

Vehicle Miles of Travel Trends in Minnesota: 1992 –2010



Minnesota Department of Transportation
Office of Transportation Data and Analysis
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MnDOT Office of Transportation Data and Analysis

Introduction

The Office of Transportation Data and Analysis (TDA) at the Minnesota Department of Transportation (MnDOT) computes and reports vehicle miles of travel (VMT) for the roadway network in Minnesota. VMT is commonly used to measure the demand on our transportation network. It is defined as the total number of miles traveled by all vehicles during a certain time period, usually daily or annually. Daily VMT is computed by multiplying average annual daily traffic (AADT) by the centerline distance (in miles) of each roadway segment.

Heavy commercial VMT (HCVMT) is calculated by multiplying heavy commercial AADT by the segment length. In Minnesota traffic data are collected on all state highways, county roads, and municipal state-aid streets on a cyclical basis. Until recently, MnDOT only counted heavy commercial traffic on the state trunk highway system; hence HCVMT trends can only be accurately calculated on the state highway system which includes Interstate, US, and MN trunk highways.

In previous decades, Minnesota has seen steady growth in VMT. However, since 2004 VMT growth in Minnesota has been virtually flat and from 2009 to 2010 it declined by 0.5%¹. Nationally, VMT increased 0.7% (20.5 billion² miles) in December (as of December 31). It has become more difficult for traffic forecasters to project VMT growth into the future due to changes in VMT trends. The purpose of this report is to monitor and report on VMT trends and the most current VMT and HCVMT conditions on Minnesota roads. This report also explores trends in several major factors that impact VMT such as population, employment, and gas prices in Minnesota.

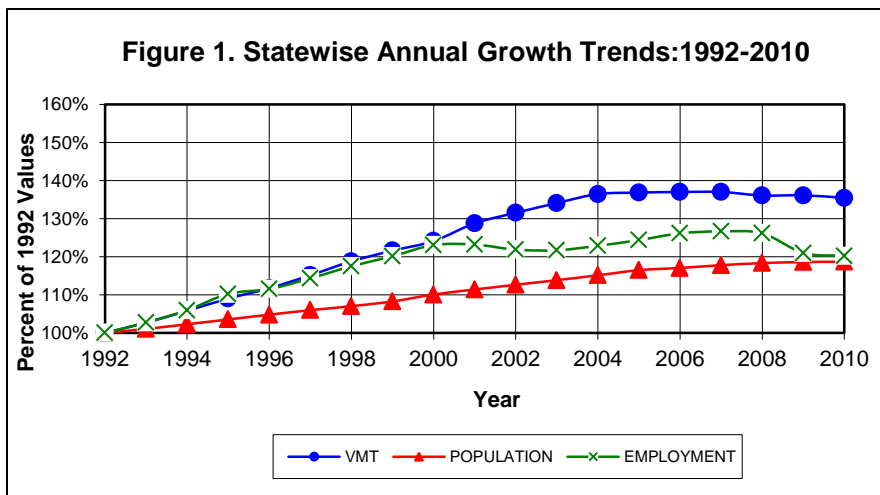
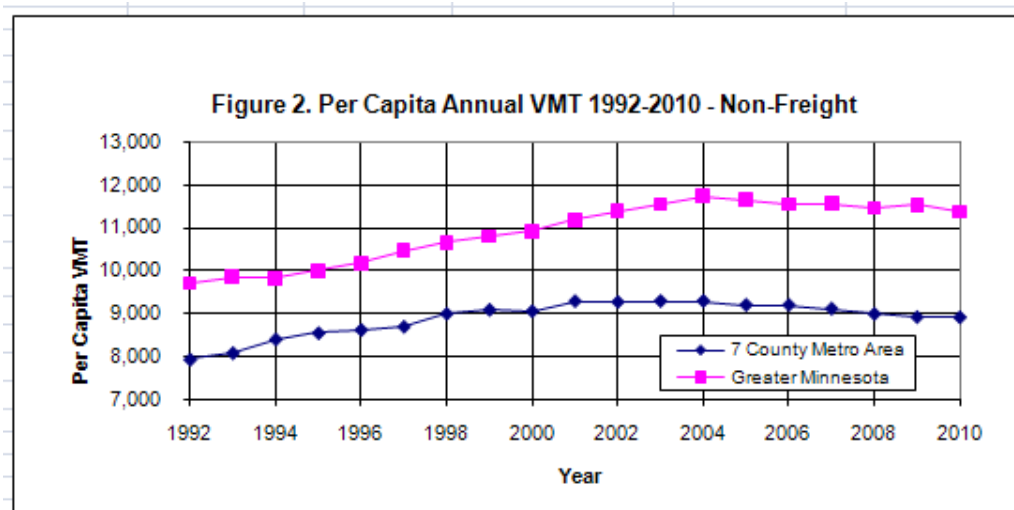


Figure 1 illustrates changes in VMT, population, and employment in Minnesota between 1992 and 2010. During most of the 18-year period, growth in VMT has outpaced population and employment. VMT increased by a total of 35.4%, population increased 18.7%, and employment increased 20.2%. However, VMT has been stable in recent years.

