CHAPTER 6: HIGHWAY SYSTEM

Description of System

The seven-county metropolitan region has over 15,000 miles of roadways. The functional class of a roadway describes its role within the hierarchy of roadways according to their primary function— for example, mobility for through trips or access to adjacent lands. The region uses a four-class system to designate roads (principal arterials, minor arterials, collectors and local streets).

Principal Arterials -- Principal arterials are the high-capacity highways that make up the metropolitan highway system. These are primarily the interstate and state-trunk highway system, although some county highways are also included in the principal arterial system.

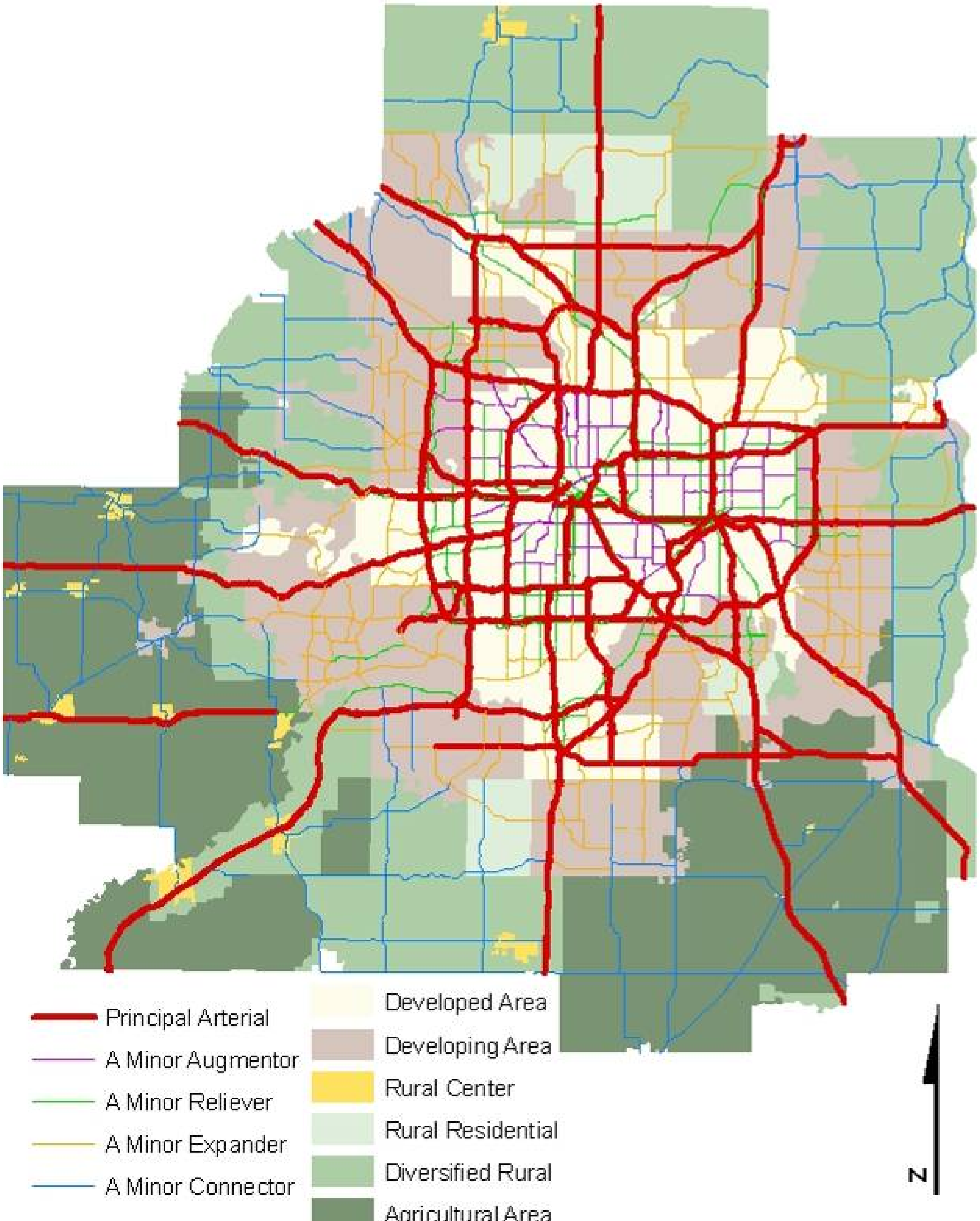
Minor Arterials – These are roadways within the metropolitan area that are not principal arterials but perform a regionally significant role in the transportation system. These roadways are designated the "A" Minor Arterial System and are classified into the following groups:

> **Relievers** - Minor arterials that provide direct relief for traffic on major metropolitan highways. These roads include the closest routes parallel to the principal arterials within the core, urban reserve and urban staging areas but not in rural areas. These roadways are proposed to accommodate medium-length trips (less than eight miles) as well as to provide relief to congested principal arterials. There are approximately 310 miles of relievers in the seven-county region. Improvements to relievers focus on providing additional capacity for through traffic.
>
> **Expanders** - These routes provide a way to make connections between developing areas outside the interstate ring or beltway. These routes are located beyond the area reasonably served by the beltway. These roadways are proposed to serve medium-to-long suburb-to-suburb trips. The seven-county region has approximately 430 miles of expanders. Improvements to expanders focus on preserving or obtaining right-of-way for future expansion.
>
> **Connectors** - These roads provide good, safe connections among town centers in the urban reserve, urban staging and rural areas within and near the seven counties. There are approximately 640 miles of connectors in the seven-county region. Improvements to connectors focus on safety and improving load-carrying capacity.
>
> **Augmenters** - The fourth group of "A" minor arterials are those roads that augment principal arterials within the interstate ring or beltway. The principal-arterial network in this area is in place. However, the network of principal arterials serving the area is not in all cases sufficient at serving the density of development in this area. In these situations, these key minor arterials serve many long-range trips. There are approximately 145 miles of augmenters in the seven-county region. Improvements to augmenters focus on providing additional capacity for through traffic.

<u>Collector Streets</u> – These streets connect neighborhoods to one another and to regional business concentrations.

<u>Local Streets</u> – These streets provide access to homes and businesses.

Twin Cities Regional Highway System & 2030 Framework Planning Areas



Source: Metropolitan Council

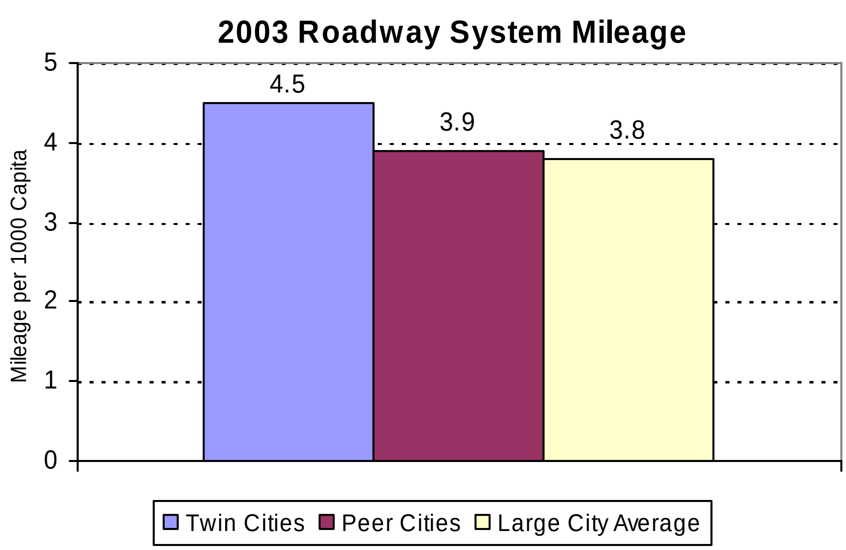
Growth in Roadway System Mileage

Between 2000 and 2004, lane miles of roadway in the seven-county commute area have grown by 1.2%. During this same period, vehicle-miles traveled increased by 5.4%.

2004 Lane-Miles by Functional Class	**Seven-County Metro**	**Nine-MN-County Commute Shed**	**Total Metro Commute Area (in MN)**
Principal Arterial - Freeway	1,721	330	2,051
Principal Arterial - Other	1,090	855	1,945
Minor Arterial	5,685	1,351	7,036
Collector	3,493	5,020	8,513
Local Systems	21,081	13,651	34,732
Total	33,070	21,207	54,277
2000 Lane-Miles	**Seven-County Metro**	**Nine-MN-County Commute Shed**	**Total Metro Commute Area (in MN)**
Principal Arterial - Freeway	1,711	365	2,076
Principal Arterial - Other	1,155	805	1,945
Minor Arterial	5,622	1,332	6,954
Collector	3,579	4,954	8,533
Local Systems	20,598	13,646	34,244
Total	32,655	21,099	53,764

Source: Minnesota Department of Transportation, Transportation Information System Database

From 2000 to 2004, lane miles in the seven-county metro area total increased 1.2% (405 lane miles). This growth was about one-sixth the increase in the regional population during that same period (7.2%).



Source: TTI Urban Mobility Report

The Texas Transportation Institute (TTI) compiles data on transportation system performance for metropolitan areas throughout the United States. Its data can be used to measure changes in the performance of the Twin Cities' highway system over time and provide a rough comparison with other urban areas in the United States. TTI considers the Twin Cities a "large urban area," the second-largest urban area category. In this report, the Twin Cities area is compared to the average for large urban areas as well as with the average for our 10 peer urban areas. These urban areas are Baltimore, Cincinnati, Cleveland, Dallas, Denver, Milwaukee, Pittsburgh, Portland, Seattle and St. Louis. The most recent year for which TTI had available data was 2003.

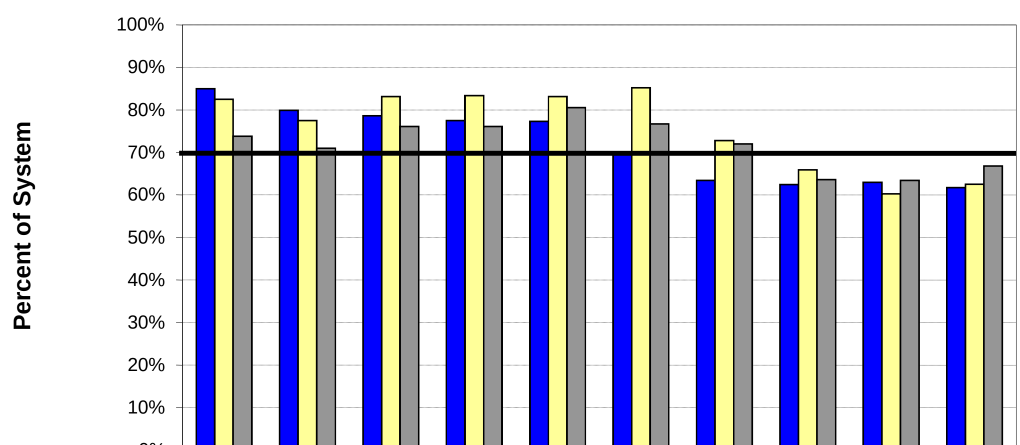
The Twin Cities has more roadway-centerline mileage per person than the average for our peer urban areas and TTI's large cities. This comparatively high amount of roadway is partly because the Twin Cities has one of the least dense patterns of urban development in the country, requiring more miles of roadway to provide access for all users of the system. Roadway centerline mileage is all roadways, including local streets, but does not include lane mileage.

> The Twin Cities has a substantially higher number of roadway-system mileage per capita than other large urban areas.

Pavement Condition

The Minnesota Department of Transportation evaluates the quality of the pavement on roads under its jurisdiction. This is measured in terms of the Ride Quality Index (RQI). The RQI is an indicator of pavement smoothness based on ratings of users. The RQI is expressed as a number between 0 and 5 with the smaller values indicating greater pavement roughness. A section of roadway with a RQI rating of 3 is considered to be in good condition. Mn/DOT's goal is to maintain at least 70% of principal arterials and 65% of non-principal arterials in good or very good condition, and allow less than 2% of principal arterials and 3% of non-principal arterials to be in poor or very poor condition. Over the last few years, Mn/DOT has fallen behind in meeting this goal, particularly on metropolitan area non-principal arterials.

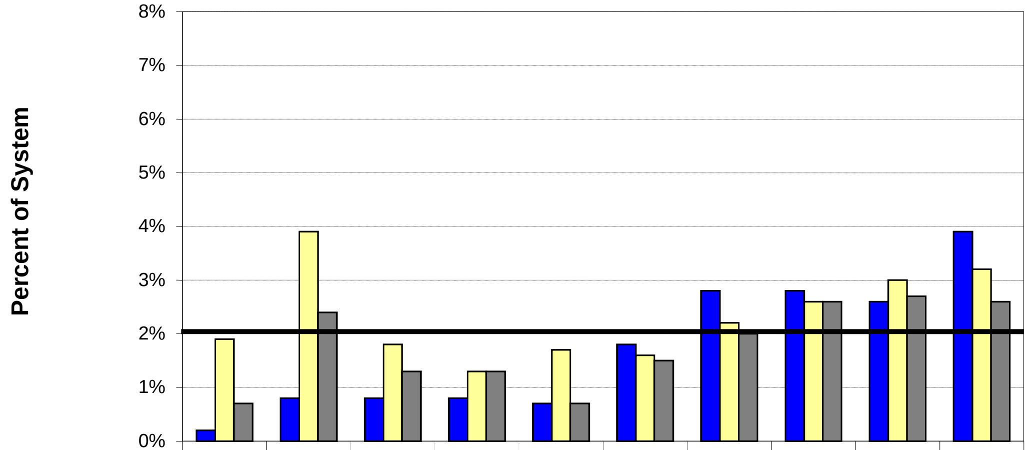
RQI in the Good/Very Good Category
(Principal Arterials)



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
7-County Metro Area	85.0%	79.9%	78.6%	77.5%	77.3%	69.7%	63.4%	62.4%	63.0%	61.7%
Surrounding Counties	82.5%	77.5%	83.1%	83.4%	83.1%	85.2%	72.8%	65.9%	60.3%	62.5%
Statewide	73.8%	71.0%	76.1%	76.1%	80.5%	76.7%	72.0%	63.6%	63.4%	66.8%

