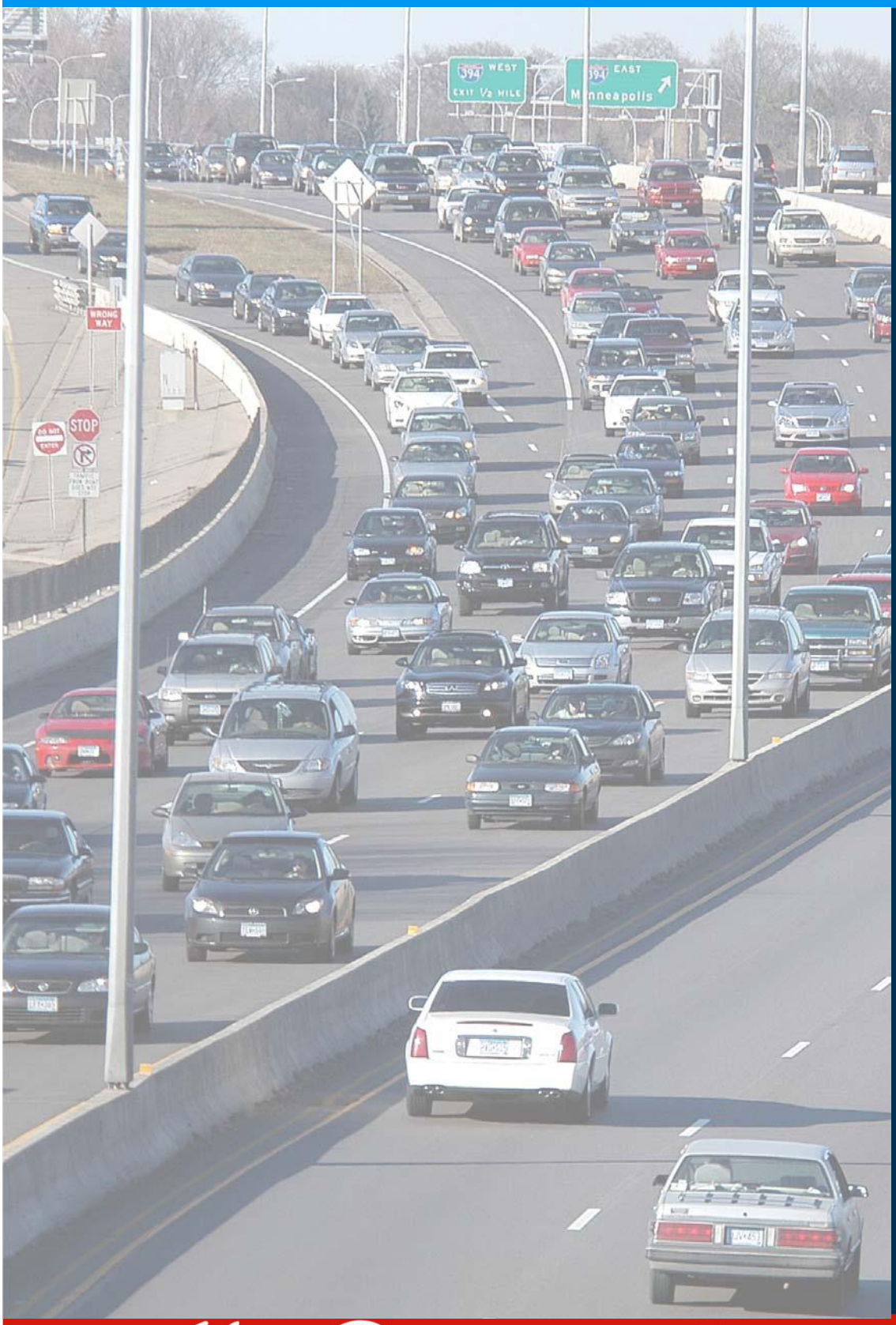


Metropolitan Freeway System 2011 Congestion Report

Metro District Office of Operations and Maintenance

Regional Transportation Management Center

February 2012

Your Destination...Our Priority

Table of Contents

Metropolitan Freeway System 2011 Congestion Report

Purpose and Need

The Metropolitan Freeway System Congestion Report is prepared annually by the Regional Transportation Management Center (RTMC) to document those segments of the freeway system that experience recurring congestion. This report is prepared for these purposes:

- Identification of locations that are over capacity
- Project planning
- Resource allocation (e.g., RTMC equipment and incident management planning)
- Construction zone planning
- Department performance measures reporting

Introduction

What is Congestion?

MnDOT 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 braking 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 breakdowns last 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

MnDOT began collecting and processing congestion data in 1993. Since this time, MnDOT 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: MnDOT 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, MnDOT 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 2011 data from 3,000 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 percentage 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 twelve midweek days in October. MnDOT 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.

2011 Results

In 2011, the Twin Cities freeway system saw a decrease in congestion, from 21.5% in 2010 to 21.0%. A contributing factor in the decrease was due to the completion of the Crosstown project at I-35W and TH 62.

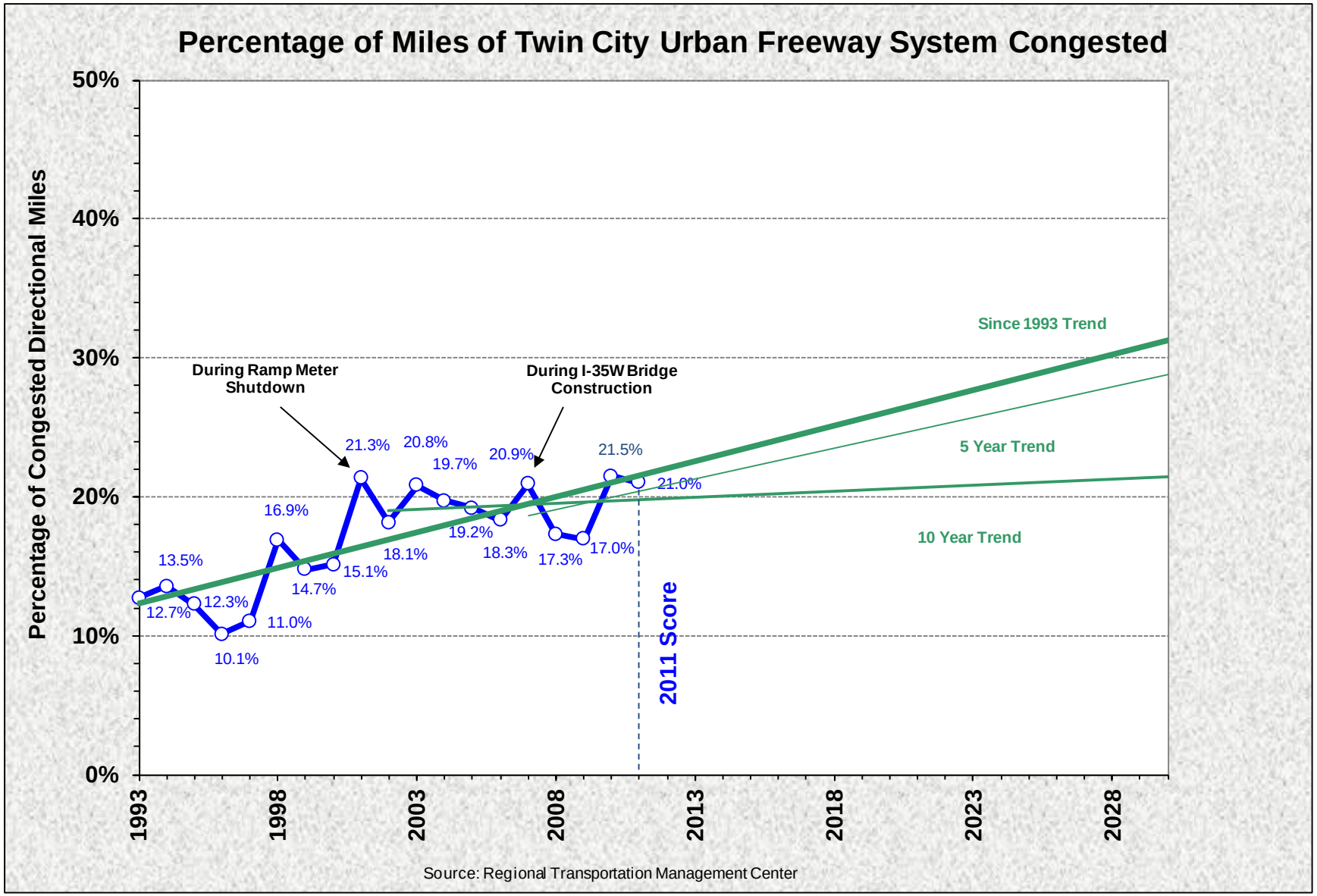
Several projects are underway aimed at addressing congestion on several highways throughout the Twin Cities metropolitan area. These include:

- I-494/TH 169 Interchange Reconstruction
- Addition of Managed Lane Controls to I-94 between downtown Minneapolis and downtown St. Paul
- I-694/TH 10/Snelling Ave Interchange Reconstruction
- Addition of an auxiliary lane to westbound I-494 between I-35W and TH 100 (Fall 2012)

Many factors affect congestion levels such as the local economy, population growth, gas prices, transit ridership and vehicle miles traveled (VMT). It is expected that, in the next few years, congestion will increase as economic activity increases.

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

Mitigating congestion is critical to the traveling public. MnDOT 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 may continue to be flat or downward due to the completion of projects and/or economic conditions. However, the anticipated trend of increased VMT and increasing construction costs along with improving economic conditions are expected to cause congestion to grow in the future.


Percentage of Miles of Twin City Urban Freeway System Congested
Percentage of Congested Directional Miles
50%
40%
30%
20%
10%
0%
1993
1998
2003
2008
2013
2018
2023
2028
During Ramp Meter Shutdown
During I-35W Bridge Construction
Since 1993 Trend
5 Year Trend
10 Year Trend
2011 Score
13.5%
12.7%
12.3%
10.1%
11.0%
16.9%
14.7%
15.1%
21.3%
18.1%
20.8%
19.7%
19.2%
18.3%
20.9%
17.3%
21.5%
17.0%
21.0%
Source: Regional Transportation Management Center