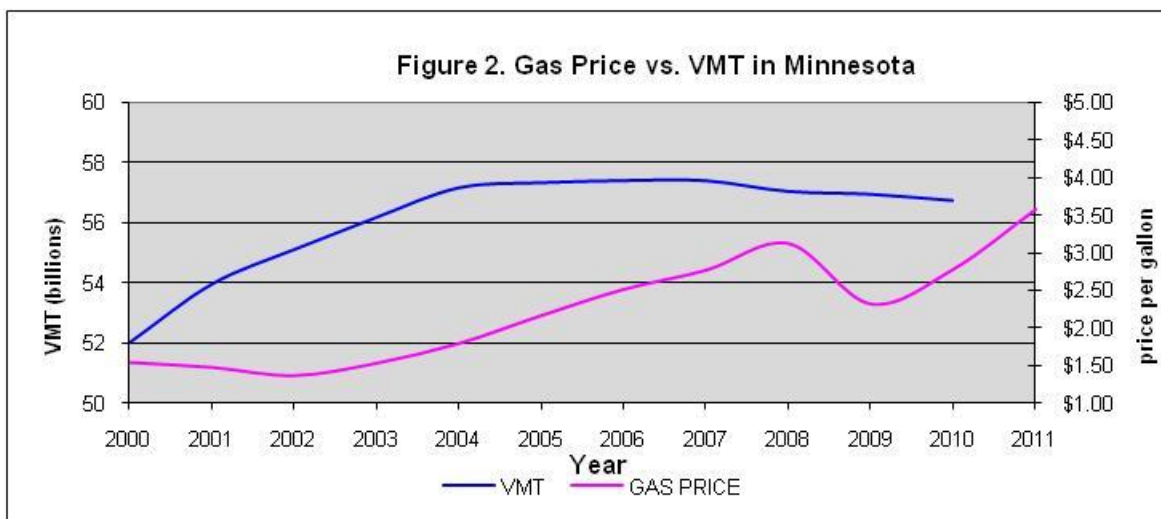
Source: Minnesota State Demographic Center;
Minnesota Department of Employment and Economic Development;
MnDOT, Office of Transportation Data and Analysis

1. VMT on state highways decreased 0.65% and county roads declined 0.49%. For more information on how to calculate 2010 VMT, see appendix A.
2. Estimated on FHWA's Traffic Volume Trends Report, which is based on a sample of automatic traffic recorders from each state.



Source: Minnesota State Demographic Center;
MnDOT, Office of Transportation Data and Analysis

Another way to look at VMT trends is to calculate per capita VMT; that is VMT divided by the population. This measure is the average vehicle miles people travel. Although population has been increasing, per capita VMT has decreased since 2004 in both the metro and non-metro areas as illustrated in Figure 2. The decrease means that individuals are driving less. The 2010 per capita travel in the Metro Area has fallen below 1998 levels.



Source: Mn/DOT, Budget Section, Office of Finance;
Mn/DOT, Office of Transportation Data and Analysis

It appears that as gas prices increased motorists began taking fewer trips, carpooling, and using more public transportation. In the Twin Cities metro area transit ridership has been increasing since 2004, although 2008 to 2009 it decreased by 6.2%³ due to the recent decline in gas price from 2008 to 2009. The gas price vs VMT graph in Figure 3 shows that as gas prices rose, VMT growth flattened beginning in 2004. Decreasing variability in gas prices and changes in driver behavior create a major challenge for traffic forecasters, transportation planners, and transportation engineers with respect to projecting future VMT.

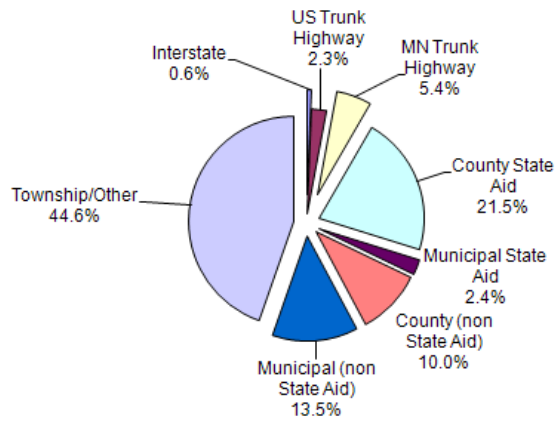
3. The ridership information is from Metropolitan Council.

4. This includes all types of gas: E85, M85, diesel combined, and etc.

Trends in Vehicle Miles of Travel

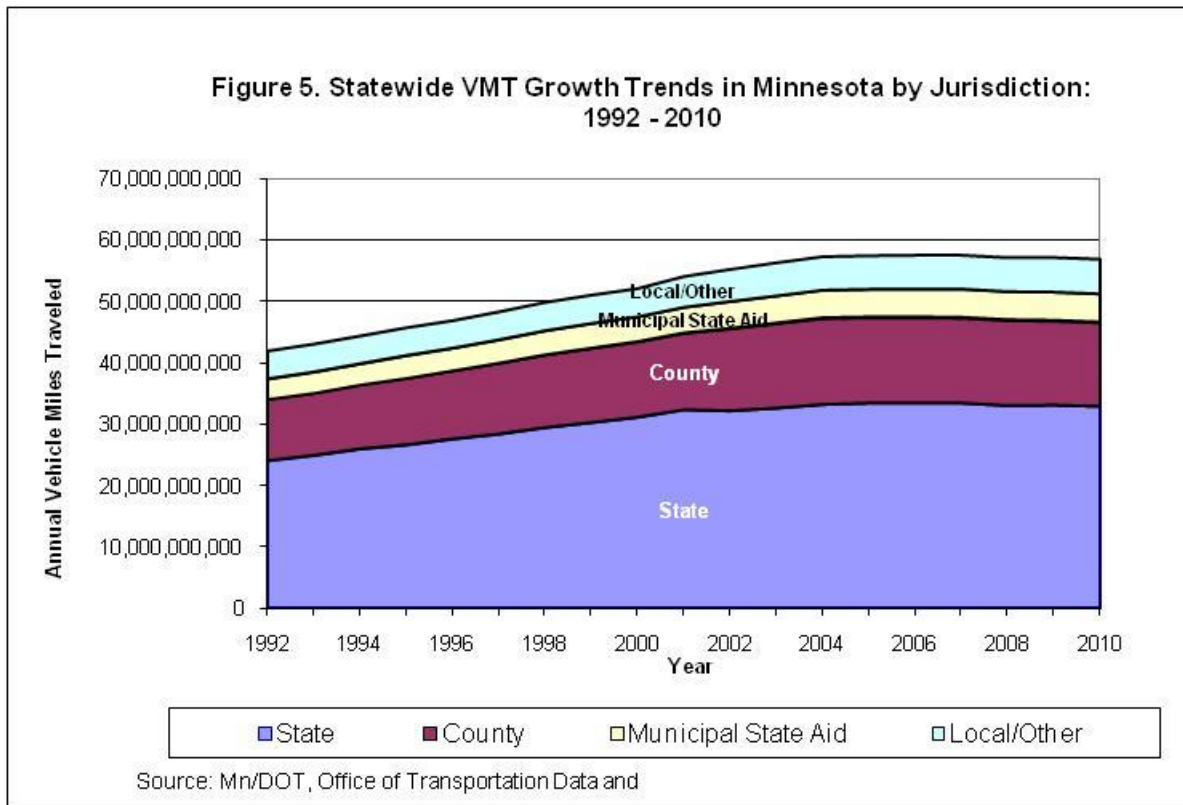
In 2010, total VMT on all 142,500 miles of roads in Minnesota was 56.8 billion⁵. The state trunk highway system, made up 58.0% of total VMT, but only 8.3% of total centerline miles. Figure 4 shows the proportions of mileage in Minnesota by route system. Figure 5 shows the statewide annual trends in VMT from 1992-2010 by jurisdiction for all public roads in Minnesota. For those years VMT has increased a total of 35.4%.