Source: Minnesota Department of Transportation

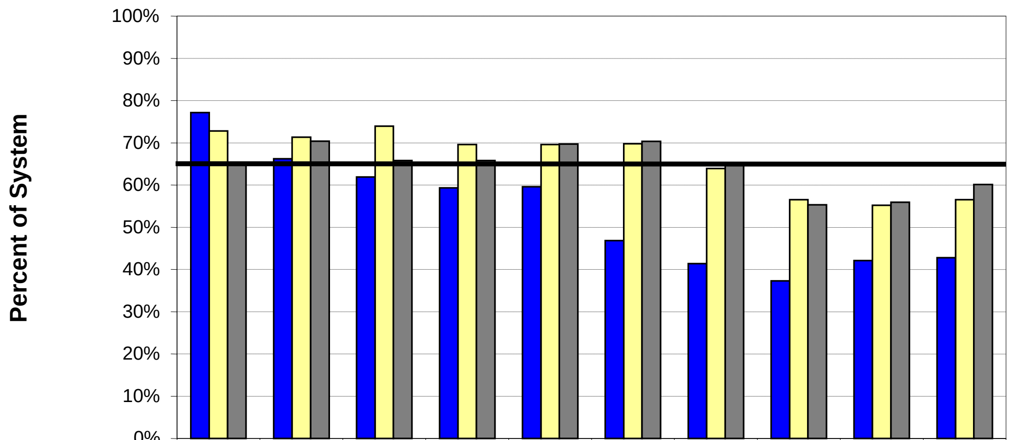
RQI in the Poor/Very Poor Category (Principal Arterials)



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
7-County Metro Area	0.2%	0.8%	0.8%	0.8%	0.7%	1.8%	2.8%	2.8%	2.6%	3.9%
Surrounding Counties	1.9%	3.9%	1.8%	1.3%	1.7%	1.6%	2.2%	2.6%	3.0%	3.2%
Statewide	0.7%	2.4%	1.3%	1.3%	0.7%	1.5%	2.0%	2.6%	2.7%	2.6%

Source: Minnesota Department of Transportation

RQI in the Good/Very Good Category (Non-Principal Arterials)

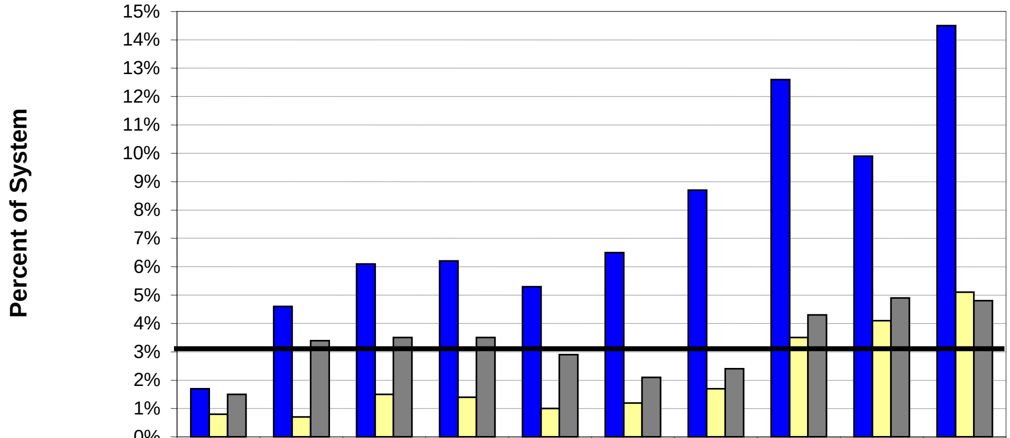


	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
7-County Metro Area	77.1%	66.2%	61.9%	59.3%	59.6%	46.8%	41.4%	37.3%	42.1%	42.8%
Surrounding Counties	72.8%	71.3%	73.9%	69.6%	69.6%	69.8%	63.9%	56.5%	55.2%	56.5%
Statewide	64.9%	70.4%	65.8%	65.8%	69.7%	70.3%	64.8%	55.3%	55.9%	60.1%

Year

Source: Minnesota Department of Transportation

RQI in the Poor/Very Poor Category
(Non-Principal Arterials)



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
7-County Metro Area	1.7%	4.6%	6.1%	6.2%	5.3%	6.5%	8.7%	12.6%	9.9%	14.5%
Surrounding Counties	0.8%	0.7%	1.5%	1.4%	1.0%	1.2%	1.7%	3.5%	4.1%	5.1%
Statewide	1.5%	3.4%	3.5%	3.5%	2.9%	2.1%	2.4%	4.3%	4.9%	4.8%

Source: Minnesota Department of Transportation

Most of the region's highway system is still in generally good condition. However, the condition of the region's non-principal arterials is deteriorating rapidly. This is a cause for concern since the region's minor arterial system is expected to carry a higher volume of traffic over the next few years as more of the principal-arterial system reaches capacity. The Mn/DOT Metro District Plan is allocating resources to fully meet the pavement performance targets by the year 2014.

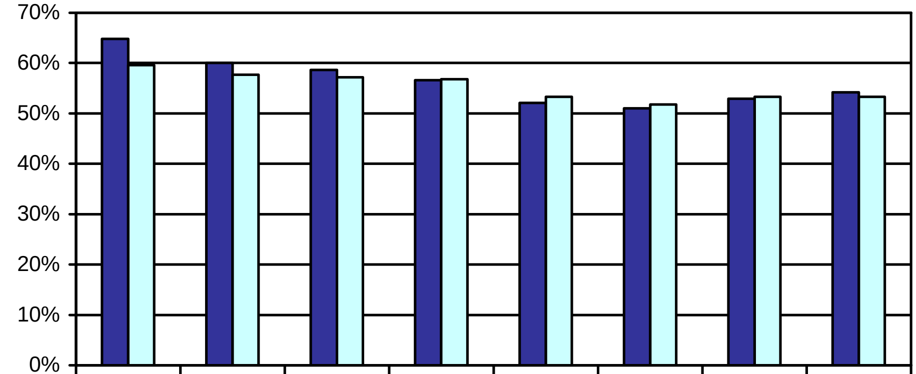
> The pavement on the region's highway system is generally in good condition but has been declining between 1996 and 2005. The pavement quality on non-principal arterials in the metro region has declined the most dramatically.

Bridge Conditions

Bridges in the State Principal and Minor Arterial system have a total surface area exceeding 23 million square feet. About 90% of this area carries principal arterial highways. Mn/DOT uses a measure to assess system-wide bridge performance. The measure is the Bridge Structural Condition Rating, which is based on the National Bridge Inventory (NBI) scale from 0 to 9 and uses a combination of Condition Code and Appraisal Rating to assign a "good," "fair," or "poor" condition.

The metropolitan area's bridges do not quite meet all the targets established in Mn/DOT's State Plan. The State bridge system does meet the target for the combined "fair and poor" condition. The Mn/DOT Metro District Plan is allocating resources to fully meet the bridge performance targets by the year 2023.

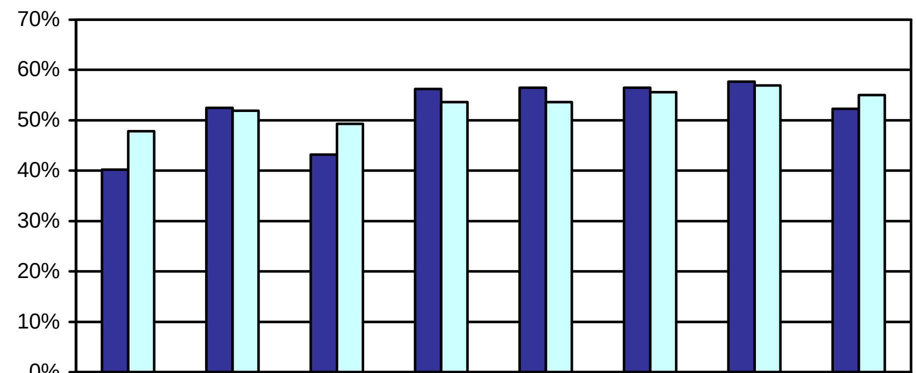
PERCENT OF BRIDGE AREA IN GOOD CATEGORY (PRINCIPAL ARTERIALS)



	1998	1999	2000	2001	2002	2003	2004	2005
METRO	64.8%	60.0%	58.6%	56.6%	52.1%	51.0%	52.9%	54.2%
STATEWIDE	59.6%	57.7%	57.2%	56.8%	53.3%	51.8%	53.3%	53.3%

Source: Minnesota Department of Transportation

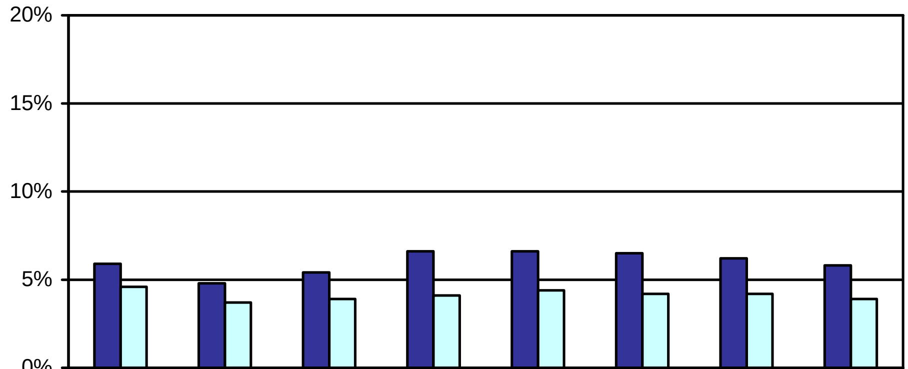
PERCENT OF BRIDGE AREA IN GOOD CATEGORY (MINOR ARTERIALS)



	1998	1999	2000	2001	2002	2003	2004	2005
METRO	40.2%	52.5%	43.2%	56.2%	56.5%	56.5%	57.7%	52.3%
STATEWIDE	47.8%	51.9%	49.3%	53.6%	53.6%	55.6%	56.9%	55.0%

Source: Minnesota Department of Transportation

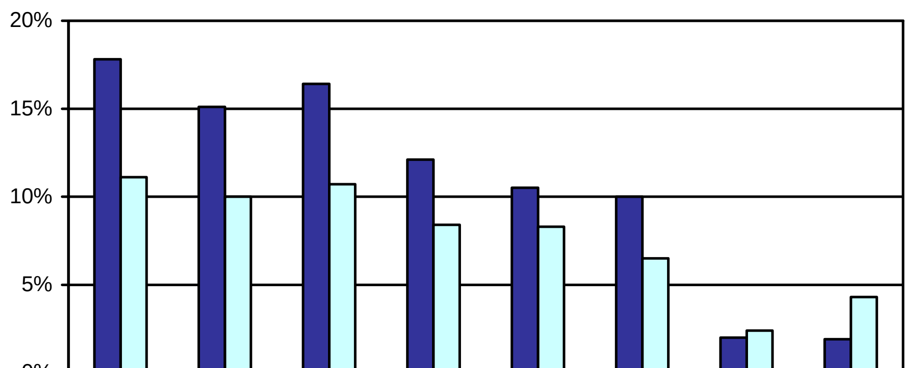
PERCENT OF BRIDGE AREA IN POOR CATEGORY (PRINCIPAL ARTERIALS)



	1998	1999	2000	2001	2002	2003	2004	2005
METRO	5.9%	4.8%	5.4%	6.6%	6.6%	6.5%	6.2%	5.8%
STATEWIDE	4.6%	3.7%	3.9%	4.1%	4.4%	4.2%	4.2%	3.9%

Source: Minnesota Department of Transportation

PERCENT OF BRIDGE AREA IN POOR CATEGORY (MINOR ARTERIALS)



	1998	1999	2000	2001	2002	2003	2004	2005
METRO	17.80%	15.10%	16.40%	12.10%	10.50%	10.00%	2.00%	1.90%
STATEWIDE	11.10%	10.00%	10.70%	8.40%	8.30%	6.50%	2.40%	4.30%

Source: Minnesota Department of Transportation

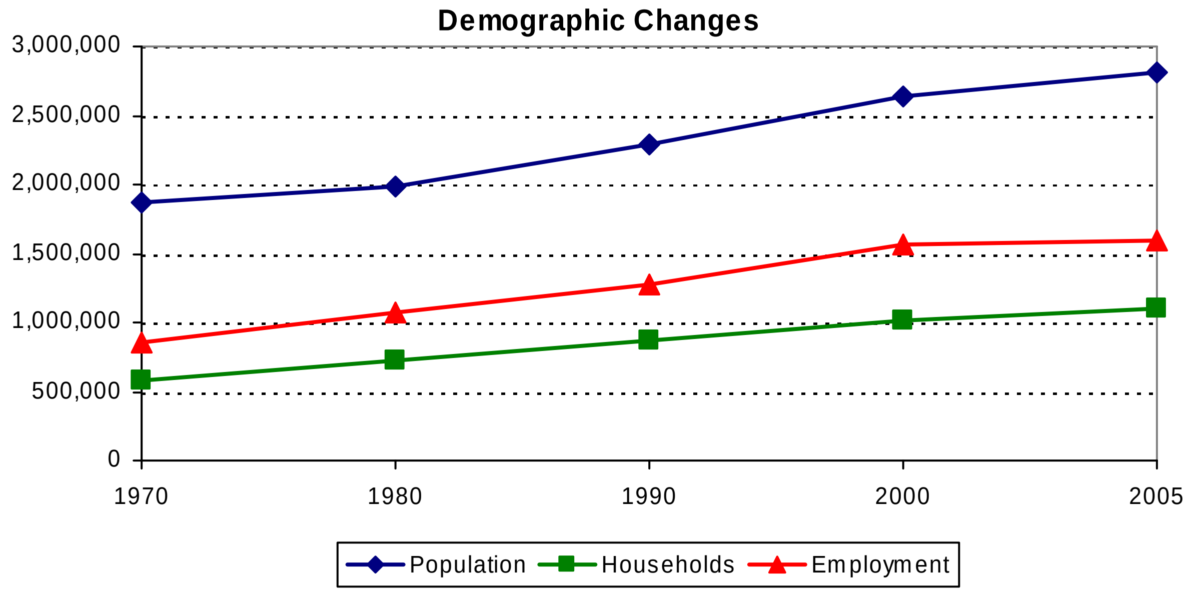
The condition of principal-arterial bridges in the region is failing to meet State targets, while minor-arterial bridges are meeting their targets. The condition of principal-arterial bridges has been deteriorating between 1998 and 2003.

Use of the Highway System

The seven-county Twin Cities region had an estimated population of 2,800,730 in 2005. This is an increase of 6% since the 2000 census. Since 1980, the seven-county region's population has increased by 41%, making it one of the fastest growing metropolitan areas in the Midwest.

Employment has grown faster than population as more people living in the area are working at jobs outside of the home. There were an estimated 1,688,160 people employed in the region in 2005. This is an increase of 8% since 2000 and an increase of 58% since 1980.

For the last several decades, average household size has been decreasing so that the total number of households in the region has grown faster than the population. There were an estimated 1,101,030 households in the region in 2005. This is an increase of about 8% since 2000 and an increase of approximately 53% since 1980.



Source: Metropolitan Council

The rapid increase in households and in the number of people working has put a great deal of pressure on the region's roadway network. More households means more housing has been constructed and more people making household-related trips. More people working in the labor force means that more people commute to work and fewer are doing household work so that more services are purchased outside of the home.