AM Plus PM Miles of Directional Congestion

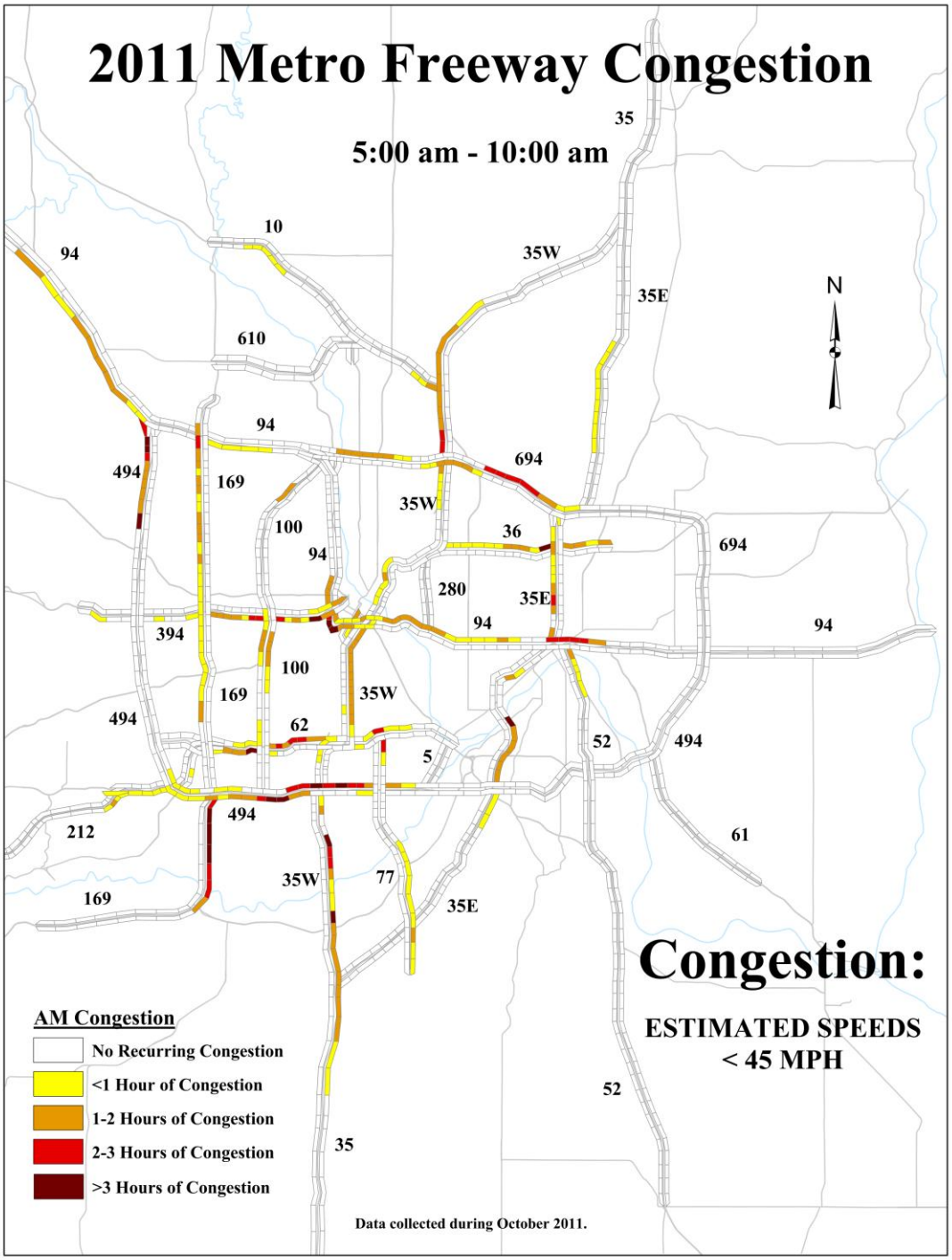
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Severe	70	83	72	83	64	82	51	55	82	73
Moderate	84	105	105	94	97	112	104	107	127	125
Low	101	106	104	101	107	111	108	114	117	121
Total	255	293	280	277	267	305	263	276	326	319

AM Plus PM Percent of Miles of Directional Congestion

	2002	2003	2004*	2005*	2006*	2007	2008*	2009	2010	2011
Severe	5.5%	6.4%	5.5%	6.4%	4.9%	6.3%	3.4%	3.6%	5.4%	4.8%
Moderate	6.6%	8.2%	8.1%	7.3%	7.5%	8.6%	6.8%	7.1%	8.3%	8.2%
Low	7.9%	8.2%	8.0%	7.8%	8.2%	8.6%	7.1%	7.5%	7.7%	7.9%
Total	18.1%	20.8%	19.7%	19.2%	18.3%	20.9%	17.3%	18.2%	21.5%	21.0%

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.**


2011 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 2011.
35
10
94
35W
35E
610
694
494
169
100
36
280
394
62
5
52
212
61
77
52
35

