.5	9	10.5
Subtotal	80.5	85	107.5	90.5	94	92.5	95.5	95.5	95.5	92	95.5

Congested Trunk Highway Miles (AM) 1, 2

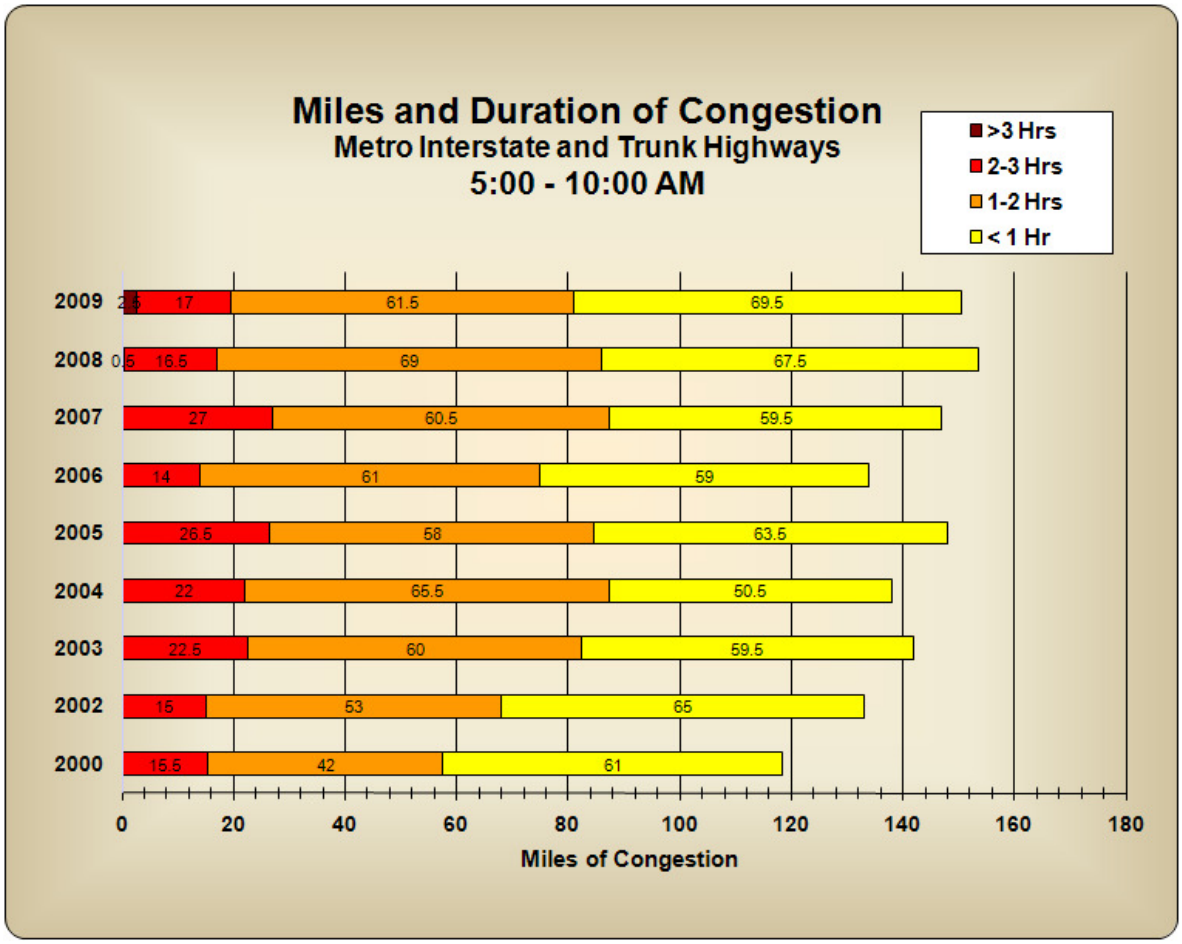
Highway	1999	Early 2000	Late 2000	2002	2003	2004	2005	2006	2007	2008	2009
TH 5	0	0	0	0	0	0	0	0	0	0	0
TH 10	-	-	-	4.5	4.5	4.5	4.5	4.5	4	4.5	2.5
TH 36	3.5	6	6.5	6	7.5	7.5	7.5	7.5	1.5	7	6
TH 52	1	1	1	1	1	1	1.5	2	2.5	2	2
US 61	-	-	-	-	-	-	-	-	-	0	0
TH 62	10	10	8.5	9	10.5	9	6.5	6.5	10	10	9.5
TH 65	0	0	0	0	0.5	0	0.5	0.5	1	0	0
TH 100	5.5	5.5	6	5	4.5	4.5	10.5	5	9	10.5	10
US 169	10	8	16	11.5	13	12.5	15.5	6.5	14	16.5	15
US 212	0	0	0	0	0	0	0	0	0	5	5.5
TH 280	0	0	0	0	0	0	0	0	3.5	0	0
TH 610	-	-	-	0	0	0	0	0	0	0	0
TH 77	3.5	3	4	4.5	6.5	6.5	6	6	6	6	4.5
Subtotal	33.5	33.5	42	41.5	48	45.5	52.5	38.5	51.5	61.5	55