Figure 4.
Percent of Total Centerline Miles by Route System
(Based on 2010 Mileage)



Source: Mn/DOT, Office of Transportation Data and Analysis

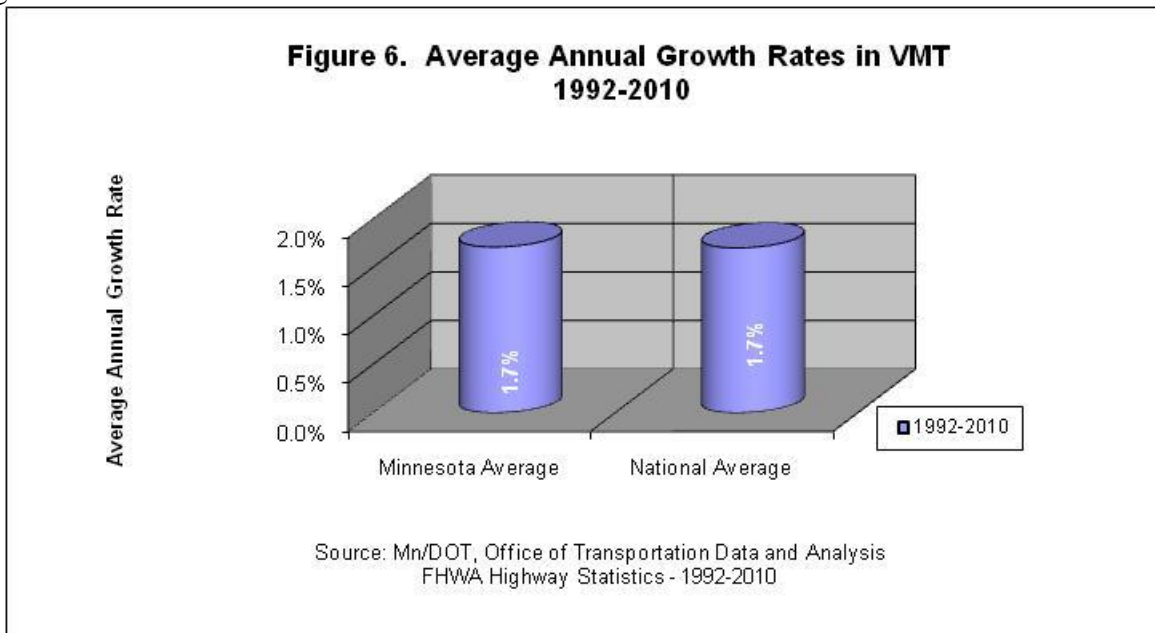
Figure 5. Statewide VMT Growth Trends in Minnesota by Jurisdiction:
1992 - 2010



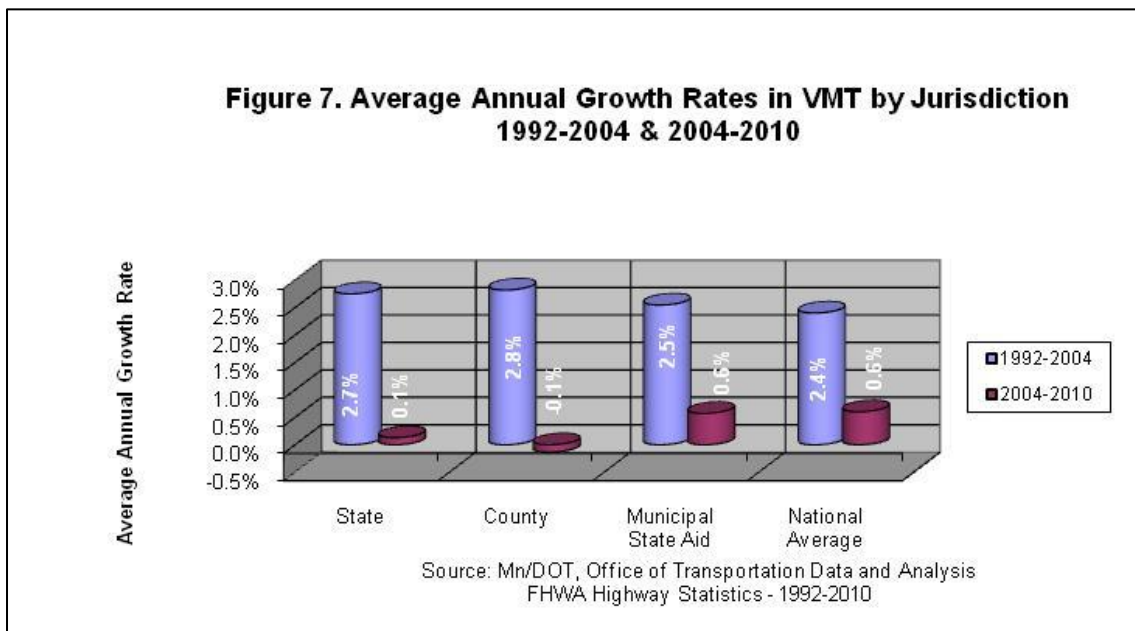
Source: Mn/DOT, Office of Transportation Data and