> The growth in the number of households and in the number of people working outside of the home has outpaced the growth in population in the region. This dynamic has led to greater development pressures and greater demand for travel.

Vehicle-Miles Traveled

A typical measurement of road system usage is the daily vehicle-miles traveled (VMT), which is the number of miles driven by vehicles in the region. According to the Minnesota Department of Transportation, VMT has been increasing steadily in the last five years.

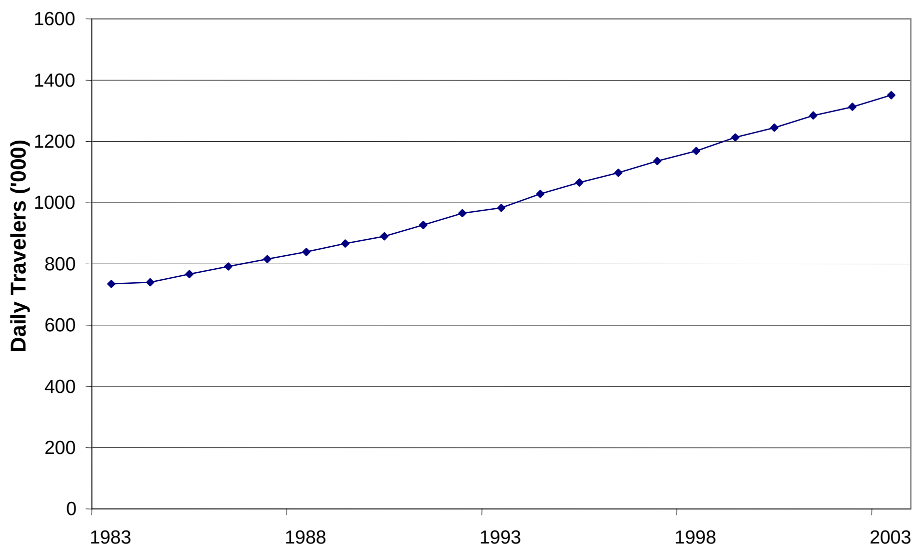
2004 Vehicle-Miles Traveled by Functional Class	Seven-County Metro	Nine-MN-County Commuter Shed	Total Metro Commute Area
Principal Arterial - Freeway	29,285,246	3,147,883	32,433,129
Principal Arterial - Other	8,190,093	3,787,053	11,977,146
Minor Arterial	21,160,541	3,421,313	24,581,854
Collector	5,374,083	3,110,155	8,484,238
Local Systems	8,231,690	1,523,486	9,755,176
2004 Total	72,241,652	14,989,890	87,231,542
2000 Total	68,536,417	12,827,525	81,363,942
2000 – 2004 % Change	5.4%	16.9%	7.2%

Source: Minnesota Department of Transportation

According to Mn/DOT, vehicle-miles traveled has grown significantly and at a substantially faster rate of growth in the nine-county Minnesota commuter shed than in the seven-county region. In both the seven-county region and the surrounding nine-county commute shed, freeway principal arterials carry a disproportionate amount of the vehicle traffic in the region. In the seven-county region, freeway principal arterials comprise of 5.2% of lane miles but carry 40.5% of the vehicle-miles traveled. In the nine-county commute shed, freeway principal arterials comprise of 1.6% of lane miles but carry 21% of the vehicle-miles traveled.

TTI data also show an increase in travel in the Twin Cities region, a trend that has never been interrupted in the last several decades. Between 1983 and 2003, the number of daily travelers on the roadways during the peak period has increased by 84%.

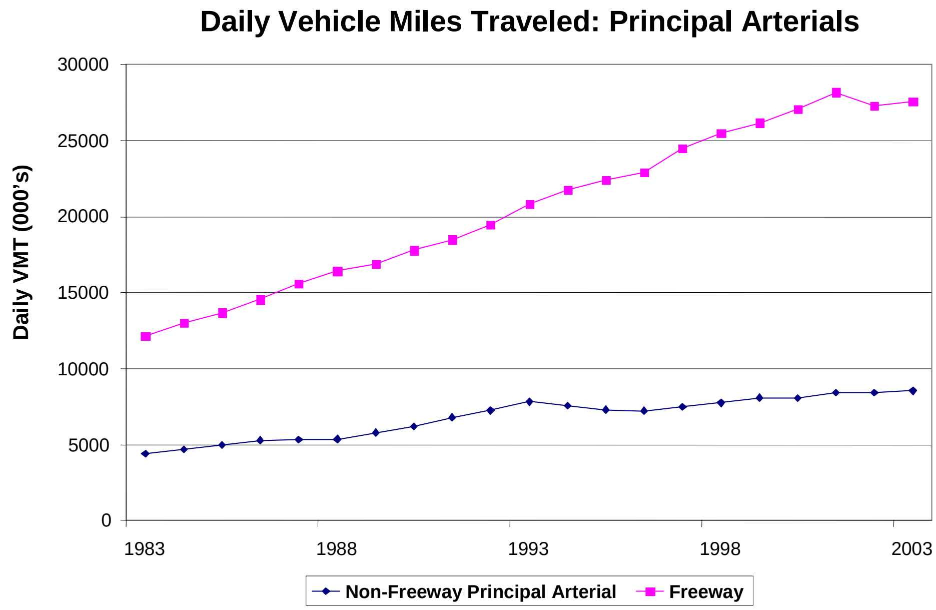
Peak Period Travelers



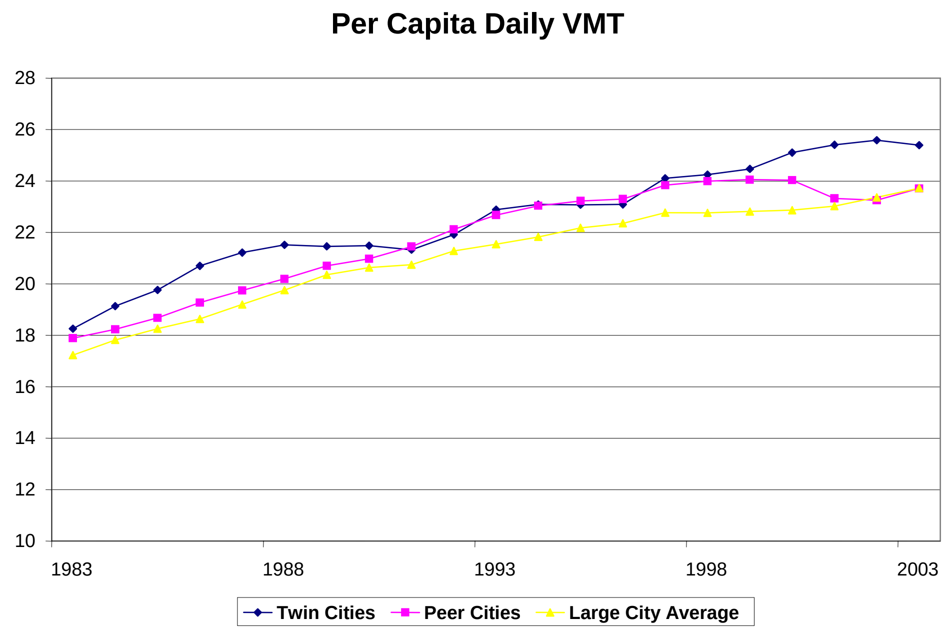
Source: TTI Urban Mobility Report

While freeway lane miles have not been expanded as much as other classes of roads in the last couple of decades, use of the freeway system has increased more than any other class of roads. In the 20 years between 1983 and 2003, daily VMT on the freeways has increased 127%, while daily VMT has increased 94% on non-freeway principal arterials and total system VMT has increased 97%. Almost all of this growth occurred during the 1980s and 1990s, as both total and per capita VMT have remained relatively constant since 2000.

Daily VMT per person has increased from 18 in 1983 to over 25 in 2003, about two miles more per day than in peer urban areas and the large cities. As the figures below show, the Twin Cities area has slowed the rate of increase in per capita VMT but many other peer cities (Seattle, Portland, Dallas) have been able to reduce per capita VMT in recent years while it continues to increase here.



Source: TTI Urban Mobility Report



Source: TTI Urban Mobility Report

The number of vehicle-miles traveled on Twin Cities roads has been increasing constantly during the last 20 years. Daily VMT has increased most considerably on principal arterials. Per capita daily VMT is higher in the Twin Cities than in peer regions and in other large cities.

Truck Vehicle-Miles Traveled

The Minnesota Department of Transportation maintains data on daily truck (heavy commercial) miles traveled on trunk highways. Truck miles have increased steadily for the past 10 years. Between 1995 and 2004, truck miles increased 16.5% in the entire commute region. Growth in truck miles was particularly strong in the nine-county commute shed.

Year	Seven-County Metro	Nine-MN-County Commute Shed	Total Metro Commute Area
1995	2,051,671	610,110	2,661,781
2000	2,149,382	724,481	2,873,863
2004	2,239,322	861,067	3,100,389
Change: '95-'04	9.1%	29.1%	16.5%
Change: '00-'04	4.2%	15.9%	7.9%

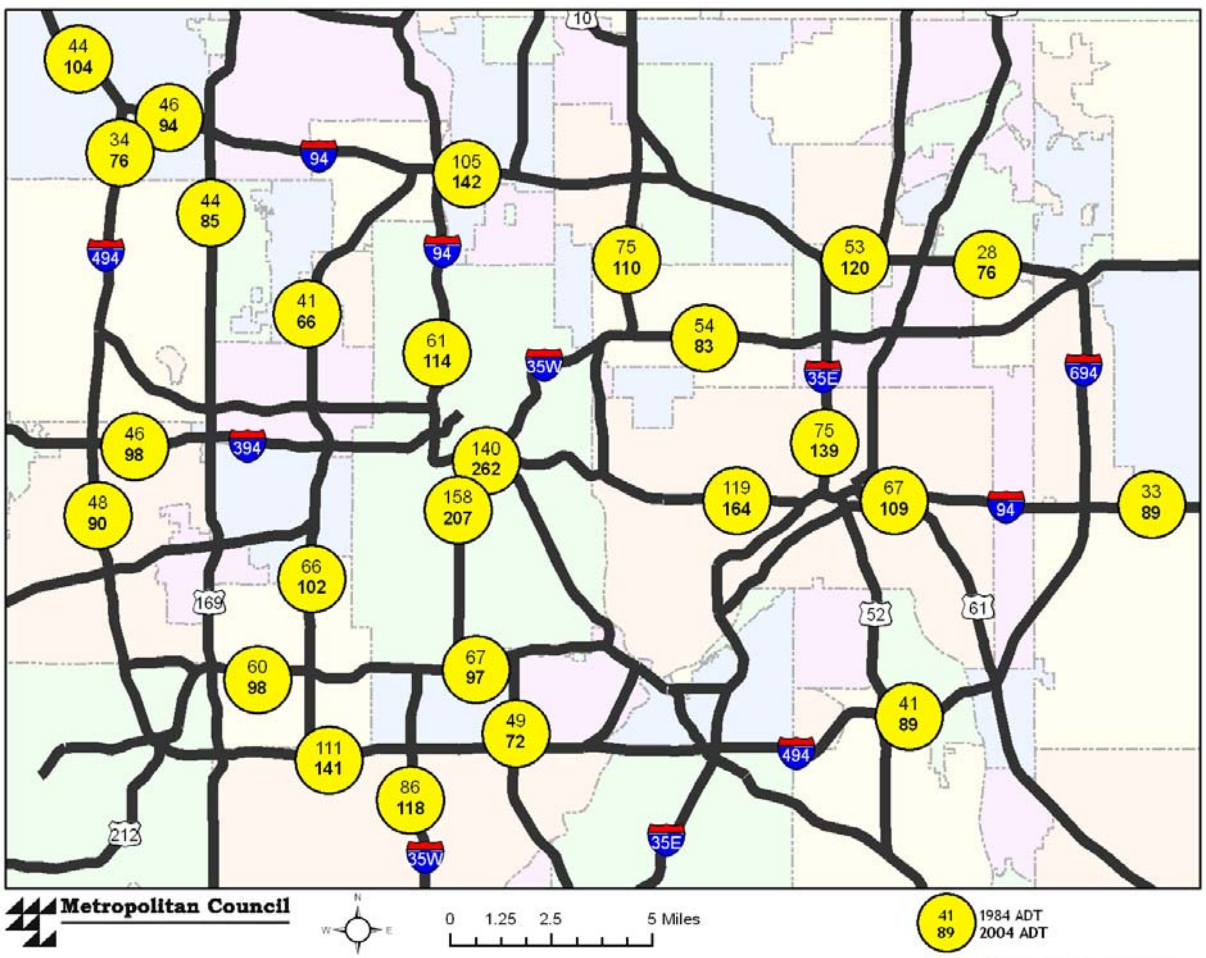
Source: Minnesota Department of Transportation

The number of miles of travel of heavy commercial trucks in the region has been increasing steadily in the last 10 years. The increase in truck traffic is most pronounced in the nine-county commute shed, where it increased 29.1% between 1995 and 2004. Growth in the seven-county region during the same period was 9.1%.