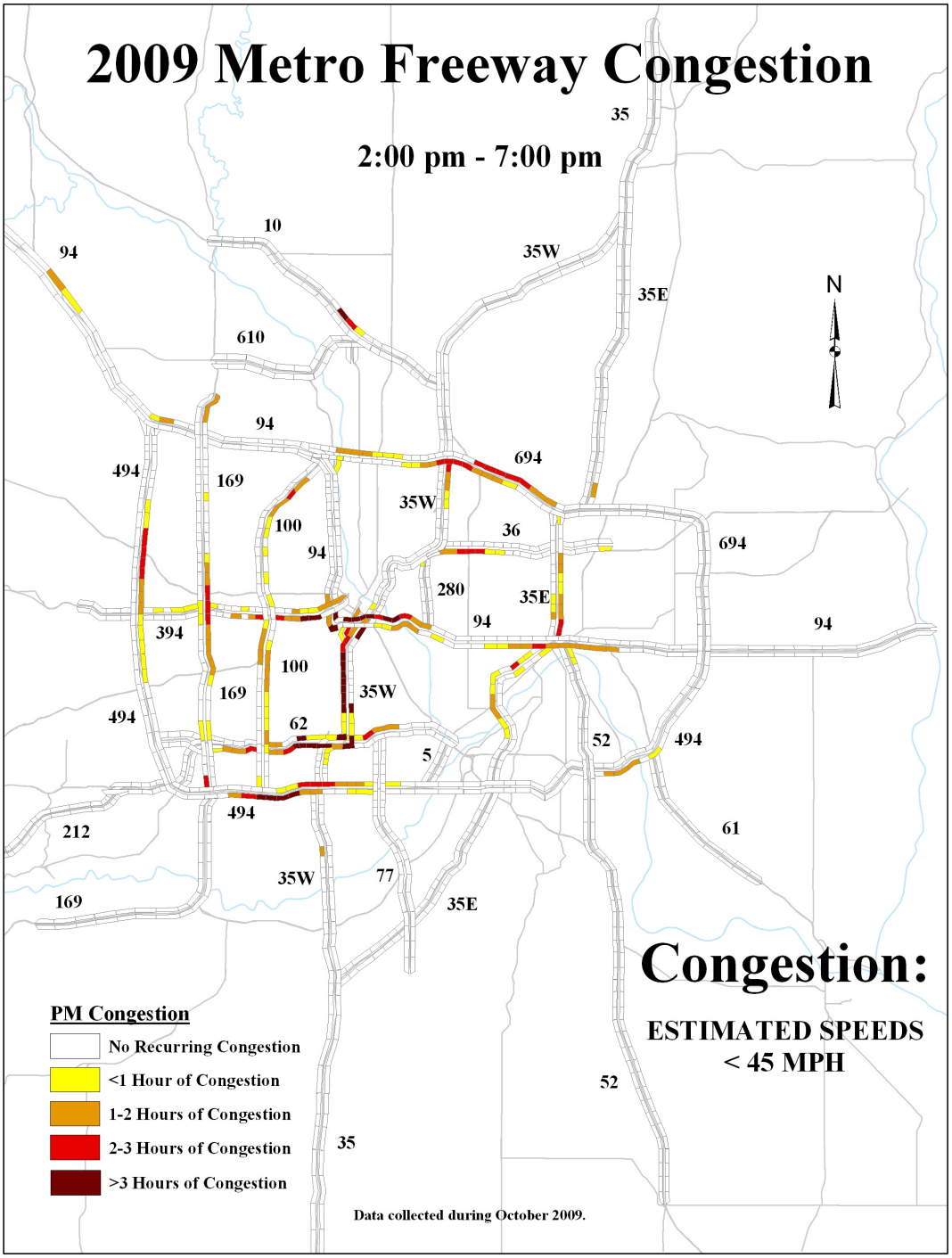
Total Congested Metro Freeway Miles (AM)