5. Adjusted for leap year. See Appendix A for more information.

From 1992 to 2010, VMT growth on all roads in Minnesota averaged about 1.7% per year. Figure 6 shows the Minnesota statewide average annual VMT growth rate compared to the national average for all roads. As can be seen, Minnesota's average VMT growth rate has been the same as the national average.



Since the year 2004, Minnesota has seen a change in VMT growth trends. The chart in Figure 7 shows VMT growth from 1992-2004 and from 2004-2010 by jurisdiction. While the growth on state trunk highways from 1992-2004 was higher at 2.7% per year, it has since slowed down to 0.1% for years 2004-2010. Growth on the county and municipal system has also slowed for 2004-2010.



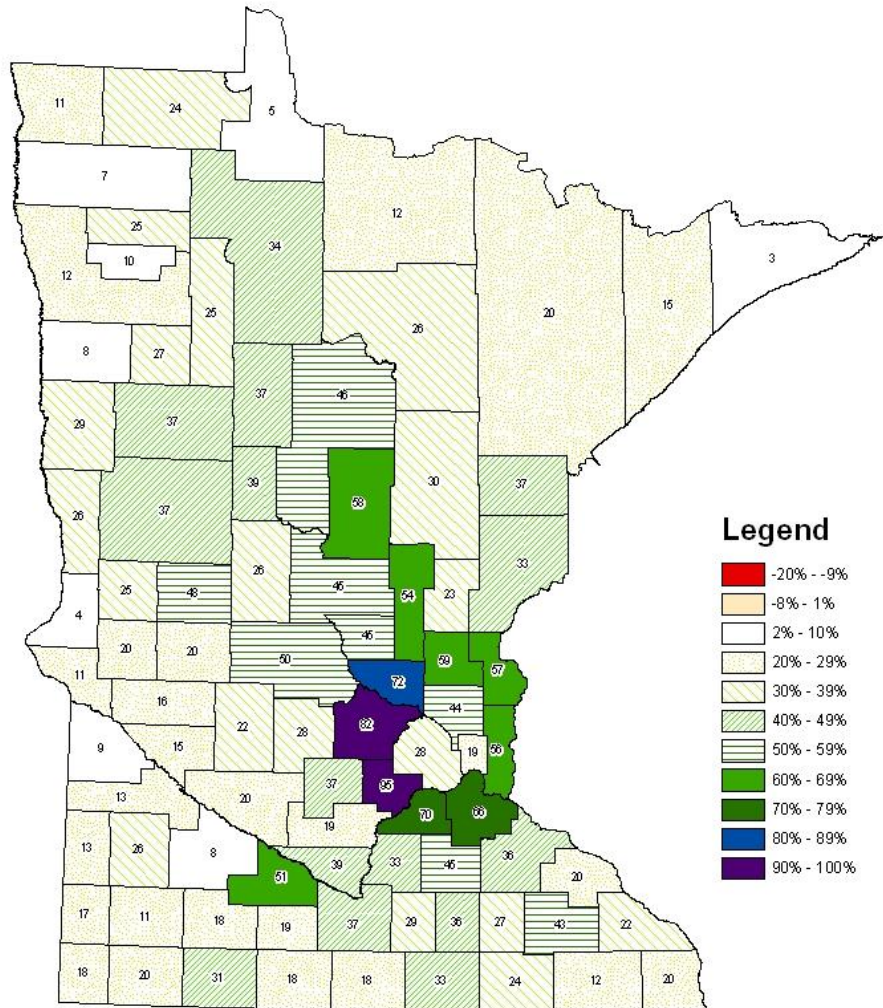
The data so far suggests that the growth rate may continue to slow for 2010. The economic downturn appears to have had some impact on the total number of miles driven.

Trends in Vehicle Miles of Travel by County

As shown in Figure 8 the highest percent growth in VMT in Minnesota has been in the counties surrounding the Twin Cities. When looking at the absolute growth by county for 1992-2010 the nine counties with the highest VMT growth are: Crow Wing, Isanti, Carver, Chisago, Sherburne, Washington, Wright, Scott, and Dakota. Each of these counties had a total growth of more than 55%.

The slowest percent growth in VMT occurred in the more rural counties in the state including Cook Lake of the Woods, and Traverse counties with total growth less than 5% for the same time period.

Figure 8
Total Percent VMT Growth on all Roads in Minnesota
1992-2010



Source: Mn/DOT, Office of Transportation Data and Analysis

Figure 9 and Figure 10 show the total percent changes in population and employment from 1992 to 2010. In general, the biggest increases in VMT correspond to areas with higher increases in population and employment.