Daily Traffic on the Highway System

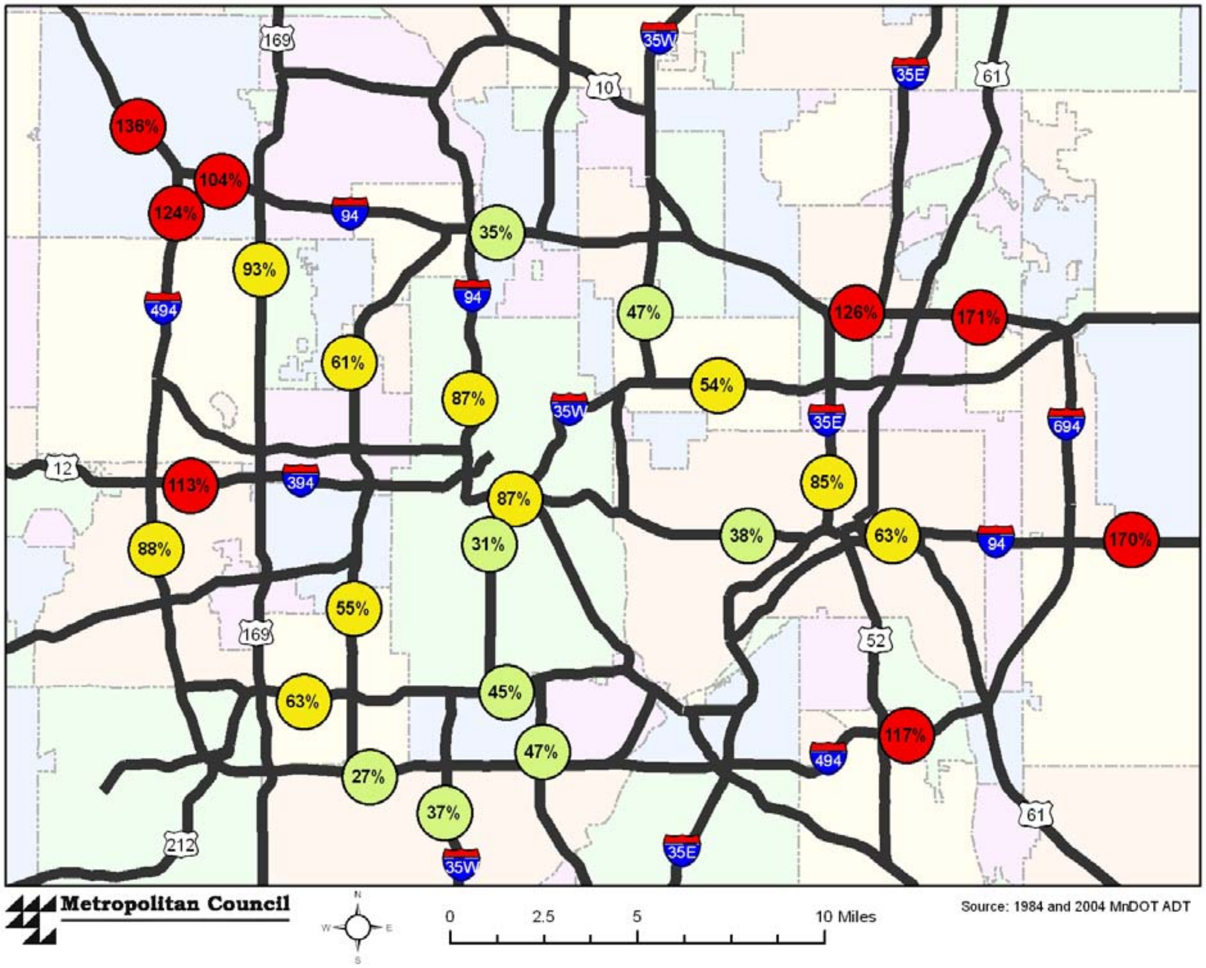
Average daily traffic (ADT) on the Twin Cities' highway system grew throughout the system during the last 20 years. The busiest segments of the highway system remained along I-94 and I-35, but traffic along them grew slower than the rest of the system. The fastest growing segments of the highway network were in the eastern and northwestern sections of the metropolitan area.

Traffic Growth: 1984 to 2004



(ADT values in 1000's Vehicles)
Source: 1984 and 2004 MnDOT ADT

Growth in Daily Traffic Volume: 1984 to 2004



Crashes and Fatalities

The performance measure Mn/DOT uses to track crashes on the state highway system is the annual crash rate. The crash-rate performance target was using a baseline of 38,000 crashes per year. This understanding of trends results in a target crash rate of 0.73 crashes per million-vehicle miles (MVM) in 2023.

Target	**2009**	**2013**	**2023**
Crashes per MVM	0.96	0.88	0.73

Based on historical information, crashes on the trunk highway system have remained relatively constant. At the same time, system use has increased substantially. The increase in system use and the relatively constant number of crashes have resulted in a declining overall crash rate. The three-year average for the total crash rate on the trunk highway system has declined from 1.42 to 1.27 over the last five years continuing a long-term trend. The metropolitan area, however, has seen an increase in overall fatalities from crashes.

The number of crashes per traveler on the highway system has been declining over the last 10 years. However, the number of fatalities from crashes has increased.

Performance of the Highway System: Current Measures and Historical Trends

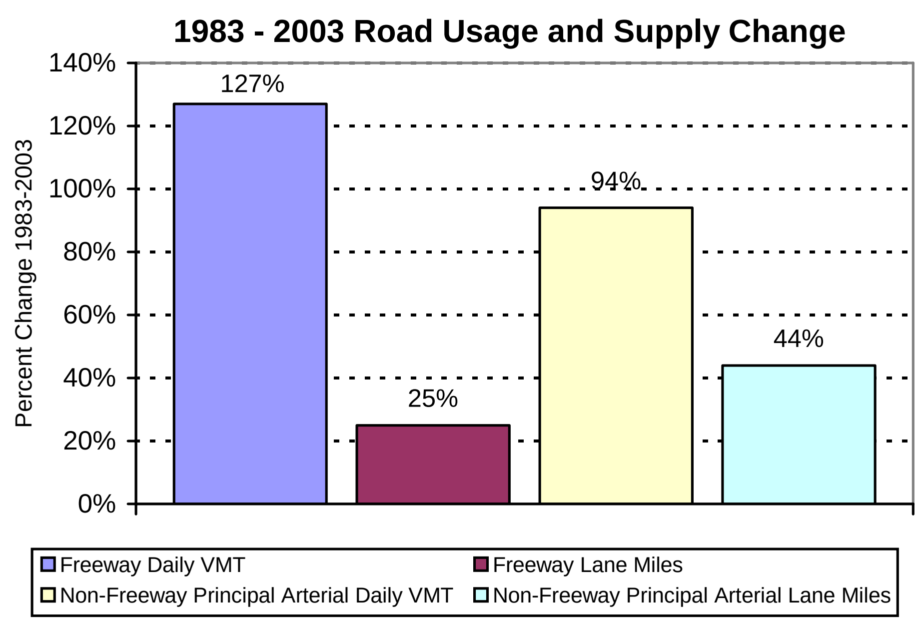
The level of congestion experienced by the traveling public has increased significantly in the last 20 years. While traffic congestion in the Twin Cities is comparable to many similar regions, the growth in congestion and its impacts on speeds and travel times are among the worst in the nation.

Various researchers define congestion differently. This report uses the Texas Transportation Institute's Urban Mobility study because it provides information that can be compared with other regions. However, the TTI measures used in this report are not the only measures available. The Minnesota Department of Transportation uses a different set of performance measures that are also referred to in this report. However, all measures show that increases in vehicle-miles traveled over time, together with slower highway capacity growth, have led to an increase in Twin Cities congestion.

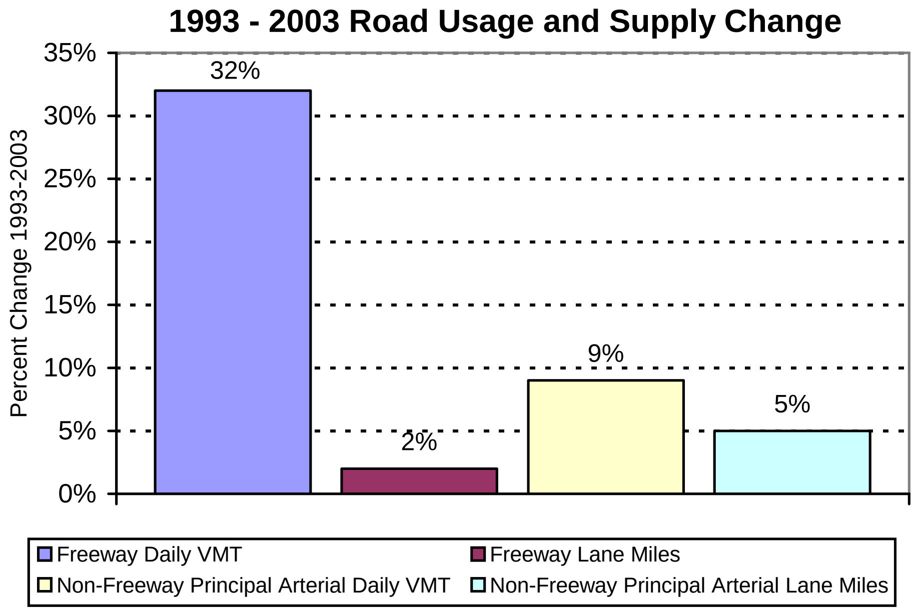
Growth in Roadway Use

Between 1983 and 2003, the number of freeway lane-miles grew 25% and that of non-freeway principal arterial lane miles grew 44%. Vehicle-miles traveled on these roads have increased much faster than the system has expanded. The major expansion of the highway system in the 1980s provided capacity to absorb the growth in VMT for the past 20-25 years. Highways are typically planned for a 20-25-year long-range horizon. In the metro area, that horizon is currently being reached and, consequently, the highway system is reaching its planned capacity. As highways reach their capacity, delays increase more rapidly with small increases in VMT than highways not yet at capacity.

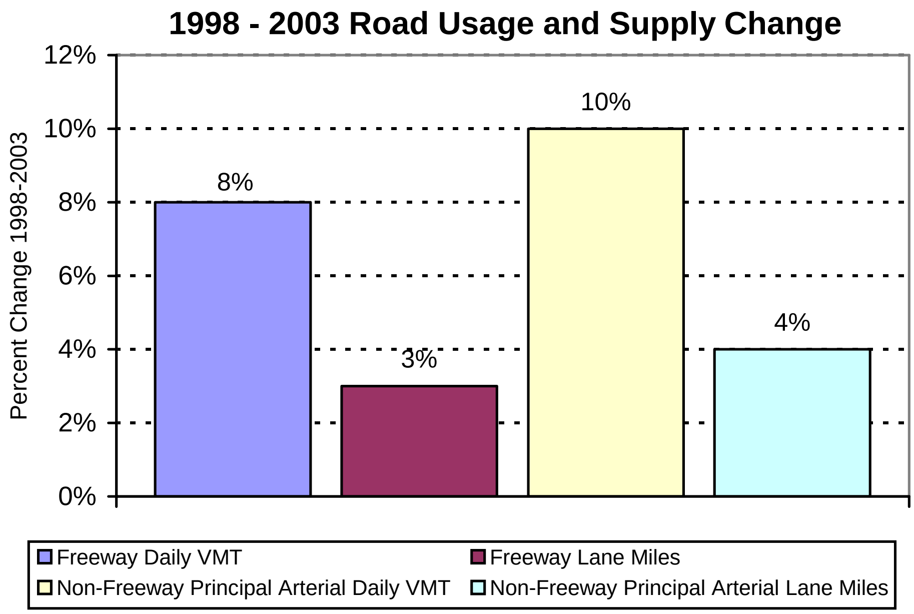
This discrepancy between the level of growth in the regional highway system and the growth of travel on the system has only increased in the last decade.



Source: TTI Urban Mobility Report



Source: TTI Urban Mobility Report



Source: TTI Urban Mobility Report

During the 1980s, construction of new highway-lane miles was able to keep up with increases in daily VMT. By the 1990s however, growth in daily VMT far outpaced increases in the construction of new highway-lane miles. This has led to more use of the existing highway network.

Vehicle Occupancy

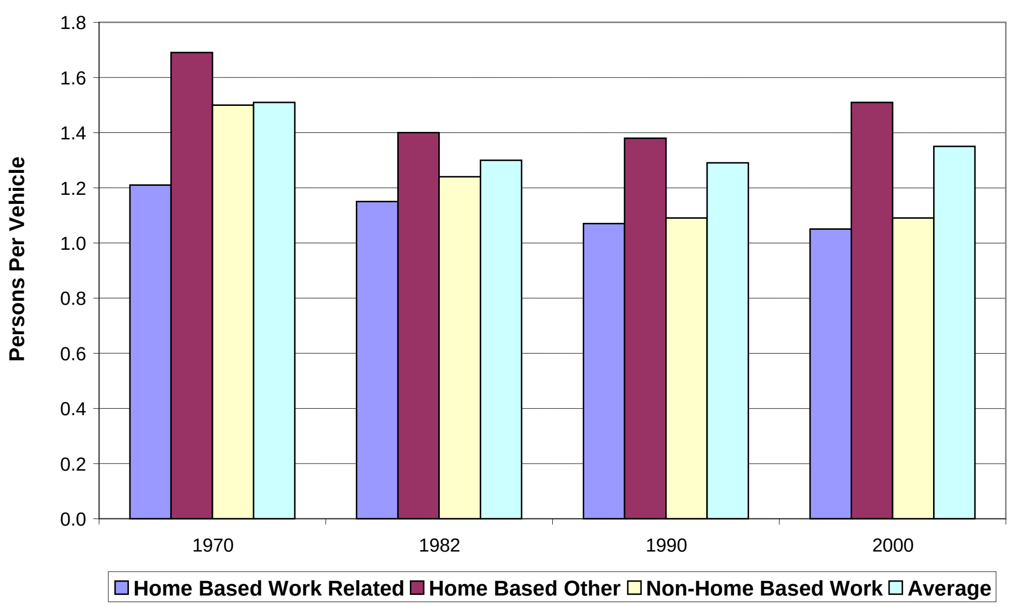
Increases in employment, decreases in household size and increases in the overall population of the region have driven the growth in the demand on the highway system. However, another reason that vehicle-miles traveled has increased is that the average number of people in a vehicle declined.

Vehicle occupancy declined steadily in the years preceding the 1980s. During the 1980s, vehicle occupancy remained practically unchanged. The 1990s saw a reversal of this trend with more people making non-work trips in vehicles with more than one person. Work-trip vehicle occupancy peaked in 1970 at 1.19 passengers per vehicle and has steadily declined to the point where it was just 1.05 in 2000. This is in part because the dispersion of work sites has made car-pooling more difficult as well as the decline of household size. The Twin Cities regional travel demand model of the Metropolitan Council predicts average vehicle occupancy to increase modestly in the next 25 years.

