
Methodologies Used to Estimate and Forecast Vehicle Miles Traveled (VMT)

What Is Vehicle Miles Traveled?

Vehicle miles traveled (VMT) is a measure used extensively in transportation planning for a variety of purposes. It measures the amount of travel for all vehicles in a geographic region over a given period of time, typically a one-year period. It is calculated as the sum of the number of miles traveled by each vehicle.

How Is VMT Used, and Why Is It Important?

VMT is a key metric in transportation planning because it provides a measure of total travel, how travel changes over time, and differences in travel among regions and states. VMT is the leading measure of both personal and commercial vehicle travel demand. VMT data are also useful in policy decisions for infrastructure investment. Since VMT measures travel demand, it is useful in determining where resources are most needed, and it is an important measure to monitor and forecast.

While VMT is not the only measure of travel demand, it can help identify the regions that are traveled more frequently and contribute to producing more traffic congestion. Increased travel on a particular roadway can result in slower speeds that, in turn, lead to delay. Delay can waste fuel and both personal and commercial time, each generating associated costs. Being able to allocate resources to these congested regions aids the state in minimizing congestion costs and maximizing traveler benefits. As a measure of trips and distances, VMT can be used to help calculate out-of-pocket traveler cost savings and other benefits such as time savings where improvements are implemented.

Additionally, VMT monitoring and forecasting are particularly important for anticipation of revenue streams from motor fuel taxes. For example, if VMT declines, the number of gallons of motor fuel being purchased declines as well. If the number of gallons sold decreases, the number of gallons taxed decreases and the revenue stream weakens. The inverse is valid as well. If growth in VMT outpaces the advancements in fuel efficiency, more gallons of motor fuel sold will strengthen the revenue stream.

VMT can be used to:

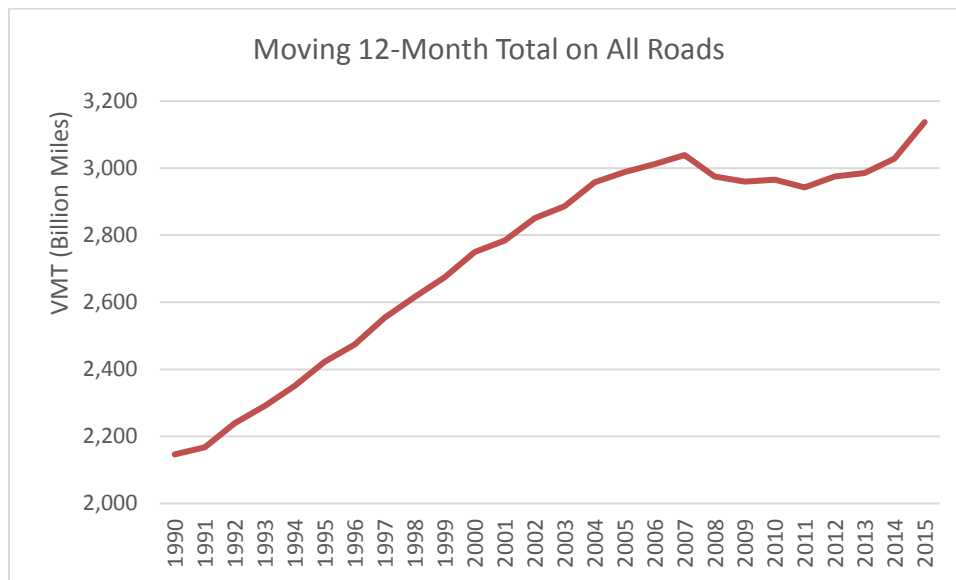
- Assess the differences in travel demand and impact between regions and other states.
 - Project future revenue streams from fuel taxes and proposed VMT fees.
 - Compare personal travel and freight/commercial vehicle travel.
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- Project future congestion levels.
- Estimate the amount of travel resulting from local residence and freight activity versus external travel.
- Assess the impact of various population forecasts.
- Support many more measures of interest for transportation planning.

Like many other measures, VMT alone does not tell the whole story. However, when coupled with traffic measures such as capacity, speeds, vehicle type, and trip purpose, it becomes a powerful statistic. VMT is an essential measure that powers virtually every analytical measure within transportation planning.

What Is the Trend?

Figure 1 includes the most recent national VMT data reported from state agencies to the Federal Highway Administration. Annual VMT growth leveled off in 2008 and returned to an upward trend in 2014.