Grand Total	114	118.5	149.5	132	142	138	148	134	147	153.5	150.5

1 2009: Interstate Miles = 458 TH Miles = 300 Total Miles = 758

2 Congestion was measured for the *freeway* segments of trunk highways


Miles and Duration of Congestion
Metro Interstate and Trunk Highways
5:00 - 10:00 AM
>3 Hrs
2-3 Hrs
1-2 Hrs
< 1 Hr
2009
17
61.5
69.5
2008
0.5
16.5
69
67.5
2007
27
60.5
59.5
2006
14
61
59
2005
26.5
58
63.5
2004
22
65.5
50.5
2003
22.5
60
59.5
2002
15
53
65
2000
15.5
42
61
0
20
40
60
80
100
120
140
160
180
Miles of Congestion


2009 Metro Freeway Congestion
2:00 pm - 7:00 pm
N
Congestion:
ESTIMATED SPEEDS
< 45 MPH
PM Congestion
No Recurring Congestion
<1 Hour of Congestion
1-2 Hours of Congestion
2-3 Hours of Congestion
>3 Hours of Congestion
Data collected during October 2009.
35
10
94
35W
35E
610
694
494
169
100
36
280
394
62
5
52
61
212
77
169

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Directional Metro Freeway Miles Congested 2:00 PM - 7:00 PM

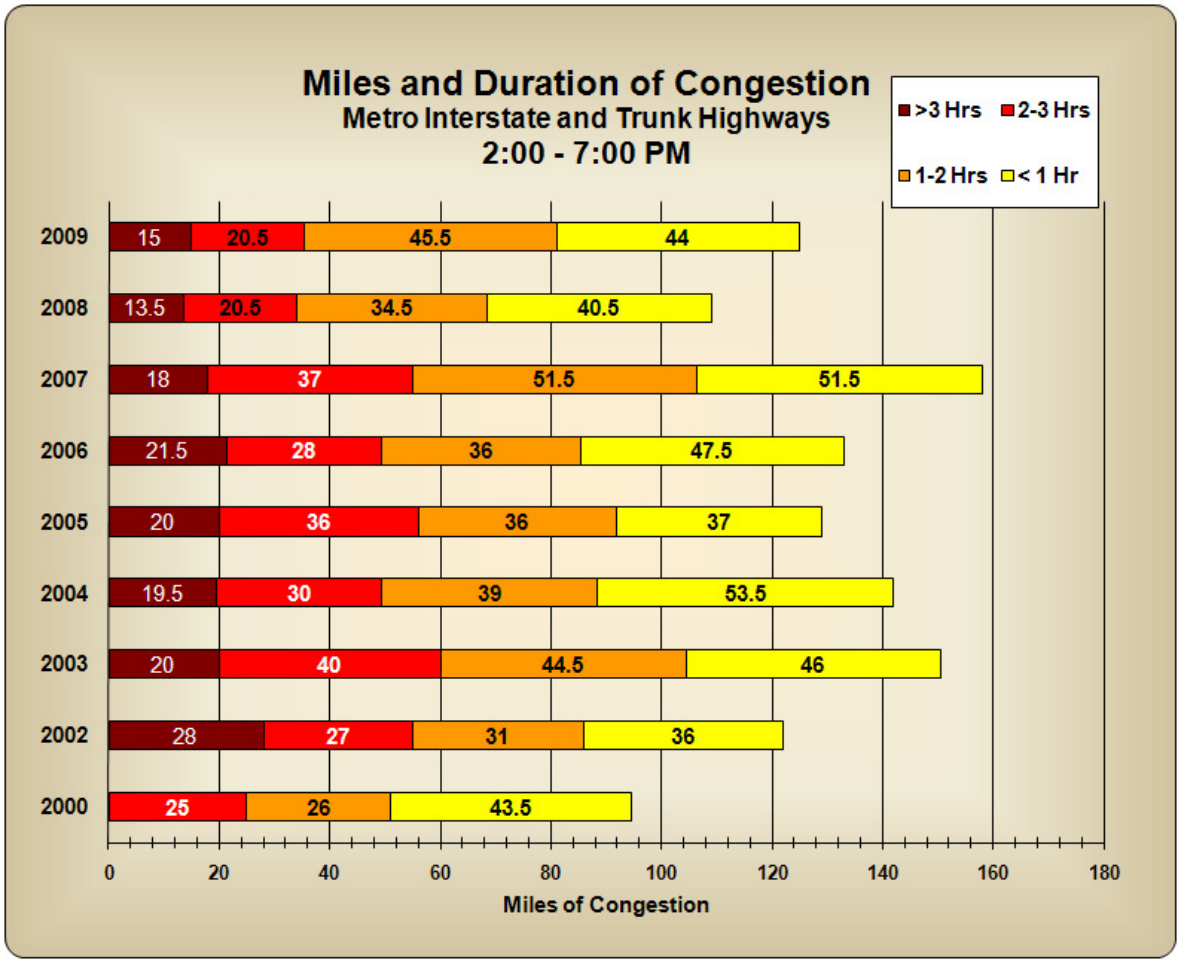
Congested Interstate Miles (PM) 1											
Highway	1999	Early 2000	Late 2000	2002	2003	2004	2005	2006	2007	2008	2009
I-35	-	-	-	-	0	0	0	0	0	0	0
I-35E	4.5	3.5	8.5	6.5	15	9.5	8.5	14.5	16.5	8.5	12.5
I-35W	16	19	27.5	23	26	24.5	25	22	14.5	17.5	15
I-94	21	17.5	33	25.5	31	29	23	26.5	24.5	16.5	18
I-394/TH 12	7.5	8	10.5	10.5	11	10	5	6.5	8	6	8.5
I-494	14.5	15.5	26.5	16	20	20.5	17.5	16.5	21	16	19
I-694	5	5	5	6.5	9	9	11.5	9	19.5	11	13.5
Subtotal	68.5	68.5	111	88	112	102.5	90.5	95	104	75.5	86.5