Metropolitan Freeway System 2011 Congestion Report

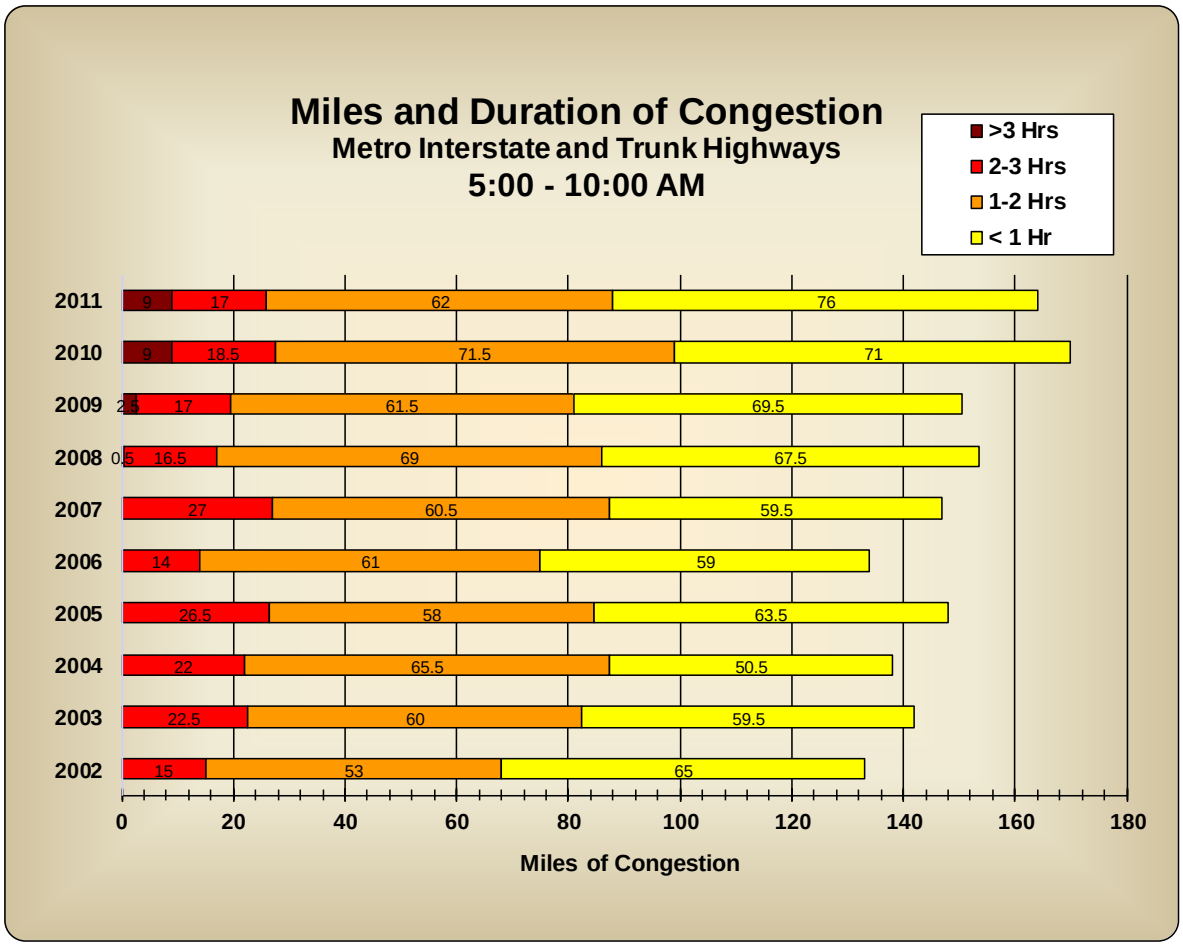
Congested Interstate Miles (AM) 1										
Highway	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
I-35	0	0	0	0	0	1	1	1	0	2
I-35E	10	9	9.5	15	12.5	13	9	9.5	13.5	14.5
I-35W	25.5	25	23	26.5	27	22	17	24	28	25
I-94	23.5	23	23.5	24.5	26	24.5	23	25.5	28.5	24.5
I-394/TH 12	7	8.5	8.5	4	6.5	6	8.5	7.5	8.5	9.5
I-494	15.5	19	18.5	13	13	16.5	24.5	17.5	14.5	19.5
I-694	9	9.5	9.5	12.5	10.5	12.5	9	10.5	12	11
Subtotal	90.5	94	92.5	95.5	95.5	95.5	92	95.5	105	106