Figure 9
Total Percent Population Growth
1992 – 2010

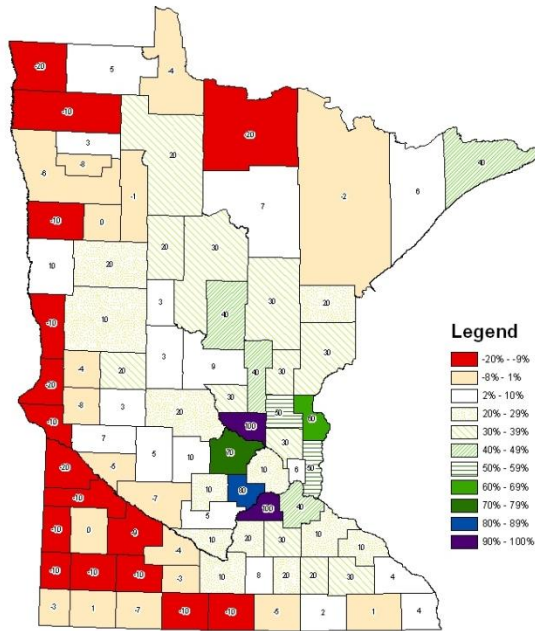
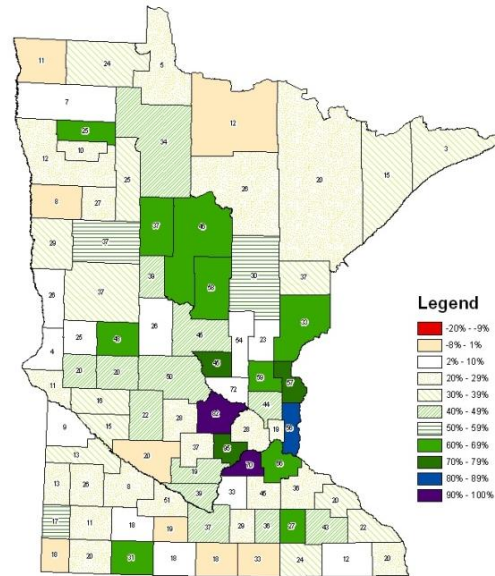


Figure 10
Total Percent Employment Growth
1992 – 2010

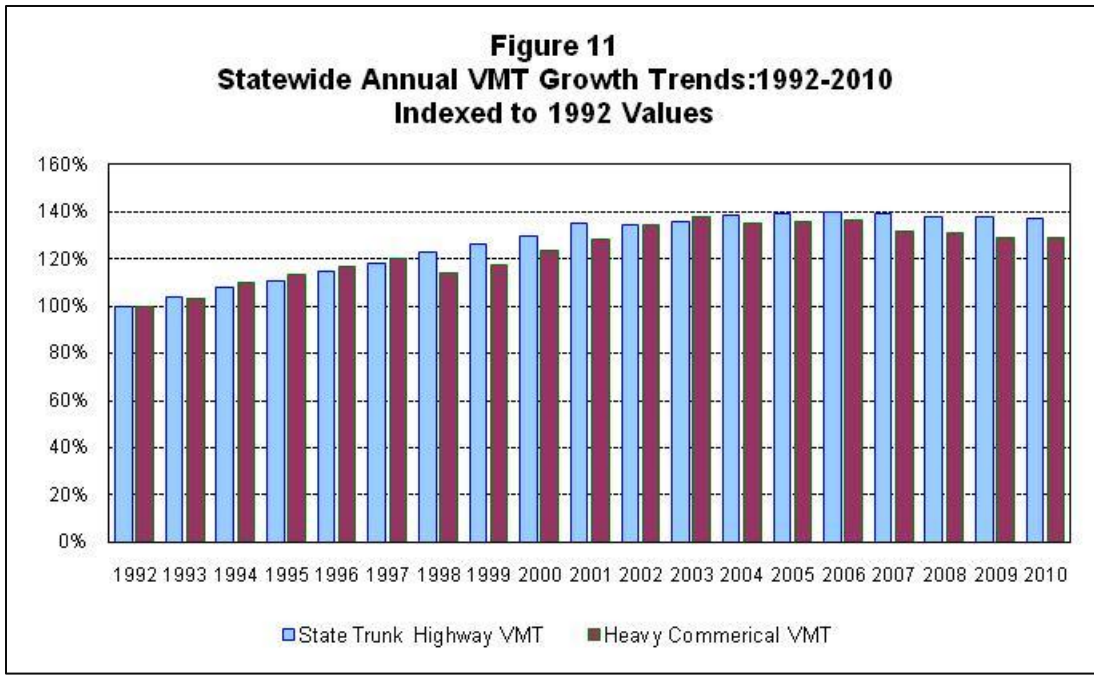


Source: Minnesota State Demographic Center,
 Minnesota Department of Employment and Economic Development