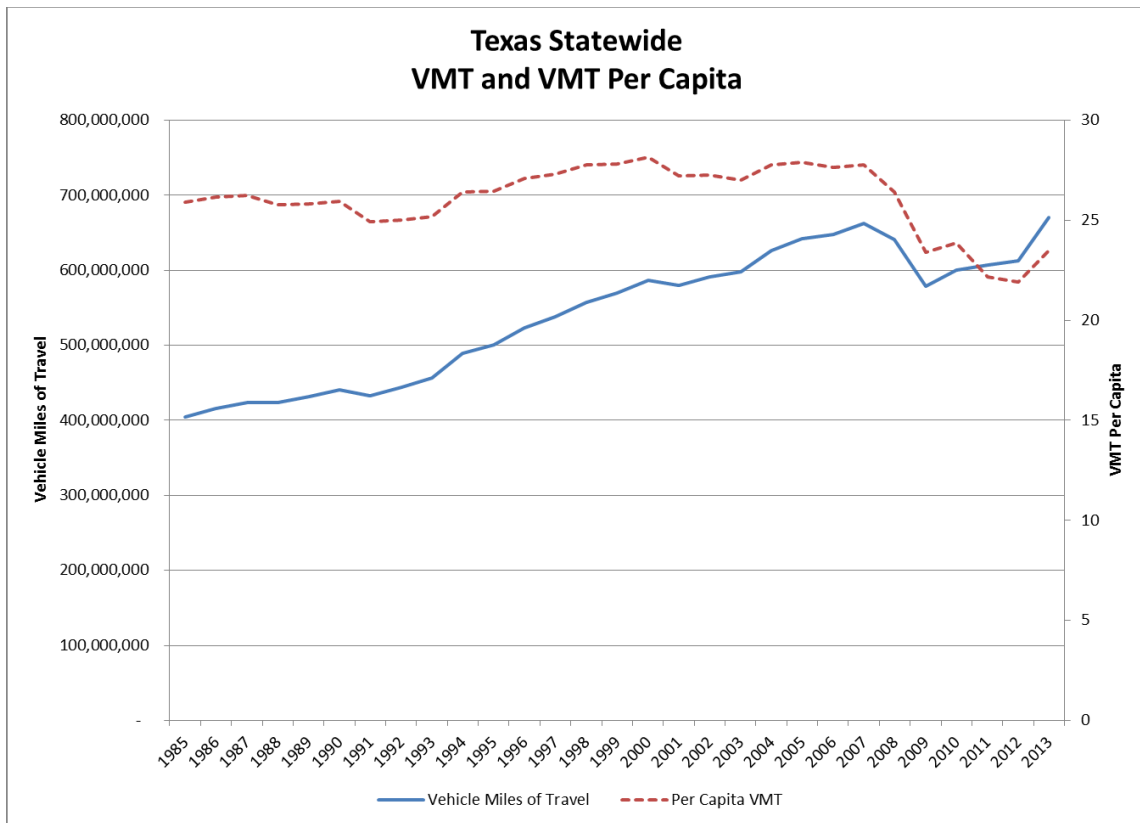
Source: (1)

Figure 1. 12-Month Moving Average Annual VMT as of November 2015 for the Entire United States.

Figure 2 shows the daily VMT in Texas from 1985 through 2013, both on a total VMT basis and on a per-capita basis. The table shows that:

- Total VMT declined beginning in 2007 but returned to growth by 2009.
- Per-capita VMT has remained somewhat flat over time but also declined significantly in 2007 and returned to growth in 2013.

A relatively flat VMT per-capita trend while the overall VMT is growing illustrates that the population and the number of vehicles on Texas roadways are increasing. If the roadway capacity does not keep pace, greater congestion levels will result.