Trip Purpose	1970	1982	1990	2000	*2030*
Home Based Work Related	1.21	1.15	1.07	1.05	*1.10*
Home Based Other	1.69	1.40	1.38	1.51	*1.55*
Non-Home Based Work	1.50	1.24	1.09	1.09	*1.16*
Average	**1.51**	**1.30**	**1.29**	**1.35**	***1.52***

Source: Metropolitan Council

Average Vehicle Occupancy by Trip Purpose

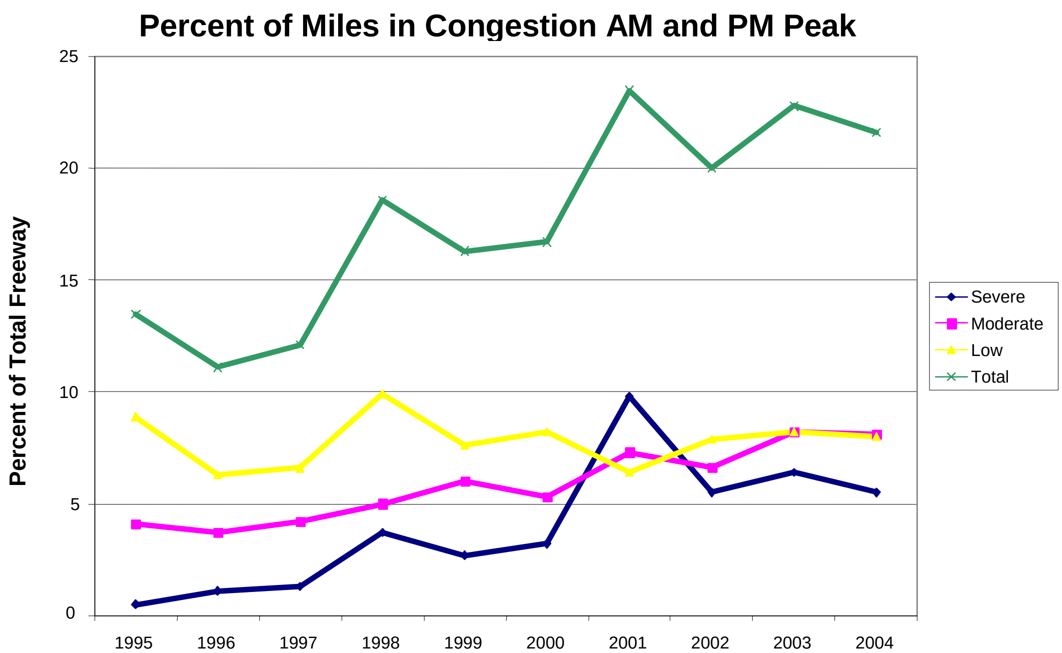


Source: Metropolitan Council

The proportion of trips taken as single-occupant trips has increased since 1970. However, it appears that this trend is stabilizing and that the proportion of non-work trips taken as single-occupant trips has begun to decrease in recent years. The Metropolitan Council's travel-demand model projects that more people will switch to high-occupant trips to a modest degree during the next 25 years.

Congestion

In assessing the performance of the freeway system, Mn/DOT has embedded detectors that measure speed of traffic. Free-flow conditions are speeds above 45 miles per hour and speeds below that are deemed congested. Mn/DOT calculates the percentage of miles on the freeway system that operate at speeds lower than this for any length of time. Tracking trends in congestion over time is difficult using the Mn/DOT data since the data-collection methods have been altered at various points prior to 2002 and because the usage of detectors has been expanding over time. The data shows the same trend, however, as the TTI data with congestion increasing considerably during the 1990s and leveling off somewhat during the early 2000s.

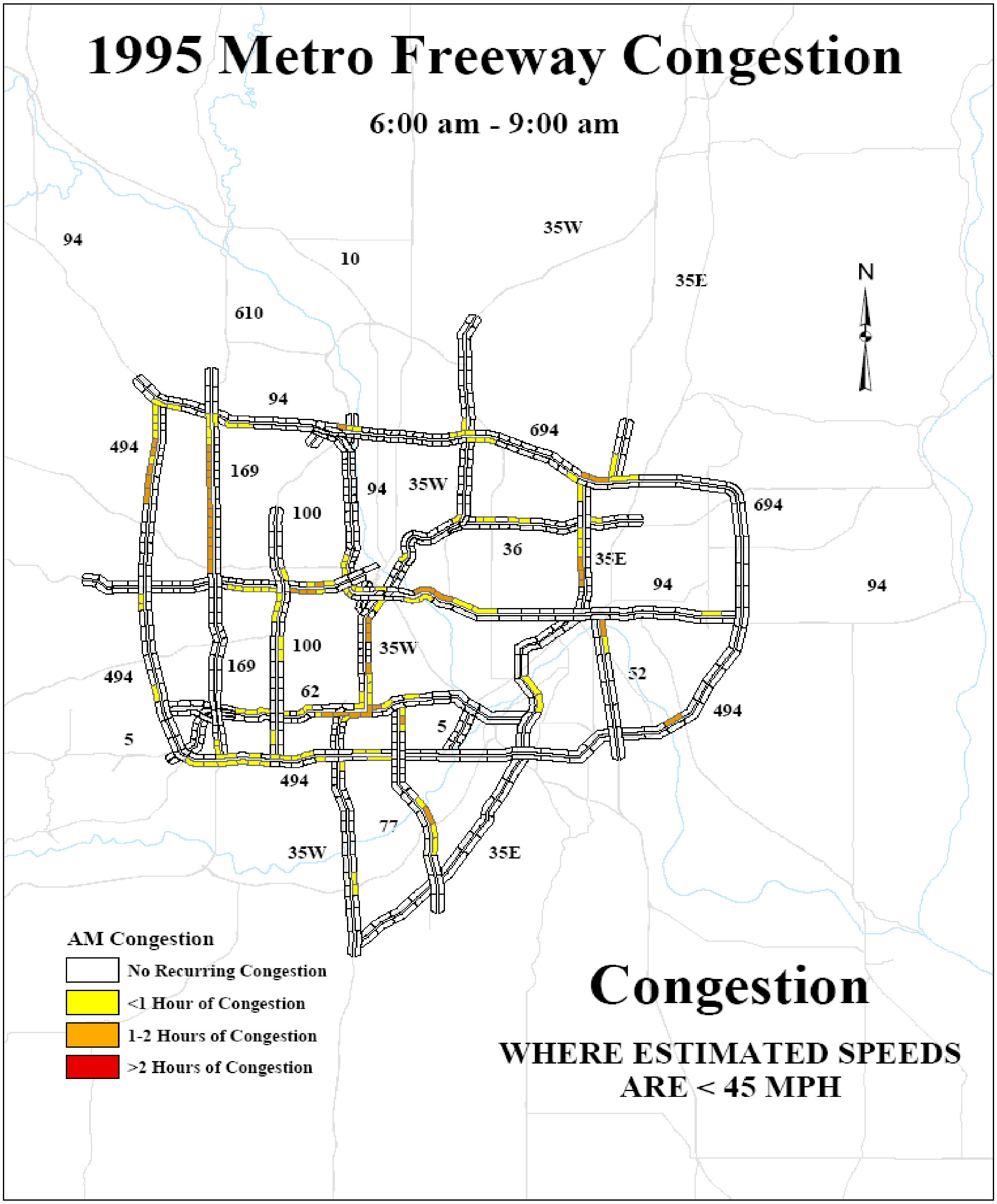


Source: Minnesota Department of Transportation

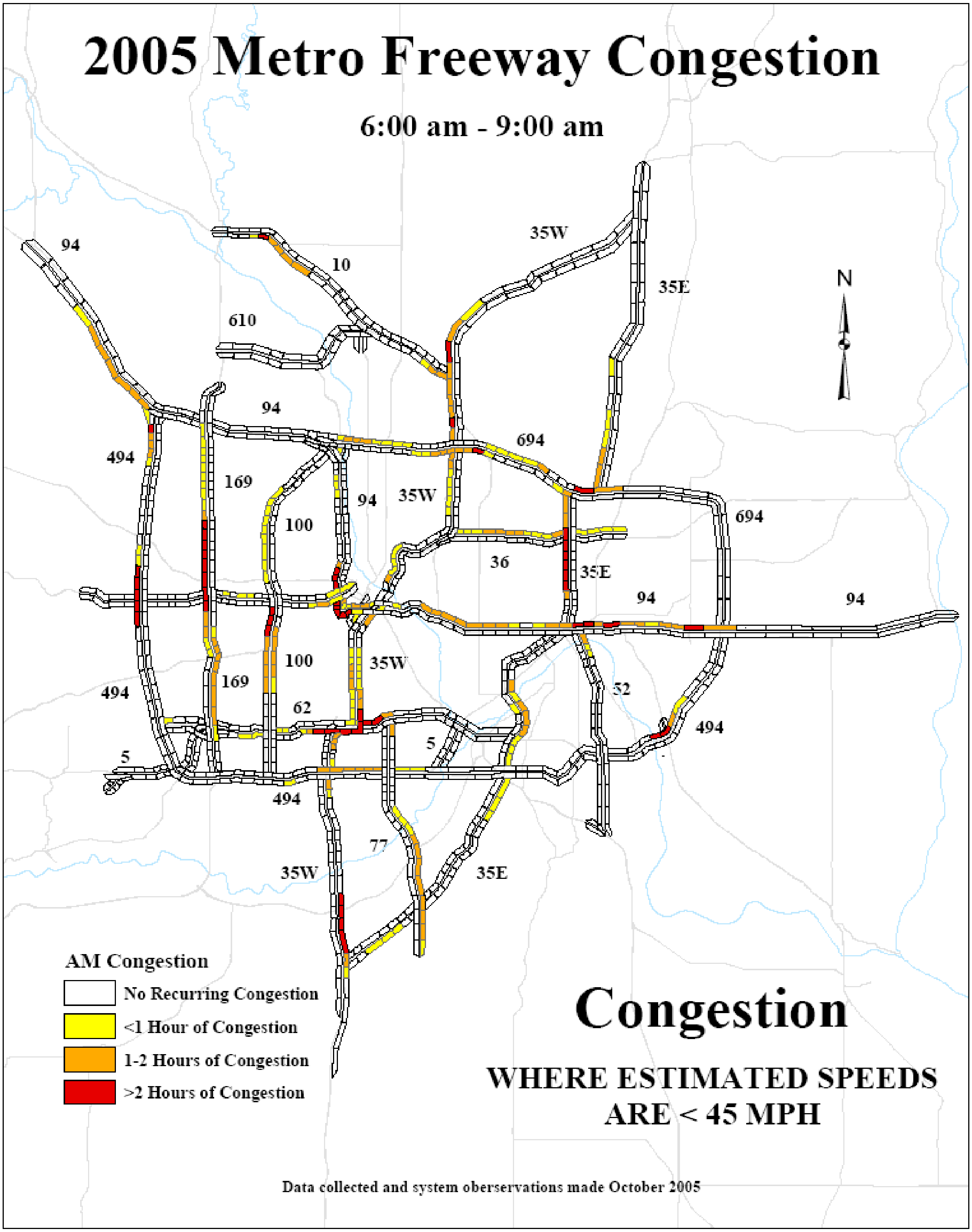
Peak Congestion

Since 1995, the% of congested freeways miles during AM and PM peak periods has increased. The following maps indicated the areas where increased congestion has occurred.