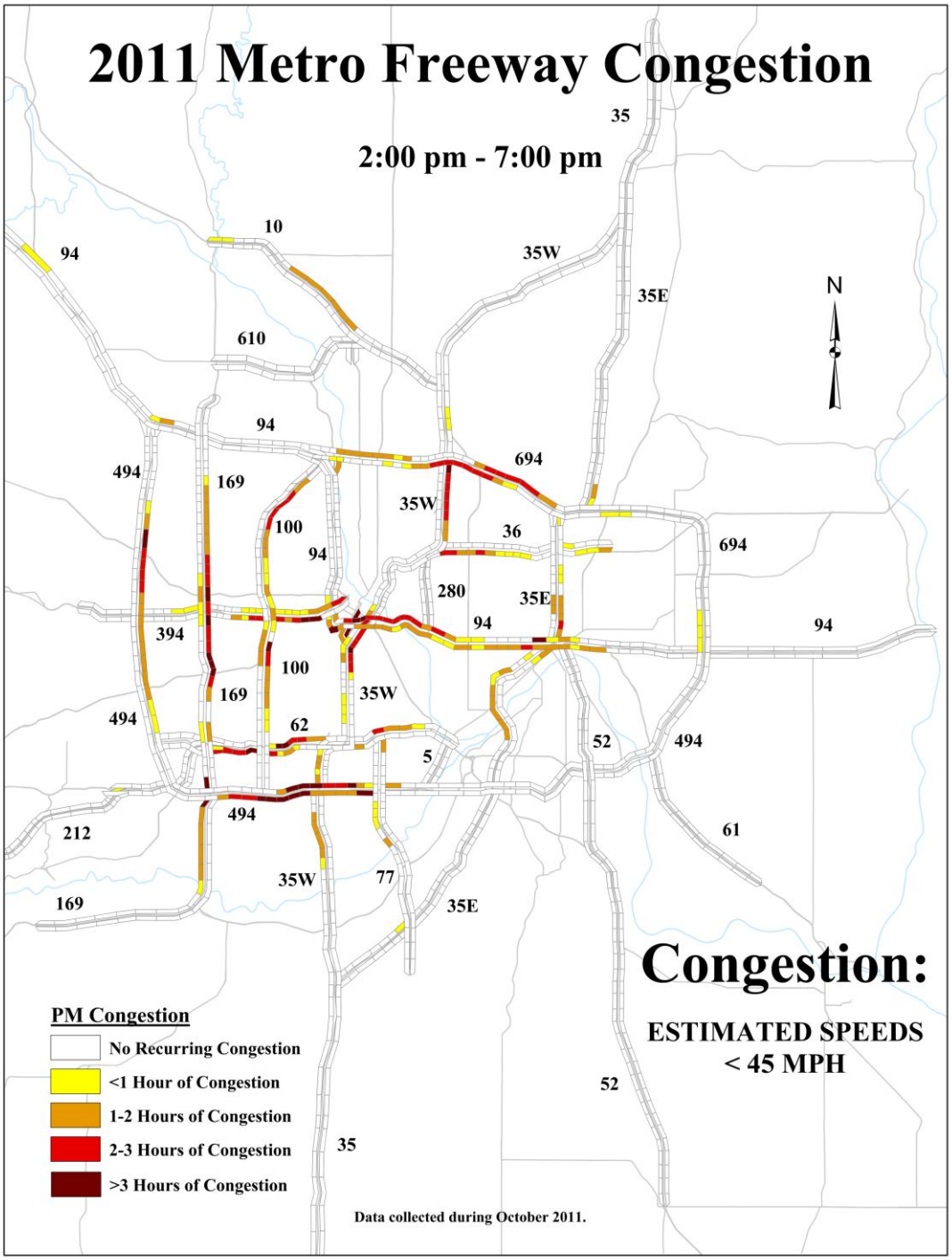
Congested Trunk Highway Miles (AM) 1, 2										
Highway	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
TH 5	0	0	0	0	0	0	0	0	0	0
TH 10	4.5	4.5	4.5	4.5	4.5	4	4.5	2.5	5	4
TH 36	6	7.5	7.5	7.5	7.5	1.5	7	6	7.5	7.5
TH 52	1	1	1	1.5	2	2.5	2	2	2	2.5
US 61	-	-	-	-	-	-	0	0	0	0
TH 62	9	10.5	9	6.5	6.5	10	10	9.5	10.5	9
TH 65	0	0.5	0	0.5	0.5	1	0	0	1	1
TH 100	5	4.5	4.5	10.5	5	9	10.5	10	10.5	7
US 169	11.5	13	12.5	15.5	6.5	14	16.5	15	17	16.5
US 212	0	0	0	0	0	0	5	5.5	5.5	5
TH 280	0	0	0	0	0	3.5	0	0	0	0
TH 610	0	0	0	0	0	0	0	0	0	0
TH 77	4.5	6.5	6.5	6	6	6	6	4.5	6	5.5
Subtotal	41.5	48	45.5	52.5	38.5	51.5	61.5	55	65	58

