

Change in Vehicle Occupancy Used in Mobility Monitoring Efforts

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Summary

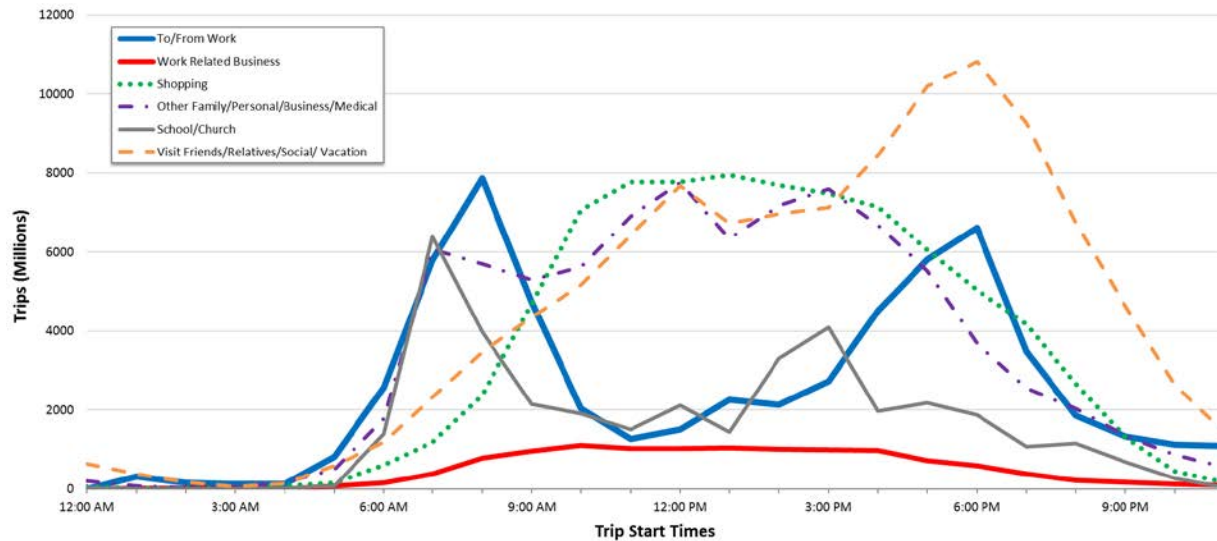
Virtually all measures of delay that the Texas A&M Transportation Institute (TTI) incorporate some form of average vehicle occupancy, or how many people, on average, are in any vehicle at any given time on our nation's roadways. In an effort to continually improve the methods and data used and produced by all of TTI's mobility-monitoring efforts, researchers reexamined and updated this factor. **Researchers now estimate the average vehicle occupancy from 1.25 persons per vehicle to 1.50 persons per vehicle, based on data from the National Household Travel Survey for all trips.** This change will be effective as of July 1, 2017.

What Changed and Why?

Conservatively, TTI researchers have traditionally used an average vehicle occupancy number of 1.25 for mobility monitoring efforts, including the Urban Mobility Report (UMR)¹, since the mid-1980's. Researchers based this original number on data from the U.S. Census Bureau and the National Personal Travel Survey (NPTS), focusing on work trips, generally thought to be the primary trip purpose during the peak-congested hours. In 1983, the NPTS reported an average vehicle occupancy of 1.29.

However, as new data emerged and the National Household Travel Survey (NHTS) produced several iterations, more accurate vehicle occupancy data emerged. In the 2009 NHTS—the latest survey to date—the total average vehicle occupancy for all trip types and times increased to 1.67 (down from 1.75 in 1983 when the UMR first began).² Occupancy for trips only to work (not including chained trips) decreased to 1.13 persons per vehicle. At this point though, researchers now know more about the type and number of trips made during the peak hour (6:00 AM to 10:00 AM and 3:00 PM to 7:00 PM), which include many other purposes other than going to and from work. Figure 1 shows a distribution of trip types by time of day.

Figure 1. NHTS Distribution of Trips by Hour



Note that while work trips make up a dominant portion of the trips during the peak hour, they do not make up the majority (even when excluding social trips). Therefore, it would be unwise to use an overly low constant for vehicle occupancy heavily skewed towards trips to and from work. It would also be inappropriate to use the average vehicle occupancy number for the entire day (1.67), as certain types of trips not made during the peak period (the most congested times of the day, and therefore of most concern to policy makers, practitioners, and planners) but with higher average occupancy would skew the relevant value in the opposite direction. Again in Figure 1, social trips, visiting friends, and vacations predominantly lie outside of peak hours, but hold significantly higher vehicle occupancy rates of 2.20, 2.08, and 2.70, respectively.³

Instead, researchers believe it would be more appropriate to use the average vehicle occupancy of all trip types during the peak hours. Researchers calculated this new average occupancy using a weighted average from a custom tabulation created from the 2009 NHTS dataset.⁴ This resulted in a new average vehicle occupancy factor of 1.51. However, the more conservative occupancy factor of 1.50 will be used to assist in quick conversions and to account for potential error in the data. Table 1 displays the custom NHTS tabulation, highlighting occupancy by peak hour.

Table 1. Average Vehicle Occupancy by Hour

Trip Start Time	Vehicle Occupancy	
	Sample Size	Mean
Hour of 00:00	1,521	1.99
Hour of 01:00	741	1.61
Hour of 02:00	481	1.42
Hour of 03:00	318	1.16
Hour of 04:00	2,834	1.57
Hour of 05:00	8,025	1.41
Hour of 06:00	21,231	1.34
Hour of 07:00	44,856	1.39
Hour of 08:00	43,476	1.54
Hour of 09:00	47,123	1.70
Hour of 10:00	53,536	1.73
Hour of 11:00	58,384	1.77
Hour of 12:00	61,175	1.89
Hour of 13:00	55,915	1.77
Hour of 14:00	55,501	1.73
Hour of 15:00	59,435	1.66
Hour of 16:00	58,812	1.59
Hour of 17:00	56,805	1.60
Hour of 18:00	40,841	1.79
Hour of 19:00	27,170	1.89
Hour of 20:00	19,271	2.09
Hour of 21:00	12,390	1.79
Hour of 22:00	6,807	1.65
Hour of 23:00	3,663	1.61
Total	741,173	1.67

References

- ¹ Schrank, D., W. Eisele, and T. Lomax. *Appendix A: Methodology for the 2015 Urban Mobility Scorecard*. Texas A&M Transportation Institute, College Station, 2016. <https://static.tti.tamu.edu/tti.tamu.edu/documents/mobility-scorecard-2015-appx-a.pdf>. Accessed July 2017.
- ² Santos, A., N. McGuckin, H.Y. Nakamoto, D. Gray, and S. Liss. *Summary of Travel Trends: 2009 National Household Travel Survey*. Report FHWA-PL-11-022. U.S. Department of Transportation, Federal Highway Administration, Washington, 2011.
- ³ *Average Vehicle Occupancy (Persons) by Trip Purpose*. National Household Travel Survey (NHTS) Tabulation created on the NHTS website. Federal Highway Administration, 2019. <http://nhts.ornl.gov>. Accessed July 2017.
- ⁴ *Average Vehicle Occupancy (Persons) and Average Occupancy by Trip Purpose by Hour of Day*. National Household Travel Survey (NHTS) Tabulation created on the NHTS website. Federal Highway Administration, 2019. <http://nhts.ornl.gov>. Accessed July 2017.