AM Peak Congestion 1995 vs. 2005

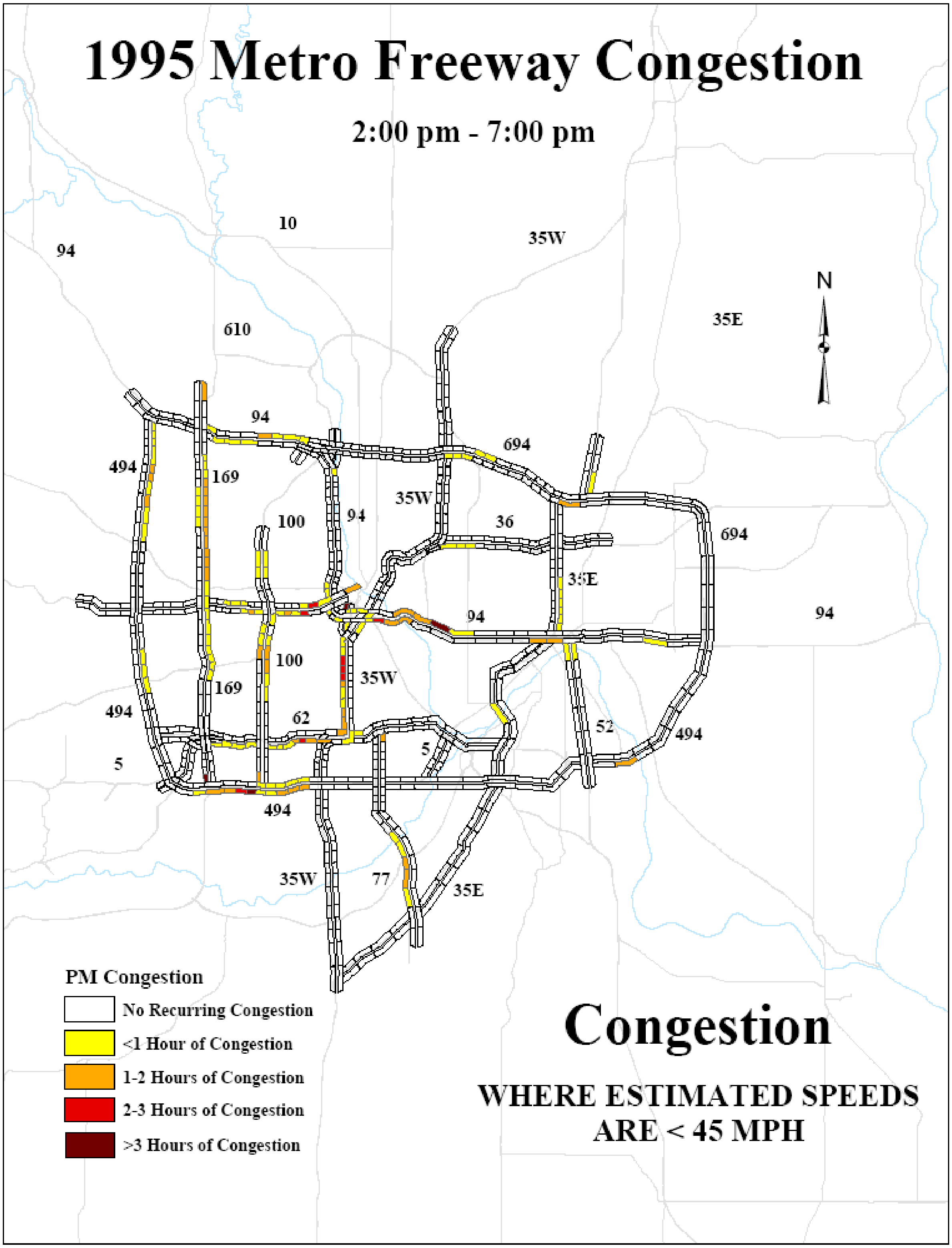


Source: Minnesota Department of Transportation

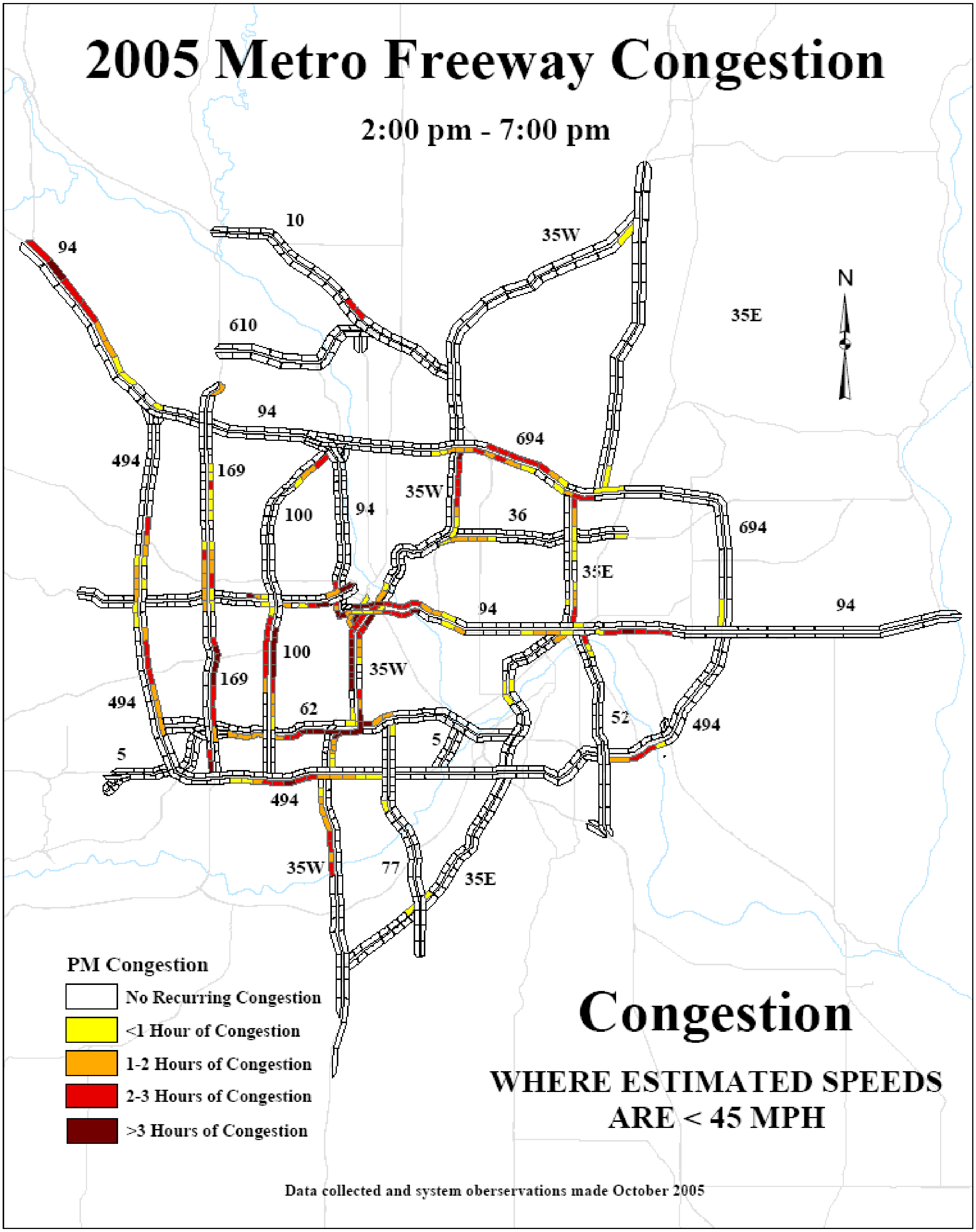


Source: Minnesota Department of Transportation

PM Peak Congestion 1995 vs. 2005



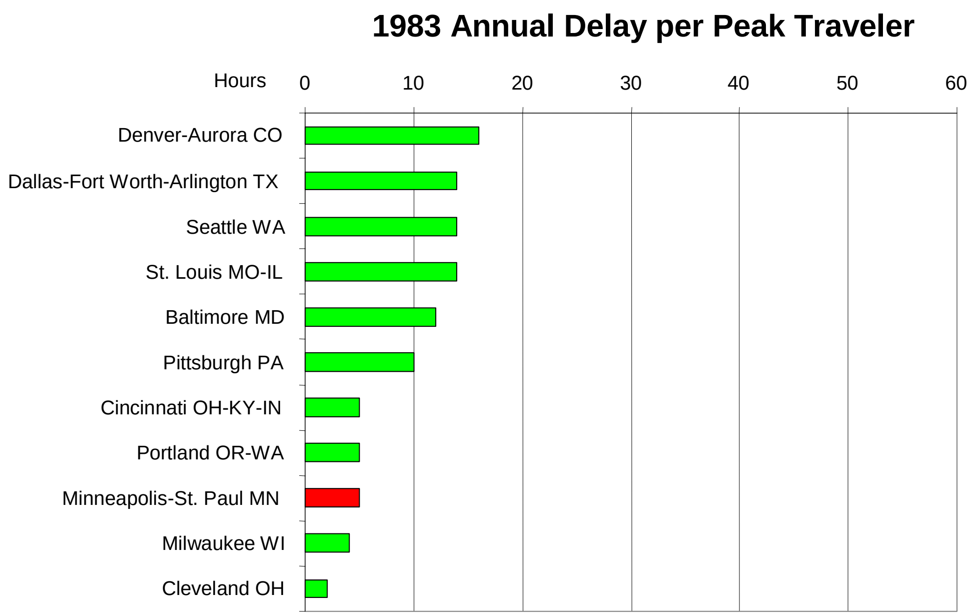
Source: Minnesota Department of Transportation



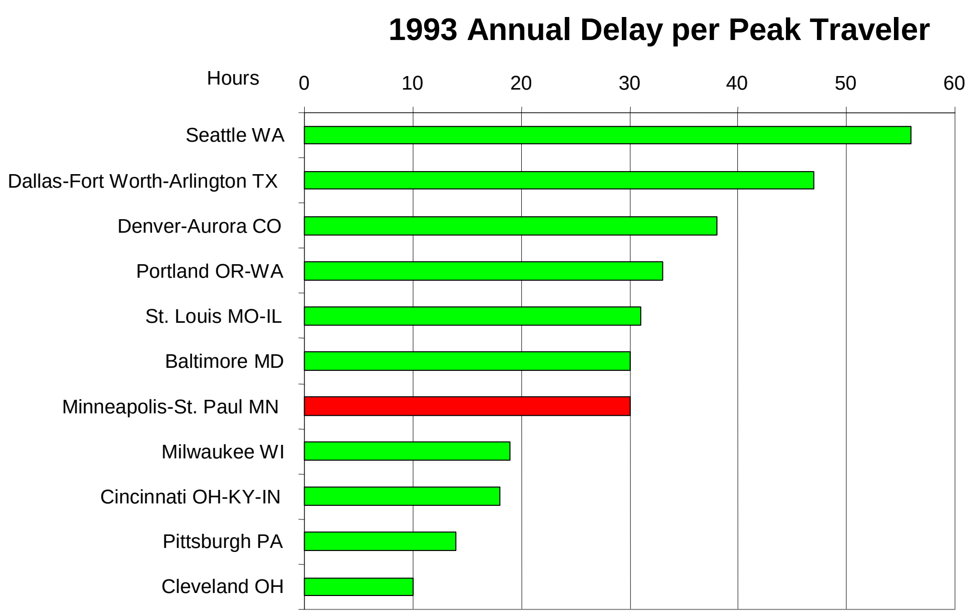
Source: Minnesota Department of Transportation

Traveler's Time Spent in Delay

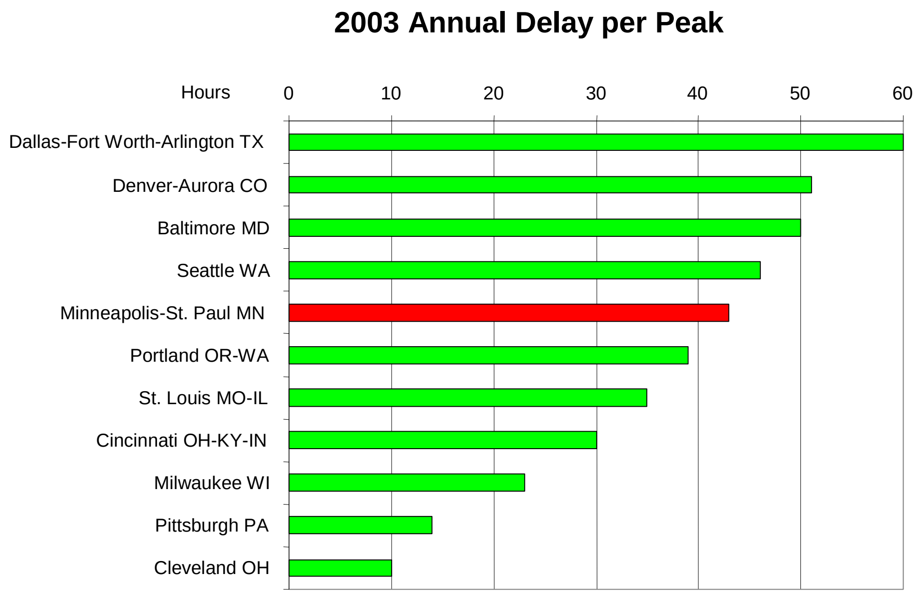
More important than the number of miles of congestion is the amount of time spent in congestion. In 2003, the average Twin Cities traveler spent 43 hours delayed in traffic. Among the 10 peer urban areas, the Twin Cities went from ninth in 1983 to fifth in 2003 in terms of hours of delay per capita



Source: TTI Urban Mobility Report

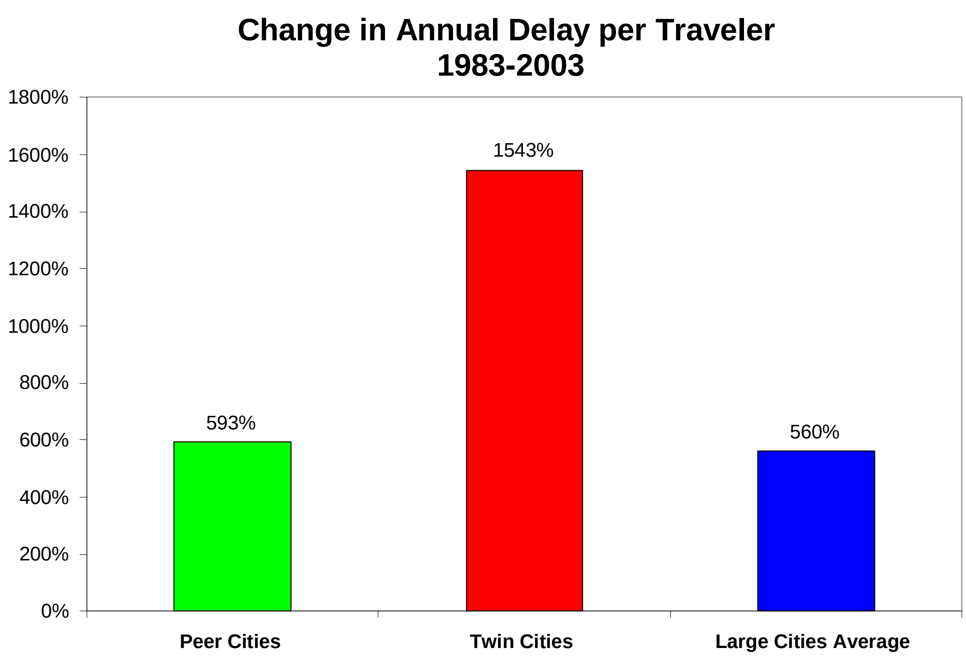


Source: TTI Urban Mobility Report



Source: TTI Urban Mobility Report

Between 1983 and 2003, per capita delay in the Twin Cities increased by more than 1500% whereas the peer city and large city averages increased by just over 500%. Put in other words, growth in the delay per traveler in the Twin Cities was three times the average growth in delay for both large cities and peer urban areas.

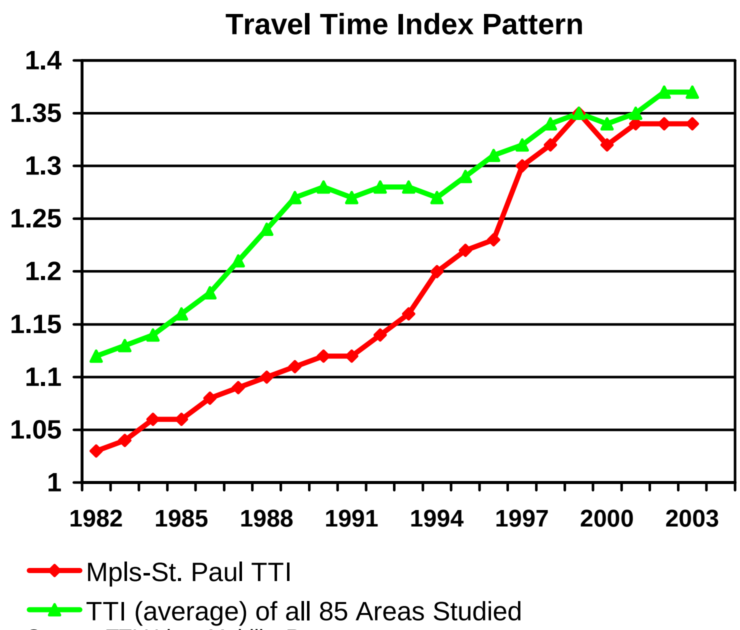


Source: TTI Urban Mobility Report

Twin Cities residents spent more time in delay than residents of peer urban areas or large cities (on average). Growth in delay per traveler was nearly three times that of growth in delay per traveler for comparable cities. In 2003, the average Twin Cities traveler spent 43 hours delayed in traffic according to the TTI Urban Mobility Report.

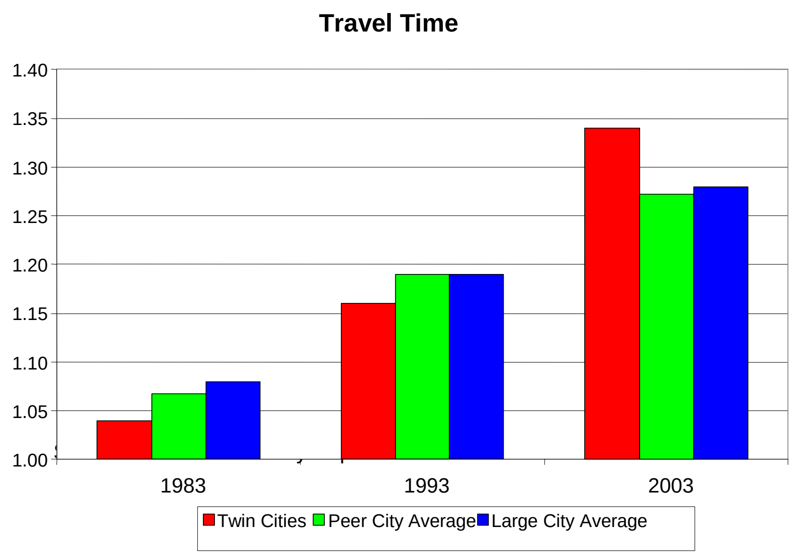
Congestion Impact on Travel Time

Another measure of congestion is the time it takes to make trips under congested conditions versus the time it would take under free-flow conditions. The Travel Time Index (TTI) is used to assess these impacts. The Travel Time Index measures the amount of additional time that a trip takes because of congestion. A TTI of 1.30 indicates that it takes 30% longer to make a trip in the peak period than in off-peak conditions, when the motorist could travel at free-flow speeds.