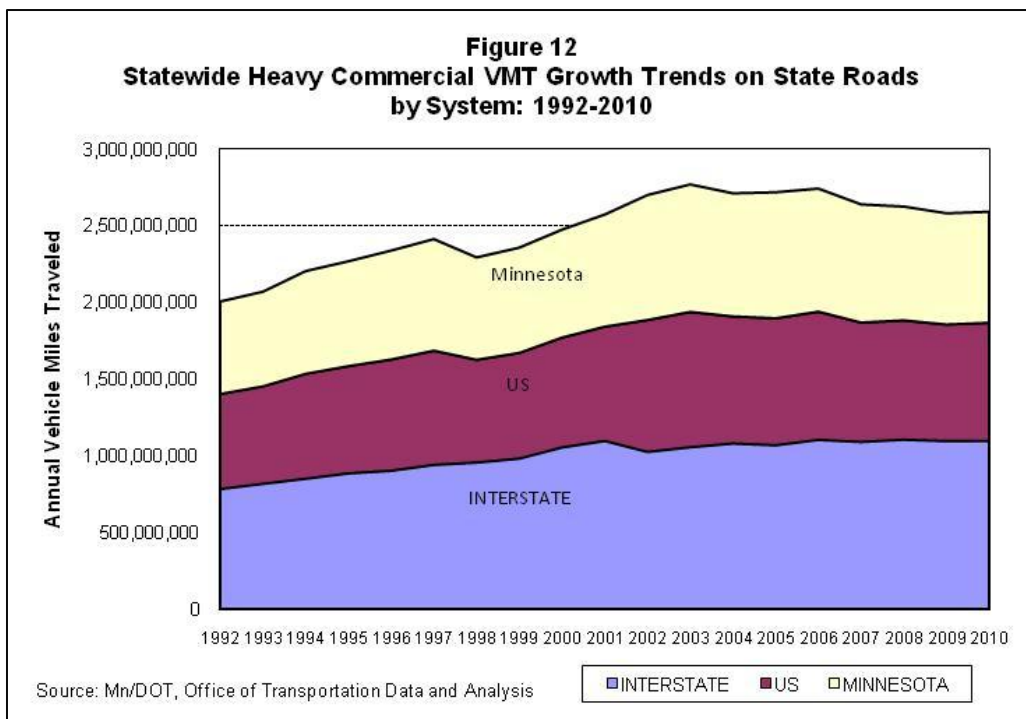
Heavy Commercial VMT

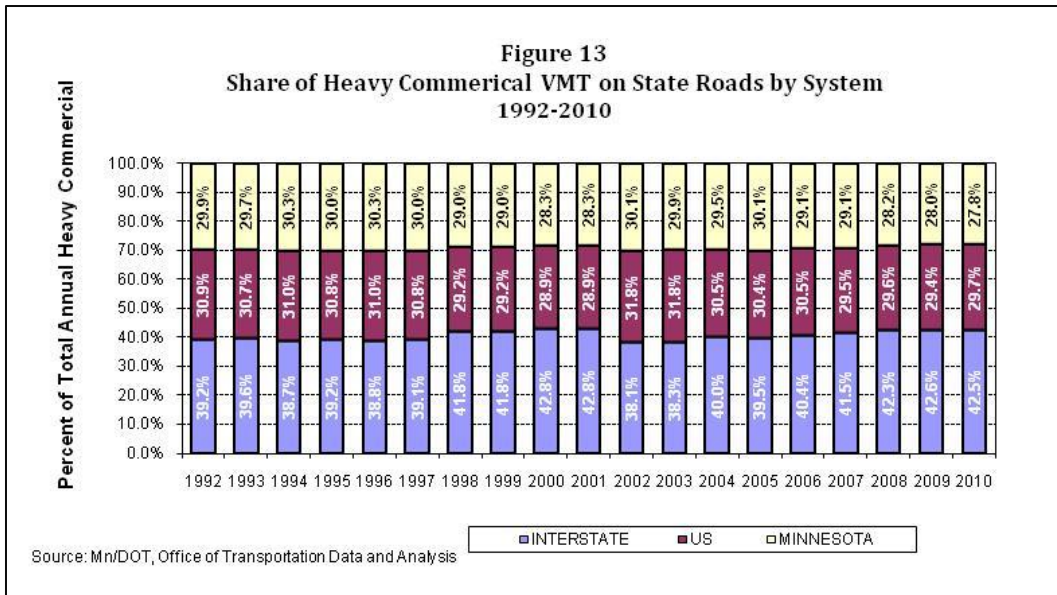
HCVMT trends can only be accurately calculated on the state roads because until recently MnDOT only collected heavy commercial traffic data on the state trunk highway system. In 2010 HCVMT made up about 7.9% of total VMT on state roads. During the time period from 1992-2010, the total VMT on state trunk highways has increased 37.1% (average annual rate of 1.8%), while the HCVMT has increased 29.0% (average annual rate of 1.5%).

Figure 11 shows the annual changes in VMT compared to HCVMT on state trunk highways from 1992 – 2010, indexed to 1992 values. While the HCVMT was increasing at a faster rate than total VMT from 1992-1997, it has slowed since then to a rate that is less than the rate for total traffic.