Total Congested Metro Freeway Miles (AM)										
Grand Total	132	142	138	148	134	147	153.5	150.5	170	164

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
2011
9
17
62
76
2010
9
18.5
71.5
71
2009
2.5
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
0
20
40
60
80
100
120
140
160
180
Miles of Congestion


2011 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 2011.
35
10
94
35W
35E
610
694
494
169
100
36
280
394
62
5
52
212
61
77
169
35

Metropolitan Freeway System 2011 Congestion Report

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

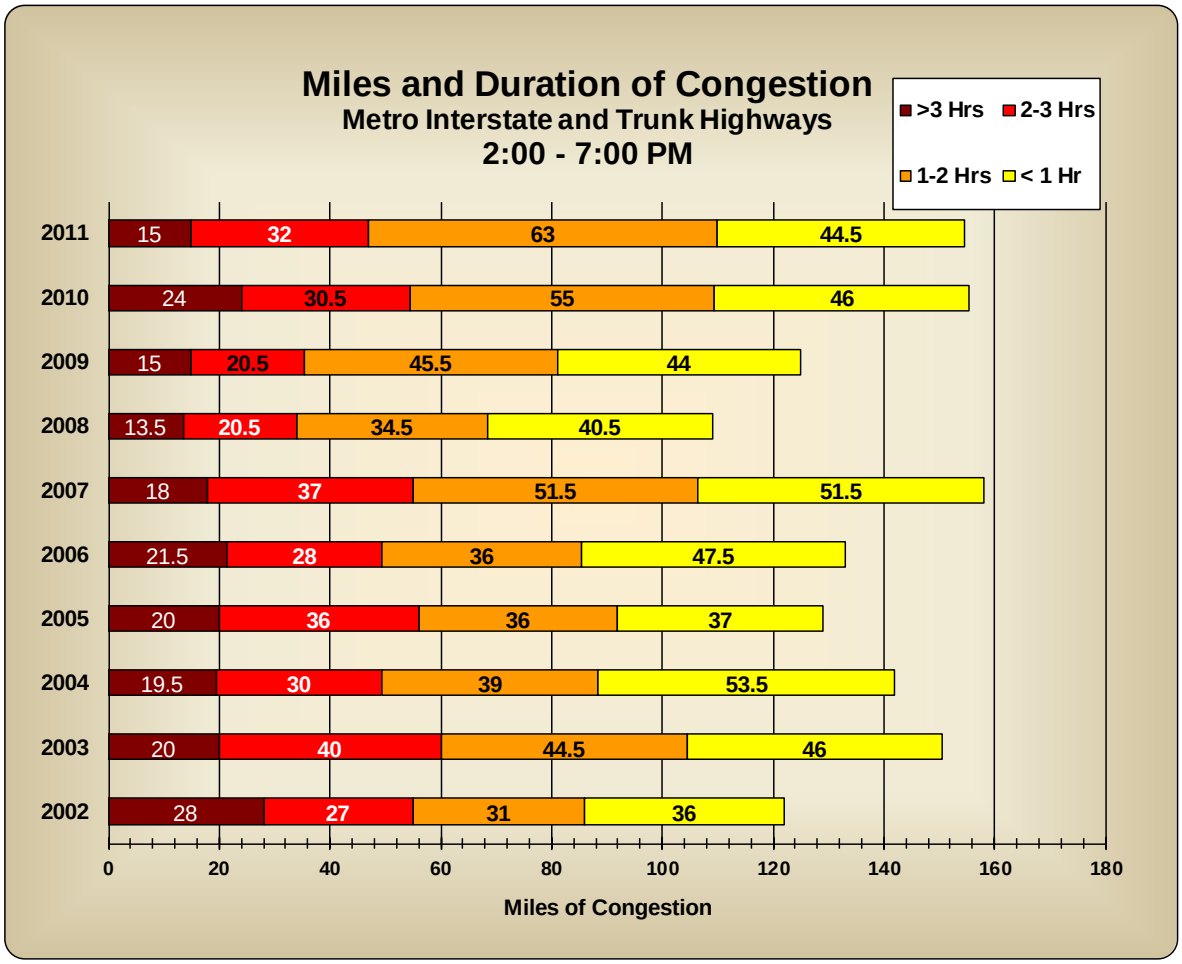
Congested Interstate Miles (PM) 1										
Highway	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
I-35	-	0	0	0	0	0	0	0	0	0
I-35E	6.5	15	9.5	8.5	14.5	16.5	8.5	12.5	12	11
I-35W	23	26	24.5	25	22	14.5	17.5	15	23	17.5
I-94	25.5	31	29	23	26.5	24.5	16.5	18	21	24
I-394/TH 12	10.5	11	10	5	6.5	8	6	8.5	9	10.5
I-494	16	20	20.5	17.5	16.5	21	16	19	23	20
I-694	6.5	9	9	11.5	9	19.5	11	13.5	17	17.5