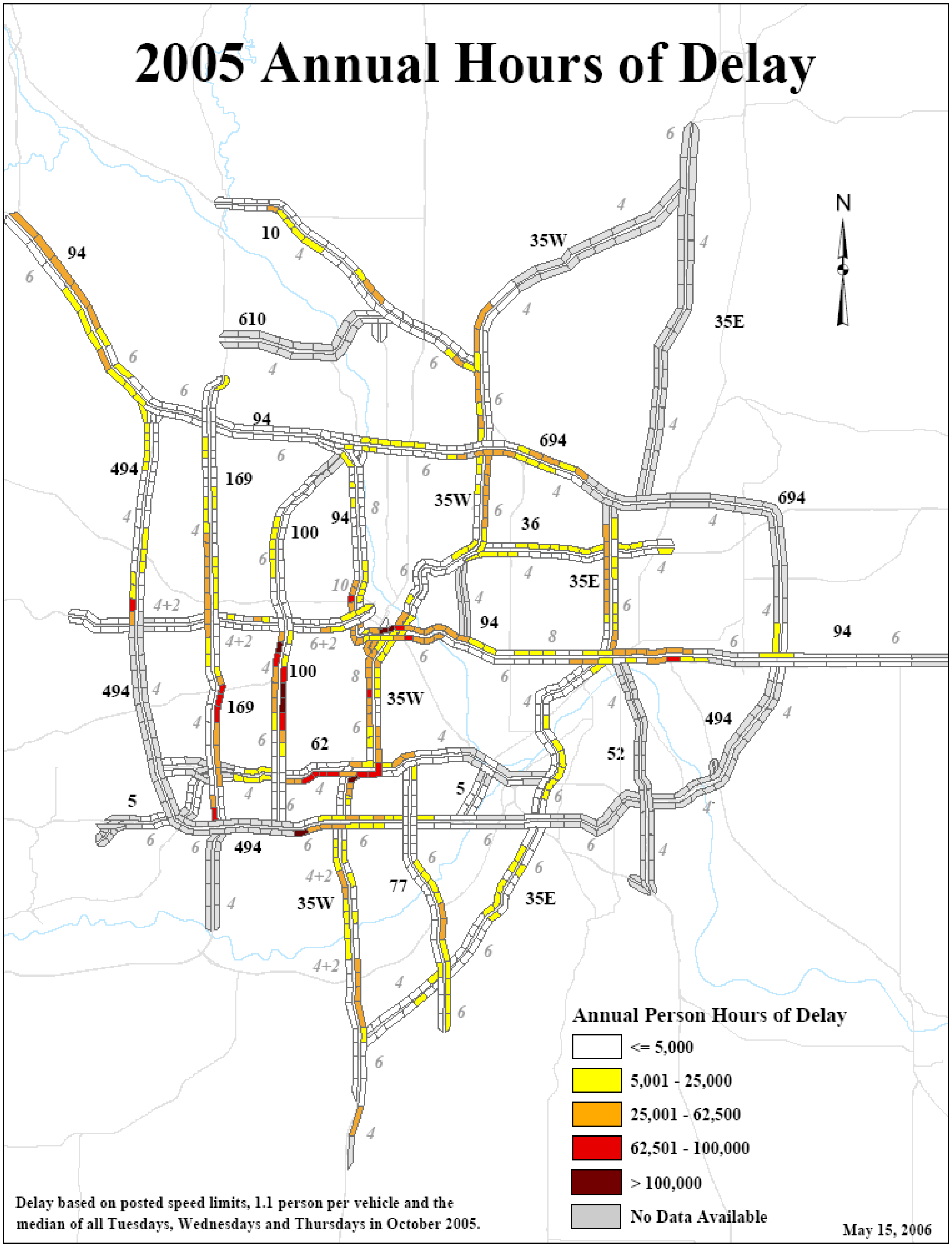
Source: TTI Urban Mobility Report

The Travel Time Index for the Twin Cities urban area was 1.34 in 2003, up from 1.04 in 1983. The average for the region's peer cities was 1.27 and 1.28 for large cities.



Traveling during the peak period was not significantly more difficult than any other time in 1983. But by 2003, traveling during the peak period took an average of 34% longer than travel in free-flow conditions. This trend exists for other cities as well but it has been much more pronounced in the Twin Cities than elsewhere. The Travel Time Index for peak travel in the Twin Cities has increased twice as fast as for comparable cities.

In 2005, the annual hours of delay in the Twin Cities were concentrated in the southwest metro but significant levels of delay were observed on I-94, I-35W north of Minneapolis and I-35E north of Saint Paul.



Source: Minnesota Department of Transportation

Current Highway Management Programs

HOV Lanes

One strategy to improve the highway system is to make carpooling, transit and other high-occupant vehicle modes more appealing. To this end, the region currently operates one High-Occupancy Vehicle (HOV) lane facility for the exclusive use of buses, carpools and motorcycles as well as one demand-sensitive High-Occupancy Toll (HOT) lane with preference still given to buses, carpools and motorcycles. One is located on I-394 (HOT) and the other on I-35W between Burnsville and Bloomington (HOV). The I-394 lane was an HOV lane and converted to a HOT lane in 2005. The following tables describe HOV usage on I-394 after the MnPass HOT lane went into effect on May 16 and HOV usage on I-35W at the Minnesota River in the Peak Period in the second quarter of 2005.

I-394 HOT Lane	Penn to Dunwoody AM EB	Penn to Dunwoody PM WB	Louisiana Avenue AM EB	Winnetka Avenue PM WB
Vehicles Moved				
HOV-Lane Total	3,739	4,089	2,367	2,670
tolled (MnPass)	568	578	423	451
HOV Per Lane	1,870	2,045	2,367	2,670
Mixed-Use Lane Total	15,101	15,908	10,961	12,437
Mixed-Use Per Lane	5,034	5,303	5,481	6,219
People Moved				
HOV-Lane Total	10,521	10,864	6,578	6,827
HOV Per Lane	5,261	5,432	6,578	6,827
Mixed-Use Lane Total	15,350	16,835	11,509	13,702
Mixed-Use Per Lane	5,117	5,611	5,755	6,851
2005 % Using HOV Lane	41%	39%	36%	33%
2001 % Using HOV Lane	37%	37%	36%	34%
HOV % of Lane Capacity	40%	40%	33%	33%

Source: Minnesota Department of Transportation

I-35W HOV Lane	AM Northbound	PM Southbound
Vehicles Moved		
HOV-Lane Total	1,940	3,259
HOV Per Lane	1,940	3,259
Mixed-Use Lane Total	12,220	11,734
Mixed-Use Per Lane	6,110	5,867
People Moved		
HOV-Lane Total	4,879	6,705
HOV Per Lane	4,879	6,705
Mixed-Use Lane Total	12,572	12,978
Mixed-Use Per Lane	6,286	6,489
2005 % Using HOV Lane	28%	34%
2001 % Using HOV Lane	26%	34%
HOV % of Lane Capacity	33%	33%

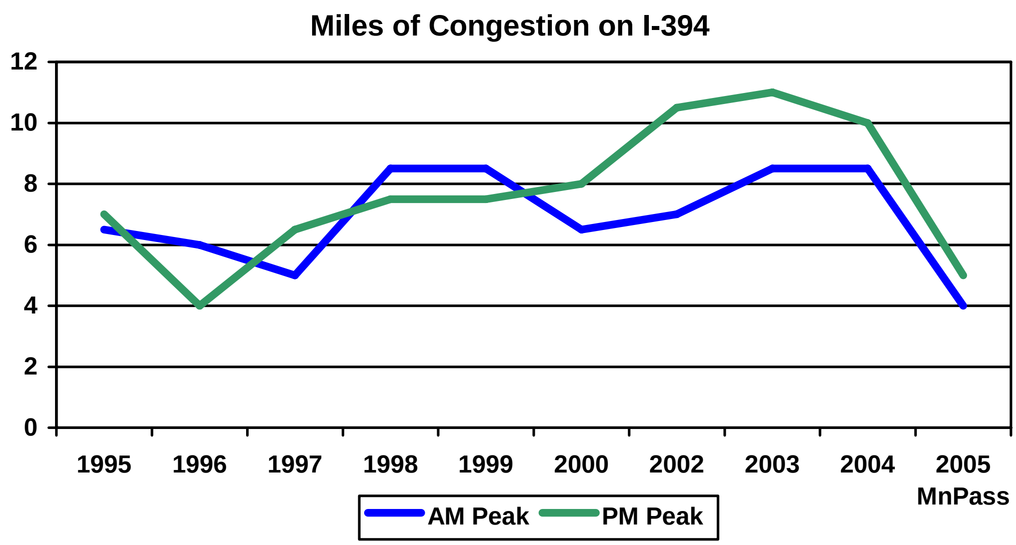
Source: Minnesota Department of Transportation

Traffic on these two corridors has not increased measurably between 2001 and 2005 and use of the HOV lanes has remained relatively constant. The HOV lanes carry slightly fewer persons per lane than the mixed-use lanes, but do so with far fewer vehicles per lane, indicating that there is still plenty of capacity for more travelers using the HOV lanes.

MnPass HOT Lane

In 2005, Mn/DOT opened the region's first High-Occupancy Toll (HOT) Lane on I-394 between Wayzata and Downtown Minneapolis. The idea behind the HOT lane is to allow single occupant vehicles (SOV) to use an underutilized HOV lane for a fluctuating price depending on the level of demand and congestion on the corridor. HOVs can still use the lane at no cost and the traffic continues to flow freely because the price of using the lane for SOVs adjusts to demand in order to maintain free-flowing traffic.

While it is too early to assess the impact of the HOT lane on the I-394 corridor completely, early reports from Mn/DOT indicate that the addition of the lane has decreased the number of miles of congestion on I-394. It has done this by essentially increasing the capacity for traffic along I-394.



Source: Minnesota Department of Transportation

> The region has two HOV lanes. These lanes carry almost as many people per lane as the adjacent multi-use lanes but with less than half the number of vehicles. The region has begun experimenting with allowing SOVs to use the HOV lane on I-394 for a demand-sensitive price in order to take advantage of the excess capacity in the HOV lane. Early reports indicate that this has reduced the number of miles of congestion on I-394.

Ramp Metering

The Minnesota Department of Transportation uses around 430 ramp meters to manage approximately 210 miles of freeways in the Twin Cities metropolitan area so that they move more smoothly and maintain high-average speeds throughout the system. In 2000, Mn/DOT conducted a study of the effectiveness of the ramp meters in the region involving the shutdown of the ramp-meter system. The study reported the following summary of the annual benefits of ramp metering:

- **Traffic Volumes and Throughput:** After the meters were turned off, there was an average of a 9% traffic-volume reduction on freeways and no significant traffic-volume change on parallel arterials included in the study. Also during peak-traffic conditions, freeway mainline throughput declined by an average of 14% in the "without meters" condition.

- **Travel Tim*e:*** Without meters, the decline in travel speeds on freeway facilities more than offsets the elimination of ramp delays. This results in annual system-wide savings of 25,121 hours of travel time with meters.

- **Travel-Time Reliability:** Without ramp metering, freeway travel time is almost twice as unpredictable as with ramp metering. The ramp metering system produces an annual reduction of 2.6 million hours of unexpected delay.

- **Safety:** In the absence of metering and after accounting for seasonal variations, peak-period crashes on previously metered freeways and ramps increased by 26%. Ramp metering results in annual savings of 1,041 crashes or approximately four crashes per day.

- **Emissions:** Ramp metering results in net annual savings of 1,160 tons of emissions.

- **Fuel Consumption:** Ramp metering results in an annual increase of 5.5 million gallons of fuel consumed. This was the only criteria category that worsened by ramp metering.

- **Benefit/Cost Analysis:** Ramp metering results in annual savings of approximately $40 million to the Twin Cities traveling public. The benefits of ramp metering out-weigh the costs by a significant margin and result in a net benefit of $32 to $37 million per year. The benefit/cost ratio indicates that benefits are approximately five times greater than the cost of entire congestion management system and over 15 times greater than the cost of the ramp metering system alone.

Performance of the Highway System: Future Highway Improvements and Expansions

Mn/DOT makes investments in improving the performance of the regional highway system. The first priority for investment is pavement reconstruction and bridge replacement. This activity keeps the existing system in working order. Second, Mn/DOT dedicates available resources toward highway system management and expansion as described in the Metropolitan Council's *Transportation Policy Plan*. The Highway Plan in the TPP includes three priorities in order of importance:

1. Preservation of the Existing Highway System
2. Management of the Highway System for Capacity and Safety
    a. Hazard-elimination and capacity-safety projects
    b. Access management
    c. Intersection improvements
    d. Signal timing
    e. Freeway-management strategies such as metering ramps, ramp-meter bypasses, bus-only shoulders, video surveillance and providing travel information
    f. Various investments to add capacity or improve safety through Intelligent Transportation Systems
    g. Construction of isolated interchanges and auxiliary lanes of less than on mile in length
    h. Tolling of existing lanes
3. Expansion of the Metropolitan Highway System

These priorities in the TPP guide the solicitation for federal funding for projects to be included in the Transportation Improvement Program (TIP). The TIP is updated every two years and covers three years of projects. A number of major highway projects are under construction or are entirely or partially in the 2005-2008 TIP. The following tables list the major improvement and expansion projects currently under way or included in the 2005-2008 TIP and projects prioritized in the 2030 long-range *Transportation Policy Plan*.

