

Technical Guidance to Support Local Computation of VMT-based Safety Performance Targets

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Motivation

23 U.S.C 150, requires States to establish safety performance targets, and 23 U.S.C 134 requires Metropolitan Planning Organizations (MPOs) to also establish safety targets within 180 days of the State's target. The Safety Performance Measures (PM) regulation under 23 CFR 490.209 allows MPOs, in setting targets, to either agree to plan and program safety projects so that they contribute toward the accomplishment of the State DOT targets, or to commit to quantifiable targets for the entire Metropolitan Planning Area. The regulation under 23 CFR 490.207, defines two Vehicle Miles Traveled (VMT) rate-based safety performance measures: Rate of Fatalities per 100 Million VMT and Rate of Serious Injuries per 100 Million VMT. The performance measures are defined as a 5 year rolling average, based on the most recent five years for which data is available.

Whereas States are expected to use Highway Performance Monitoring System (HPMS) data to furnish the VMT denominator for the safety rate metrics, using HPMS data at the MPO level is not directly possible. The VMT denominator must include travel on all public roadways within the Metropolitan Planning Area boundary. In HPMS, local roadway travel is reported in aggregate for the state and for large Census urbanized areas. However, urbanized areas do not necessarily coincide with Metropolitan Planning Area boundaries, as MPOs must also plan for areas that are reasonably expected to become urbanized in the next 20 years.

In HPMS, travel on roadways with higher functional classification is reported for specific geo-located roadway segments and may be readily disaggregated to the geographic bounds of a Metropolitan Planning Area. However, because travel on local roadways is not geo-located, HPMS by itself does not provide sufficient information to compute full travel in an MPO study area. The present guidance is offered to identify reasonable technical methods for developing consistent VMT estimates on local roadways for a geographic area smaller than an entire State.

In addition to reporting historical data, MPOs (and States) may wish to extrapolate estimates of VMT when establishing their performance targets for the subsequent calendar year. A variety of extrapolation techniques are available. These include simple trend line analysis, more complex regression models that take account of unique circumstances that differ from the historical trend, and application of regional travel demand models that extrapolate from behavioral estimates rather than direct traffic observation. Both States and MPOs may reasonably be expected to apply some or all of these methods. The

present guidance thus suggests minimal extrapolation methods that can be used to estimate VMT, and guidelines for establishing the suitability of more elaborate methods.

Technical Recommendations

MPOs that develop their own rate-based safety performance targets are encouraged to use reasonable and consistent methods for VMT estimation when establishing their targets. The estimates should be based to the greatest extent possible on data collected within the Metropolitan Planning Area boundary, should be consistent with estimates made for other Federal reporting purposes, and should reflect accepted professional practice for developing such data.

To establish that the Safety PM fatality and serious injury rate VMT denominators are reasonable and consistent, the MPO should document that the value of the denominator is consistent with VMT summaries reported to HPMS for the MPO urbanized area or for any maintenance or non-attainment area that includes all or part of the MPO. For example, if the Metropolitan Planning Area boundary used for the safety PM denominator is larger or smaller than the urbanized area boundary, then the reported VMT should also be larger or smaller.

MPOs should make maximum use of data prepared for HPMS when preparing the Safety PM rate denominator. If an MPO develops data specifically for the Safety PM denominator, it should use methods to compute VMT that are consistent with those used for other Federal reporting purposes (HPMS and, where applicable, air transportation conformity analysis).

Per 23 CFR 490.207 the Safety PM MPO VMT must be estimated historically to report MPO safety performance outcomes. MPOs may also choose to forecast the VMT for the subsequent calendar year when establishing the MPO's safety rate target(s). Because HPMS reporting for the most recent year may not happen immediately, it may be necessary to extrapolate VMT in order to establish a baseline for the performance measure as well as to establish the performance measure target. In evaluating the denominator for years subsequent to the most recent year submitted to HPMS, MPOs are encouraged to extrapolate traffic trends by functional class from at least three and up to ten previous years of HPMS data and from local data computed using a consistent methodology. The MPO may apply more elaborate modeling strategies if desired (such as a regression analysis or a regional travel demand model), but the results of such strategies should be compared in any case to a simple traffic trend analysis, and any significant differences between the estimates should be documented by reference to recent significant changes in planning assumptions or local conditions that are represented in the models but that may not yet be visible in historical roadway count data.

Technical Resources

Currently, the following applicable technical guidance exists for computing regional VMT for HPMS and for air quality analysis. Computing regional VMT for the Safety PM is structurally an identical problem to computing regional VMT for HPMS and for air quality analysis, but is conducted in a different planning area. Other methods may be used, though such methods should be adequately documented and should reflect accepted professional practice.