Congested Trunk Highway Miles (PM) 1, 2											
Highway	1999	Early 2000	Late 2000	2002	2003	2004	2005	2006	2007	2008	2009
TH 5	0	0	0	0	0	0	0	0	0	0	0
TH 10	-	-	-	1.5	2.5	1.5	1	1	3	1.5	1.5
TH 36	2.5	2	4	3	4	4	3	4.5	4.5	3	3.5
TH 52	0.5	0.5	0.5	0.5	1	1	1.5	1	1	1	1
US 61	-	-	-	-	-	-	-	-	-	0	0
TH 62	8.5	7	8.5	7	9.5	11.5	7	8	10.5	8.5	9.5
TH 65	0	0	0	1.5	1	1.5	1.5	1.5	1.5	1	1.5
TH 100	7	8	10.5	6	6	5	9	4	12.5	7.5	11
US 169	6	8	14	12	14	12.5	14.5	15	16	9.5	10
US 212	0	0	0	1	0	0	0	0	0	1	0
TH 280	0	0	0	0	0	0	0	0	3	0	0.5
TH 610	-	-	-	0	0	0	0	0	0	0.5	0
TH 77	0.5	0.5	1	0.5	1	2.5	1	3	2	0	0
Subtotal	25	26	38.5	33	39	39.5	38.5	38	54	33.5	38.5

Total Congested Metro Freeway Miles (PM)											
Grand Total	93.5	94.5	149.5	121	151	142	129	133	158	109	125

1 2008: Interstate Miles = 458 TH Miles = 300 Total Miles = 758

2 Congestion was measured for the *freeway* segments of trunk highways


Miles and Duration of Congestion
Metro Interstate and Trunk Highways
2:00 - 7:00 PM
>3 Hrs
2-3 Hrs
1-2 Hrs
< 1 Hr
2009
15
20.5
45.5
44
2008
13.5
20.5
34.5
40.5
2007
18
37
51.5
51.5
2006
21.5
28
36
47.5
2005
20
36
36
37
2004
19.5
30
39
53.5
2003
20
40
44.5
46
2002
28
27
31
36
2000
25
26
43.5
0
20
40
60
80
100
120
140
160
180
Miles of Congestion

Appendix A: Centerline Miles Measured for Congestion

Highway	Centerline Miles of Highway	Limits
I-35	16	North split to Hwy 8 & South split to Cty 70
I-35E	39	Entire Highway
I-35W	42	Entire Highway
I-94	54	Hwy 101 to St. Croix River
I-394/TH 12	12	Central Ave to Downtown Mpls
I-494	43	Entire Highway
I-694	23	Entire Highway
Subtotal	229	

Highway		
TH 5	3	I-494 to Miss Rvr
TH 10	12	Hwy 169 to I-35W
TH 36	7	I-35W to English St
TH 52	25	I-94 to Upper 55th St
US 61	8	Cty 19 to I-494
TH 62	12	I-494 to Hwy 55
TH 65	1	10th St to I-35W
TH 100	16	I-494 to I-694
US 169	28	Highwood Dr to Cty 15 & I-494 to 77th Ave
US 212	17	Hwy 147 to Hwy 62
TH 610	7	Hwy 169 to Hwy 10
TH 77	11	138th St to Hwy 62
TH 280	3	I-94 to Broadway Ave
Subtotal	150	
Grand Total	379	

Appendix B: 2009 Metro Freeway Data Sources