Subtotal	88	112	102.5	90.5	95	104	75.5	86.5	105	100.5

Congested Trunk Highway Miles (PM) 1, 2										
Highway	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
TH 5	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	3.5	4
TH 36	3	4	4	3	4.5	4.5	3	3.5	6.5	6.5
TH 52	0.5	1	1	1.5	1	1	1	1	0	0
US 61	-	-	-	-	-	-	0	0	0	0
TH 62	7	9.5	11.5	7	8	10.5	8.5	9.5	10.5	9.5
TH 65	1.5	1	1.5	1.5	1.5	1.5	1	1.5	1.5	1.5
TH 100	6	6	5	9	4	12.5	7.5	11	11.5	12.5
US 169	12	14	12.5	14.5	15	16	9.5	10	14.5	17
US 212	1	0	0	0	0	0	1	0	0	0.5
TH 280	0	0	0	0	0	3	0	0.5	0.5	0
TH 610	0	0	0	0	0	0	0.5	0	0	0
TH 77	0.5	1	2.5	1	3	2	0	0	2	2.5
Subtotal	33	39	39.5	38.5	38	54	33.5	38.5	50.5	54

Total Congested Metro Freeway Miles (PM)										
Grand Total	121	151	142	129	133	158	109	125	155.5	154.5

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
2011
15
32
63
44.5
2010
24
30.5
55
46
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
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: Daily Congestion Map