- FHWA Traffic Monitoring Guide
<http://www.fhwa.dot.gov/policyinformation/tmguide/>
- FHWA HPMS Field Manual
<http://www.fhwa.dot.gov/policyinformation/hpms/fieldmanual/>
- FHWA Review of State Practices Used to Report Local Area Travel
<http://www.fhwa.dot.gov/policyinformation/hpms/statepractices.cfm>
- FHWA Sample Methodologies for VMT Estimation and Forecasting
http://www.fhwa.dot.gov/environment/air_quality/conformity/research/sample_methodologies/emismeth02.cfm
- EPA Transportation Conformity Regulations
<http://www.epa.gov/otaq/stateresources/transconf/regs/420b12013.pdf>
- EPA Technical Guidance on Using MOVES to Prepare Emission inventories in State Implementation Plans and Transportation Conformity
<http://www.epa.gov/otaq/models/moves/documents/420b12028.pdf>
- EPA Use of Locality-Specific Transportation Data for the Development of Mobile Source Emission Inventories (1996)
<http://www.epa.gov/ttnchie1/eiip/techreport/volume04/iv02.pdf>

Review of Existing MPO Capacity

Most MPOs currently keep track of traffic within their boundaries, either by collecting counts themselves or by aggregating information from state and local agencies that may have conducted such counts. An MPO that seeks to establish quantifiable safety performance targets will need to develop local estimates of traffic. It is observed that most MPOs already have sufficient data on hand to undertake such procedures, and it is anticipated that any MPO that seeks to establish quantifiable performance targets will have access to the necessary data.

Appendix: Review of Technical Resources

The technical problem of computing complete VMT estimates for an area smaller than a state is routinely addressed in other regulatory contexts, and detailed technical guidance on estimation methodologies is available. For example, in conducting a regional conformity analysis, agencies estimate VMT for the entire non-attainment or maintenance areas designated by EPA, even though some of these areas do not coincide with MPO boundaries. In addition, VMT for urbanized areas, and VMT used for conformity determination must be reported to HPMS.

HPMS submissions include VMT summaries for each state, for urbanized areas within the state, and for NAAQS areas. The specific expectations for those summaries are detailed here:

<http://www.fhwa.dot.gov/policyinformation/hpms/fieldmanual/chapter3.cfm#summaries>

Methods for computing VMT for HPMS are discussed in the HPMS Field Manual (http://www.fhwa.dot.gov/policyinformation/hpms/fieldmanual/chapter5.cfm#chapter5_5_3). The field manual includes the following guidance:

“Examples of good state practices for estimating VMT on non-Federal-aid highways are:

- Current traffic growth rate on collectors or higher systems;
- Limited sample of short term traffic counts;
- Combination of sample and estimated counts; and
- Area-wide average daily traffic based on documented methods.”

The Traffic Monitoring Guide makes the following recommendation: (http://www.fhwa.dot.gov/policyinformation/tmguidetmg_2013/hpms-requirements.cfm):

“These estimates should be produced by the States using a documented statistically valid procedure based on monitored traffic. [...] Each State is encouraged to select the best approach for collecting or estimating local road data and rural minor collectors that meets their business needs.”

The Traffic Monitoring Guide provides general descriptions of methods used in New York, Iowa and Mississippi, as well as some additional acceptable “general purpose” methods.

A review of state strategies for computing minor facility VMT is also available on the HPMS site (the document provides limited technical details, and is based on data collected from the states in 2002):

<http://www.fhwa.dot.gov/policyinformation/hpms/statepractices.cfm>

EPA’s conformity regulations state that “projects which are not regionally significant are not required to be explicitly modeled, but vehicle miles traveled (VMT) from such projects must be estimated in accordance with reasonable professional practice.” 40 CFR 93.122(a)(1) , EPA further explains in 40 CFR 93.122(a)(7):

“Reasonable methods shall be used to estimate nonattainment or maintenance area VMT on off-network roadways within the urban transportation planning area, and on roadways outside the urban transportation planning area.”

Further, EPA requires that HPMS estimates of VMT must be considered the primary measures of VMT for the nonattainment or maintenance areas. For those areas where network based modeling is used in conducting the regional emissions analysis, HPMS should be used as the primary data source for model validation purposes. However, other data sources such as locally developed count-based programs can also be used. (40 CFR 93.122(b)(3))

EPA has also produced detailed guidance on developing inputs for MOVES (<http://www.epa.gov/otaq/models/moves/documents/420b12028.pdf>). That guidance also refers to another EPA document from 1996, entitled "Use of Locality-Specific Transportation Data for the Development of Mobile Source Emission Inventories" (<http://www.epa.gov/ttnchie1/eiip/techreport/volume04/iv02.pdf>). That document contains very detailed procedures for developing local VMT estimates and forecasts.

Finally, FHWA has published a document discussing methods for computing VMT to support certain types of air quality analysis in rural and small urban areas that do not have resources to conduct a significant study of traffic on local roads:

http://www.fhwa.dot.gov/environment/air_quality/conformity/research/sample_methodologies/emismeth02.cfm