Major Highway Projects Under Way or Included in the 2005-2008 Transportation Improvement Program

Project Highway and Bridge	Cost Estimates (000s)	Current program years	Assumed year open to traffic	Project Description
1. TH 12	$60,000	2003	2006	Construct new limited access 2-lane highway between Wayzata Blvd. to CR 6 in Orono. Parallel to existing TH 12.
2. I-35E, from TH 13 to Shepard Rd.	$33,000	2002	2005	Replace and expand Miss. River Bridge. Project let.
3. I-35W, HOV lane, from 66th St. to 42nd St.	$206,000	2006	2010	Reconstruct TH 62 and I-35W and add the HOV lane. Stage 1 (I-494 to 60th St.). Contracts let 4/99
4. TH 36, St. Croix Bridge	$5,000			New 4-lane bridge and approaches. Negotiation process under way. Request for high-priority funding has been made
5. TH 55, Hiawatha Av.	$129,000	2003	2004	Reconstruct the 4-lane arterial from Crosstown to I-94.
6. TH 100, from Glenwood Av. to CSAH 152	$146,000	2003	2004	Construction underway to rebuild as 6-lane freeway.
7. I-494/TH 61 interchange, TH 61/local access	$250,000	2002	2009	Replace and widen I-494 bridge, reconstruct interchange, reconstruct TH 61. Provide local access.
8. I-94, from Weaver Lake Rd. to Humboldt Av.	$80,000	2001	2005	Reconstruct, add general-use 3rd lane from Hemlock to Brooklyn Blvd.
9. I-94 from McKnight to TH 120	$11,000	2005	2007	3rd lane, bridge widening from Ruth St. to Ramsey Co. line
10. I-494 from TH 5 to TH 100	$74,000	2003	2005	Add 3rd lane. First contract let.
11. TH 610 from TH 169 to CR 130	$26,750	2004	2005	Continue construction of new 4-lane freeway on new alignment.
12. TH 169 from Minnesota River to Valley View Road	$104,000	2005	2008	Reconstruct 3 intersections as interchanges and reconstruct interchange with I-494.
13. I-494 from TH 212 to TH 55	$130,000	2004	2006	Widen I-494 to 6 lanes.
14. TH 212 from CSAH 4 to ¾ mile west of CSAH 147	$259,000	2004	2006	Construct new 4 lane freeway on new alignment
15. I-694 from west to east Junction I-35E (unweave the weave)	$137,000	2004	2007	Reconstruct and add lanes to eliminate bottleneck
TH 169 so. of CSAH 81 to No. of CSAH 109	$41,580	2007	2009	Construct interchange bridge.
TOTAL	$1,692,330			

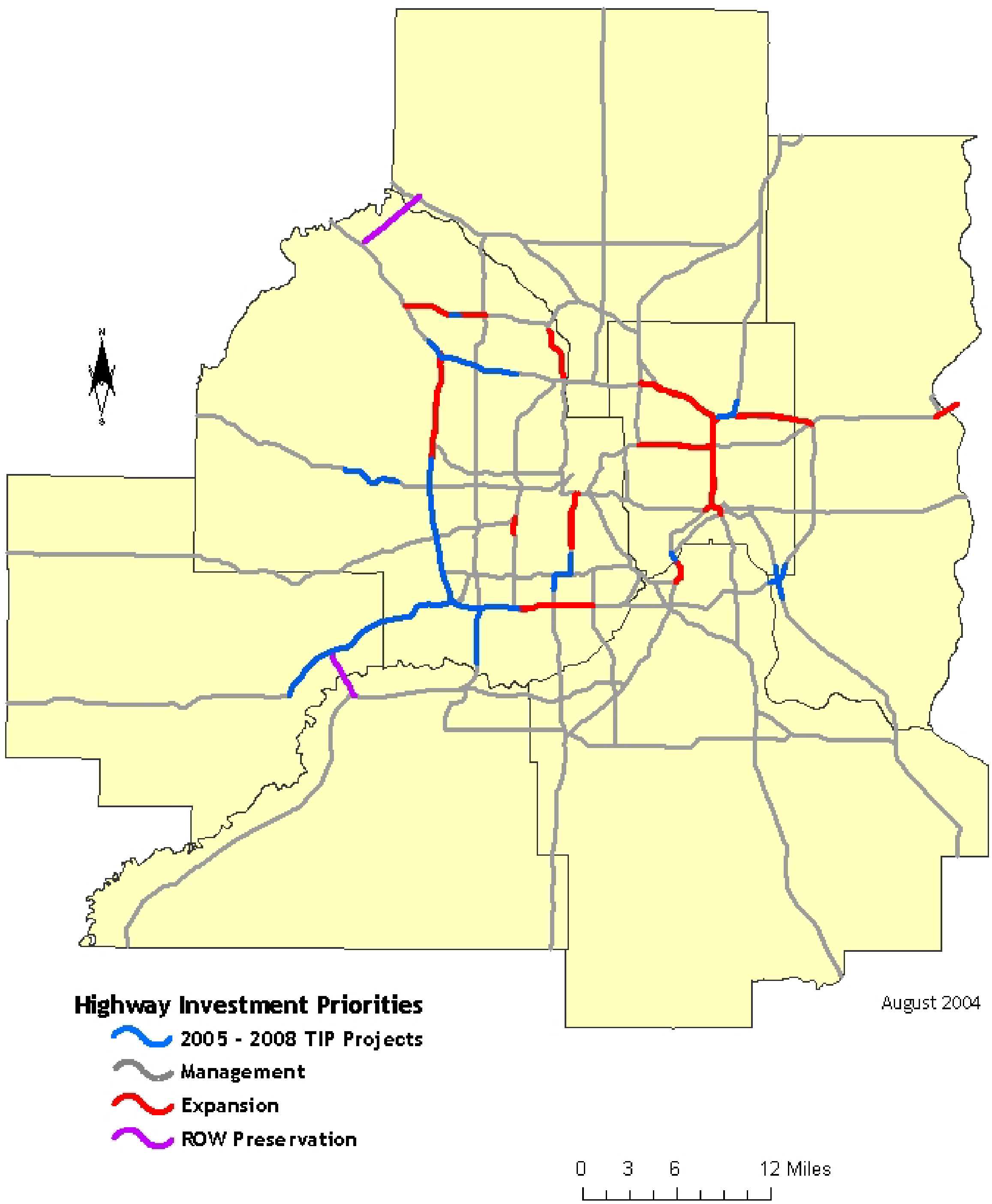
Source: *2030 Transportation Policy Plan*

Planned Metropolitan Highway System Expansion Projects: 2009-2030

Highway	From	To	Length (miles)	Total (millions)	Recommended Facility Improvement
I-35E	TH 110	TH 5	2.3	39	Bridge under construction. Add 3rd Lane.
I-35E**	I-94	I-694	5.6	197	Add 3rd and 4th lane. Connect Phalen Corridor. Reconstruct Cayuga Bridge.
I-35W**	46th St.	I-94	5.3	309	Add HOV/ transit-priority lane and Lake Street interchange.
I-494	TH 55	I-94	5.5	176	Add 3rd lane.
I-494	TH 77	TH 100	5.1	628	Build in accordance with EIS completed in 1997.
I-694**	I-35W	W. Jct. I-35E	5.6	180	Add 3rd lane.
I-694	E Jct.I-35E	TH 36	5.5	86	Add 3rd lane.
TH 36 St. Croix Bridge*			1.0	201	New 4-lane bridge and mitigation
TH 36**	I-35W	I-35E	5.3	118	Add 3rd lane.
TH 41	TH 169	TH 212	3.0	10	Preserve right-of-way after alignment is defined.
New Miss. River Crossing	TH 10	I-94 or TH 610	2.0	10	Preserve right-of-way after alignment is defined.
TH 100**	36th St.	Cedar Lake Rd.	1.0	104	Add 3rd lane.
TH 252	73rd Av.	TH 610	2.9	127	Convert to 4-lane freeway.
TH 610	CR 130	I-94	5.0	148	Complete 4-lane freeway.
TOTAL			46.8	$2,322	

Source: *2030 Transportation Policy Plan*

2030 Constrained Metropolitan Highway System Plan Investment Priorities

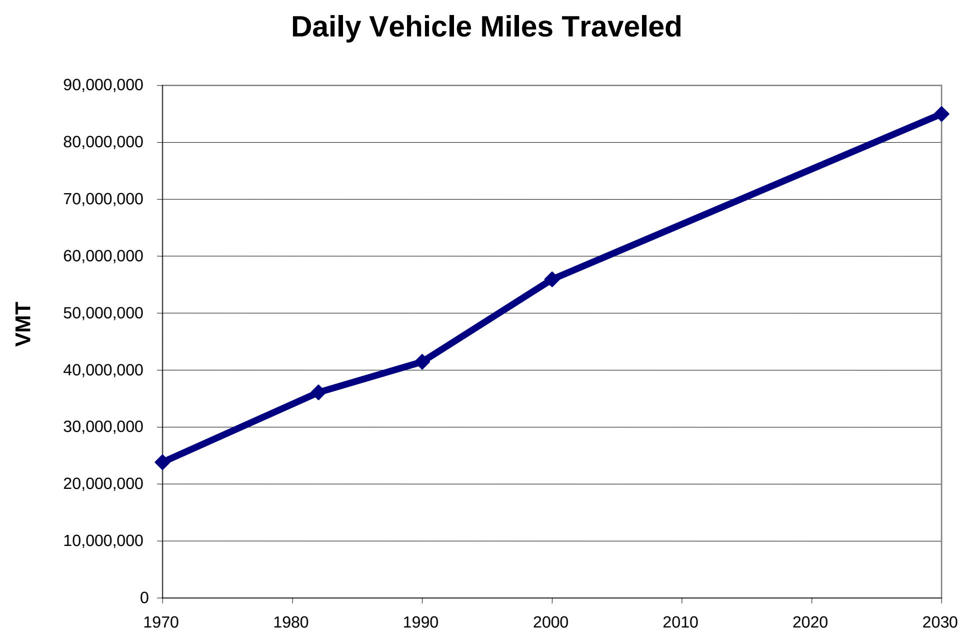


Source: *2030 Transportation Policy Plan*

Performance of the Highway System: Future Congestion

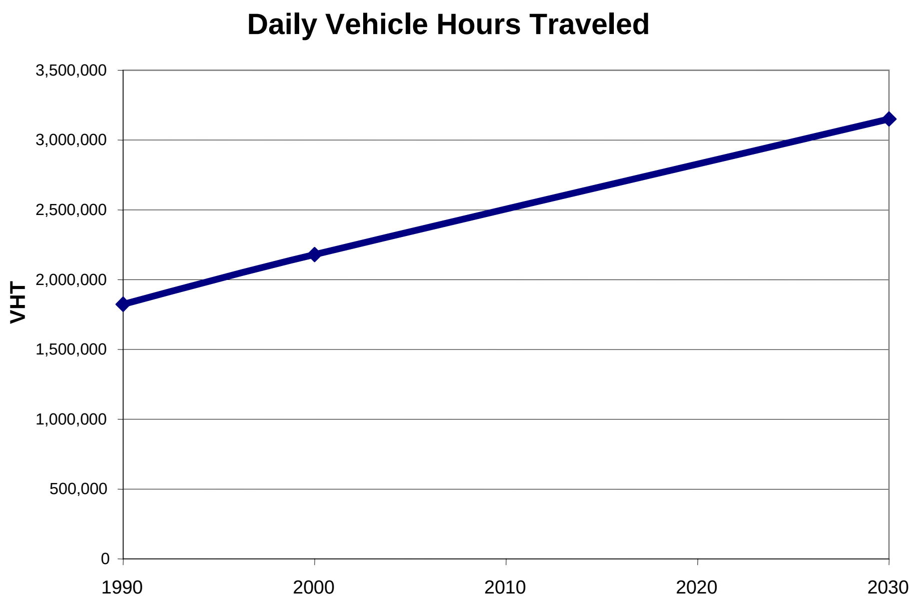
The Metropolitan Council's regional travel-demand forecast model allows projections of future conditions and assessment of future road improvements included in the fiscally constrained long-range plan. Assumptions in the model include population and employment growth, as well as highway system improvements discussed above.

Vehicle-miles traveled (VMT) increased 140% from 1970 to 2000, from 24 to 57 million VMT. If current trends in land use and transportation in the region continue under the fiscally constrained plan scenario in the *2030 Transportation Policy Plan*, VMT is expected to continue to increase to over 80 million vehicle-miles daily by the year 2030, an increase of 52% over the 2000 VMT. This means that under the current plan, per capita VMT is expected to remain relatively constant.



Source: Metropolitan Council, TBI Home Interview Survey and 2030 Regional Travel Demand Model

If trends in land use and transportation in the region continue along with network improvements under the fiscally constrained scenario of the *2030 Transportation Policy Plan*, vehicle-hours traveled (VHT), is expected to grow to over 3 million hours of vehicle travel daily by 2030, an increase of 45% from 2000.



Source: Metropolitan Council, TBI Home Interview Survey and 2030 Regional Travel Demand Model

Regional travel-demand models predict total daily vehicle-miles traveled to increase to almost 85 million and daily vehicle-hours traveled to increase to over 3 million by 2030. This is based on projections of employment and population growth and transportation network improvements included in the fiscally constrained scenario of the *2030 Transportation Policy Plan*.

Performance of the Highway System: Conclusions

Through the decade of the 1980s, traffic growth and its impacts on congestion, travel time and speeds grew but at a manageable rate. For all measurement criteria, this region was below the average both for the 11 peers and for large cities. This changed, however, in the 1990s. By 1999, the rate of change for all of the measurement criteria for the Minneapolis-Saint Paul urban area had increased faster than our peers and the large-area average. Furthermore, the measurement values placed the region in a worse condition than each of those two averages. Since 1999, the congestion rate appears to have stabilized somewhat but this may be due to the slowing economy of the early 2000s and not indicative of a long-term trend.

Traffic and its impacts in the region are growing faster than the increases in road and transit capacity can serve, thus resulting in worsening conditions for the traveling public. Furthermore, model results indicate that this trend is expected to continue into the future given the assumed funding levels for road and transit improvements, making worsening congestion almost a certainty.

Many factors that create congestion actually come from positive trends in the region. The Twin Cities has experienced healthy economic growth over the last 20 years, bringing with it new residents, new jobs and more income, all of which drive up the demand for travel. The peer urban areas that have seen the smallest increases in congestion over the last 20 years are also those urban areas that have had the most difficult time economically. In many ways, congestion is a byproduct of a successful metropolitan region, so some levels of congestion are to be expected. The purpose of managing the transportation network better is to enhance the ability of

Twin Cities residents, workers and visitors to access the things they need. By themselves, measures of congestion do not reflect how well the system is working.

Addressing the problem of congestion is an extraordinarily complicated and expensive project. It involves increasing the capacity of the transportation system while reducing future demand on the system where possible. Expanding highway capacity can be accomplished by adding lanes to existing freeways. It can also be accomplished by adding transit-only and HOV lanes in dedicated rights-of-way along highway corridors and by managing the highway system better, such as with meters at on-ramps on freeways, adding toll lanes and employing access management on arterials. HOV lanes and transitways also can reduce the demand on the system by reducing the growth in the number of vehicles that need to use the system to carry an increasing number of travelers. Another critical piece of addressing this issue is connecting land-use decisions to transportation investments. The region has had a trend of becoming much larger and less dense over the last few decades. This has only begun to reverse itself over the last several years. Land-use decisions with the purpose of reducing per capita VMT would also help reduce the growth in congestion.

The challenge, therefore, is to maintain an acceptable level or slow the growth of congestion before it becomes a hindrance to further economic growth and quality of life. In addition, there is a challenge to provide more alternatives to commuting alone during peak periods so that the burden of congestion can be avoided for many trips. These goals lay the foundation for the investment strategies outlined in the region’s long-range transportation plan, which will determine investment priorities for future available funding.

This analysis clearly indicates increases in travel demand will greatly outpace the increase in the region’s current transportation plans. This will only result in more congestion on the arterials and local streets, exacerbating the current trend.