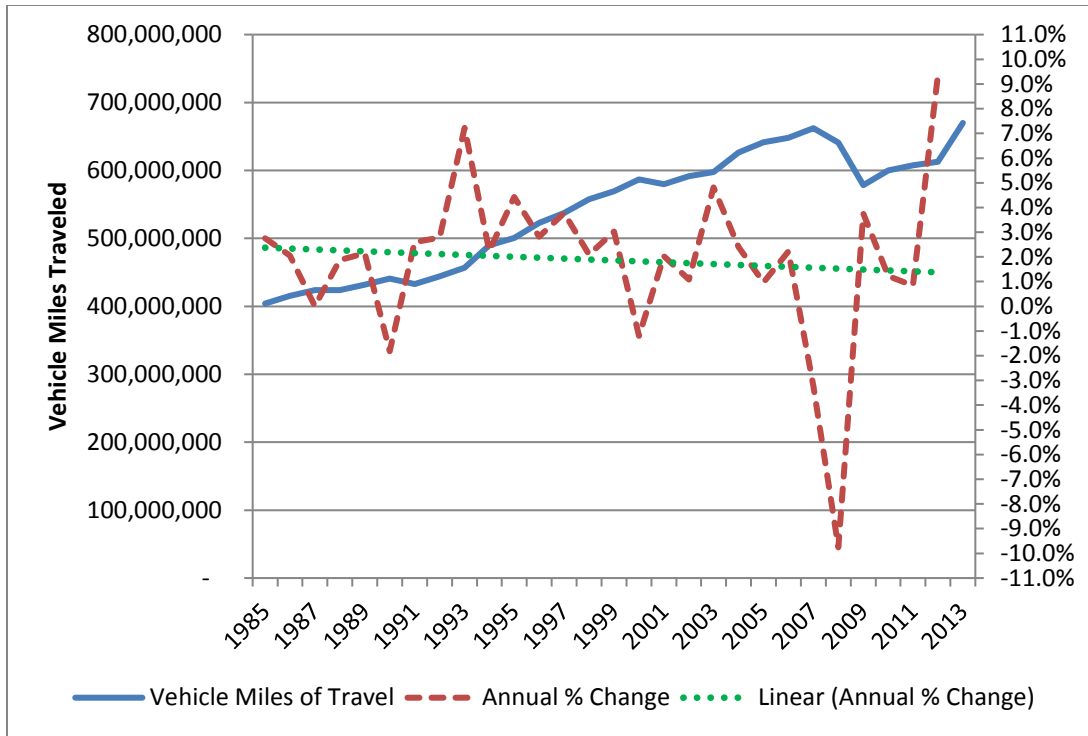


Source: Texas A&M Transportation Institute (TTI) analysis of data obtained from the Texas Department of Transportation and U.S. Census Bureau

Figure 2. Texas Daily Total VMT and Per-Capita VMT Estimates.

Figure 3 shows the growth trends for daily VMT in Texas:

- The percent change from year to year can vary significantly.
- While total daily VMT has grown, the annual percent change is trending downward.
- Annual VMT growth was almost 3 percent in 1985, fell to 2 percent in 2000, and is nearing 1 percent today.
- Annual estimates of VMT vary due to daily and seasonal variation in travel demand, counting errors, and changes in the locations where traffic counts are taken year to year. A linear approximation of the trend shows a declining rate of growth, while overall VMT totals are growing.



Source: TTI analysis of data obtained from the Texas Department of Transportation

Figure 3. Texas Daily VMT and VMT Growth Trend.

The Texas Department of Transportation’s recent Texas Transportation Plan 2040 notes that VMT is expected to increase by 62 percent from 2010 to 2040 (based on the Texas Statewide Analysis Model [SAM]). Also, the plan states that population is expected to rise 61 percent. These numbers indicate that VMT, including both personal travel and commercial travel, is growing at the same rate as total Texas population. If the VMT per-capita growth rate is declining, indicating a slowing in personal VMT growth, then one scenario that could account for the continued growth in total VMT is the rate of population growth combined with increases in commercial vehicles (trucks). In this scenario, the population growth rate surpasses the rate of VMT growth, equating to a decline in VMT per capita. The growing demand for commercial traffic further contributes to the increase in total VMT.

A trend of past VMT values is only one of many scenarios that could indicate future outcomes. While trend analysis remains a useful tool, it is important to take many behavioral, technological, and economic factors into account when analyzing growth in overall travel, as measured by VMT, in Texas.

How Can We Forecast for Different Scenarios?

A Transportation Policy Research Center study recently developed a VMT scenario tool that allows researchers to explore changeable scenarios. It can test various changes in travel behavior resulting from technological or economic shifts. This tool is programmed in an Excel worksheet and has its basis in the Texas SAM and Texas State Data Center population forecasts. The model

can adjust population scenarios to account for different levels of VMT that would result from various population forecast scenarios. Additionally, the model can increase or decrease trip rates, auto occupancies, and growth rate in Mexico- and U.S.-oriented trips and their resulting VMT.

Incorporating scenario planning when forecasting VMT in Texas allows policy makers to see the impacts travel growth and decline will have on specific regions. While other factors such as project funding and economic considerations affect demand, knowing how future travel is trending assists Texas in planning for the future.

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