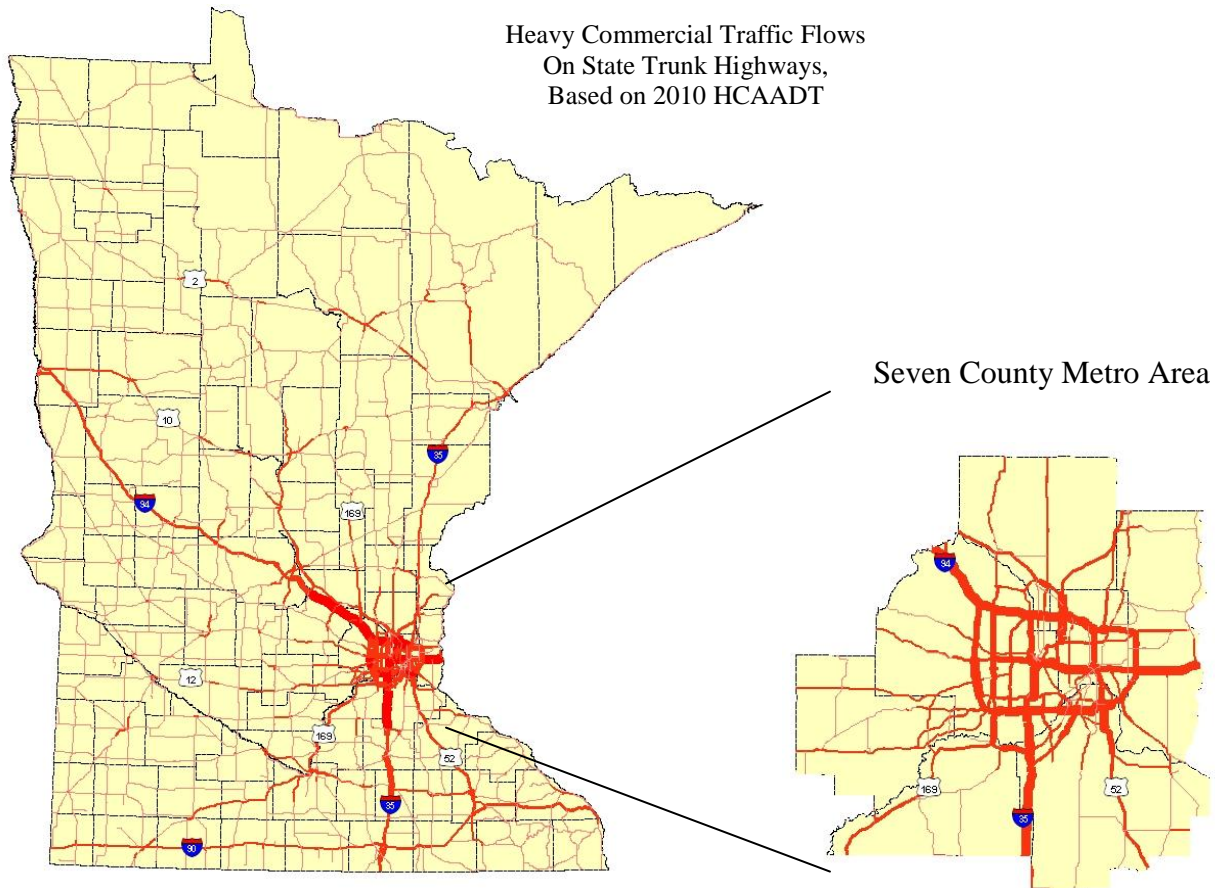
The following two figures show the trends in HCVMT by system types on Minnesota trunk, U.S. trunk, and interstate highways for 1992-2010. Figure 12 shows the trends along with the proportions of each roadway system type, and Figure 13 shows the percentage of total HCVMT for each of these systems. Although there have been some variations, the proportions have remained fairly constant with Minnesota and U.S. trunks at about 30% and interstates with about 40% of the total share.





In Minnesota, the majority of the heavy commercial traffic occurs on the interstate system and in the Twin Cities metro area. Figure 14 shows the relative volume flows of heavy commercial traffic on state highways throughout the state. In greater Minnesota, trunk highways 10, 52, and 169 carry a large share of the heavy commercial traffic on the non-interstate system.

Figure 14



Summary

The vehicle miles of travel has been increasing for decades in Minnesota, but since the year 2004 traffic has remained at about the same level. In recent years, the highest growth in VMT in Minnesota has been in the counties surrounding the Twin Cities while the growth has slowed or declined on many of the rural counties. The VMT in Minnesota has been slightly declining from 2007 to 2010. Due to factors such as the economic environment, we anticipate, at least in the near-term that VMT will continue to decrease, but at a more moderate rate than Minnesota has seen over the past decades.

For more information contact:

Chu Wei, P.E.
Traffic Forecast and Analysis Section
Office: 651-366-3851
Fax : 651-366-3886
e-mail: chu.wei@dot.state.mn.us

Gene Hicks, P.E.
Director, Traffic Forecast and Analysis Section
Office: 651-366-3856
Fax : 651-366-3886
e-mail: gene.hicks@dot.state.mn.us

Appendix A

Qualifications for 2010 VMT Data

It is important to note the differences between the data used for this analysis and the official VMT reports available at: <http://www.dot.state.mn.us/roadway/data/reports/vmt.html>

1. In late spring 2008, TDA implemented a project to update local roads in the Transportation Information System (TIS). The project resulted in the addition of over 5,000 miles of municipal and township roads. The change in mileage is the result of the update process and not the building of new roads.
2. The official VMT reports are based on centerline miles from the year they were created. Therefore, comparing the VMT totals for consecutive years is invalid.
3. For this report, the historic VMT information was calculated for all historic years using the current year's centerline miles. This calculation allows for consecutive year VMT comparisons.
4. In addition to reporting VMT using the current mileage, a number of data conversions were necessary to normalize the historic and current VMT data for comparison.
 - a. On leap years VMT is reported as 366 days worth of traffic. So, all leap years must be normalized to 365 days when comparing with non-leap years.
 - b. In 2008, a large number of pre-existing routes were added to TIS on Route Systems 8-23. This addition resulted in an artificial increase in VMT. Therefore, additional VMT is added to the historic data to normalize the effect of this artificial increase.
5. Actual traffic counts are taken on most trunk highways on a two year cycle and most local roads on a four year cycle. Thus, roads on a two year cycle have more actual counts than roads on a four year cycle. HCADT counts are on a different schedule than AADT counts. The conditions above should also be considered for HCVMT analysis.

The following notes consist of information specific to the 2008 VMT data:

1. The addition of the "New" 212 in Carver County increased VMT on U.S. highway routes in that county by 34% over 2007.
2. The update of AADT on MSAS roadways in New Prague increased VMT on MSAS routes in that county by 300% over 2007.

The following notes consist of information specific to the 2009 VMT data:

1. Due to the opening of the "New" 212 in Carver County in 2008, VMT on local roadways in the surrounding area has decreased while VMT on U.S. Highway routes has increased.
2. The update of AADT on MSAS roadways in Kasson increased VMT on MSAS routes in Dodge County by 115% over 2008.
3. The update of AADT on MSAS roadways in Wyoming increased VMT on MSAS routes in Chisago County by 20% over 2008.

The following notes consist of information specific to the 2010 VMT data:

1. In Carver County traffic patterns have changed significantly as a result of the “New” 212. Trunk Highway 912C (“Old” 212) saw a major decrease in AADT due to these changes. Therefore Minnesota Trunk Routes (system 3) saw a major decrease in VMT.
2. Many miles were added to tribal and state forest routes in 2010.

For more information contact:

Megan E. Forbes
 Research Analyst Specialist Senior
 Traffic Forecast and Analysis Section
 Office: 651-366-3883
 Fax: 651-366-3886
 e-mail: Megan.Forbes@dot.state.mn.us

Appendix B

Total growth of VMT from 1992-2010 in Minnesota shown by county

County Name	All System	State System	Local System	Total CenterlineMiles
AITKIN	33.2%	31.9%	37.4%	1795
ANOKA	43.0%	39.4%	46.2%	2358
BECKER	39.5%	43.2%	35%	2199
BELTRAMI	39.5%	40.6%	38%	2584
BENTON	44.6%	52.4%	32.0%	977
BIG STONE	12.3%	15.5%	7.8%	963
BLUE EARTH	35.9%	42.8%	29%	1718
BROWN	29.7%	29.9%	29%	1212
CARLTON	39.4%	45.4%	28.8%	1207
CARVER	82.3%	68.6%	104.0%	1071
CASS	41.3%	40.2%	43%	3074
CHIPPEWA	15.6%	15.6%	16%	1208
CHISAGO	52.9%	45.7%	69.5%	1133
CLAY	35.1%	34.4%	36.4%	2147
CLEARWATER	25.1%	22.3%	28%	1260
COOK	4.3%	-7.7%	40%	926
COTTONWOOD	23.4%	33.2%	14.8%	1266
CROW WING	56.2%	53.1%	59.7%	2031
DAKOTA	64.1%	69.8%	58%	2567
DODGE	28.2%	13.2%	58%	923

DOUGLAS	55.2%	51.2%	62.3%	1538
FARIBAULT	17.4%	23.3%	9.0%	1453
FILLMORE	16.1%	14.4%	18%	1621
FREEBORN	32.4%	41.6%	17%	1551
GOODHUE	38.2%	30.5%	57.8%	1637
GRANT	27.8%	38.0%	6.0%	1085
HENNEPIN	25.0%	29.6%	19%	5295
HOUSTON	22.8%	25.0%	19%	916
HUBBARD	37.5%	34.9%	42.3%	1761
ISANTI	56.7%	45.7%	74.4%	1075
ITASCA	24.3%	26.4%	21%	3401
JACKSON	35.3%	47.9%	16%	1416
KANABEC	21.7%	10.9%	49.1%	849
KANDIYOHI	24.1%	29.2%	19.3%	1701
KITTSOON	14.8%	16.5%	13%	1640
KOOCHICHING	10.5%	10.2%	11%	1384
LAC QUI PARLE	10.6%	11.1%	10.1%	1494
LAKE	17.6%	4.6%	42.1%	1079
LAKE OF THE WOODS	11.8%	15.5%	6%	872
LE SUEUR	35.8%	32.5%	41%	1052
LINCOLN	18.8%	27.7%	11.5%	1068
LYON	29.5%	28.2%	31.3%	1466
MAHNOMEN	28.3%	22.6%	39%	757
MARSHALL	5.9%	18.3%	-2%	2886
MARTIN	25.4%	27.2%	23.7%	1505
MCLEOD	36.9%	35.2%	38.8%	1118
MEEKER	28.5%	24.6%	36%	1299
MILLE LACS	52.1%	53.9%	46%	1020
MORRISON	48.5%	56.1%	37.5%	1925
MOWER	24.0%	27.2%	19.9%	1572
MURRAY	14.3%	14.7%	14%	1387
NICOLLET	43.7%	37.6%	58%	899
NOBLES	23.4%	34.7%	10.6%	1517
NORMAN	10.0%	4.5%	17.0%	1599
OLMSTED	46.6%	38.0%	59%	1807
OTTER TAIL	39.9%	50.7%	28%	4011
PENNINGTON	26.5%	31.8%	22.3%	1141
PINE	32.0%	30.5%	35.9%	1927
PIPESTONE	18.2%	27.3%	8%	968
POLK	14.1%	7.7%	21%	3716
POPE	24.5%	34.9%	10.0%	1246
RAMSEY	18.1%	25.2%	8.7%	1972
RED LAKE	12.3%	13.4%	11%	791
REDWOOD	10.2%	6.7%	14%	1714
RENVILLE	20.3%	15.7%	25.7%	1898
RICE	46.7%	48.7%	42.8%	1275
ROCK	23.7%	30.7%	13%	1014
ROSEAU	25.5%	20.1%	33%	2326
SCOTT	68.5%	70.3%	66.8%	1262

SHERBURNE	69.8%	53.1%	100.1%	1305
SIBLEY	15.2%	9.9%	23%	1137
ST LOUIS	20.2%	25.3%	15%	5897
STEARNS	50.0%	58.4%	41.1%	3203
STEELE	40.4%	45.1%	32.4%	976
STEVENS	22.2%	30.1%	14%	1078
SWIFT	16.5%	26.6%	4%	1435
TODD	28.1%	31.2%	24.0%	1883
TRAVERSE	6.5%	19.4%	-4.5%	1115
WABASHA	21.3%	12.4%	37%	992
WADENA	41.1%	50.7%	29%	959
WASECA	30.4%	36.1%	23.5%	873
WASHINGTON	55.3%	47.8%	67.6%	1885
WATONWAN	25.6%	29.8%	20%	890
WILKIN	31.1%	36.8%	19%	1511
WINONA	25.3%	31.5%	12.3%	1236
WRIGHT	73.2%	64.9%	87.9%	2067
YELLOW MEDICINE	14.2%	16.0%	12%	1505