PART V: Changes to the Highway Performance Monitoring System

The Federal Highway Administration's (FHWA) Highway Performance Monitoring System (HPMS) receives highway information from State departments of transportation to determine the extent, use, condition, and performance of the Nation's highways. The information is used for transportation needs assessments, transportation performance measures, apportionment of highway funds to States, and many research applications. The HPMS data program has existed since 1978.

State departments of transportation report data to FHWA in a format and via a collection methodology specified in the *HPMS Field Manual*. FHWA provides an interface for States to report data, which they must submit each year by June 15th. Although HPMS is not specifically mandated by Congress, many of the data applications that HPMS supports—such as this C&P Report and Transportation Performance Management (TPM) discussed in detail in the Introduction to Part I—are mandated. As part of TPM, State departments of transportation are required to establish performance targets for safety, road condition, and congestion in support of the National Highway Performance Program (23 U.S.C. 119). Data requirements that States must meet are specified in 23 CFR 490, which also specifies HPMS as the system of record.

In 2020, the current version of the HPMS (8.0) software application will reach the end of its software lifecycle. Several third-party software components will no longer be supported by their respective vendors. FHWA is taking this opportunity to evaluate the program to ensure it is consistent with current legislative requirements and provides the most efficient means to collect, store, analyze, and report critical data.

Stakeholder Outreach

From April through October 2017, FHWA conducted several sessions with HPMS data customers including external users as well as those within FHWA and the U.S. Department of Transportation (DOT). These sessions were designed to gather critical feedback on the scope and extent of data that HPMS should store. For example, FWHA's Office of Safety has an interest in the Model Inventory of Roadway Elements (MIRE). MIRE is a list of safety-related data collection items recommended by the Office of Safety, representing data that safety engineers deem beneficial to highway safety analysis. Having a place to store these data would have a positive impact on the Highway Safety Improvement Program goals. Currently, since no single database or other system stores MIRE data at the national level, and because States are encouraged to use MIRE in data reporting, the Office of Safety would like to add MIRE data elements to HPMS.

In the fall of 2017, FHWA reached out to stakeholders and data partners for insight to design HPMS, version 9.0. FHWA conducted four regional meetings and one virtual meeting for State departments of transportation to provide ideas regarding efficiencies. All but one State participated. These meetings were designed to identify more efficient ways to collect and receive required data. Many of the suggestions gathered from the workshops were used in the recommendations identified below.

Finally, FHWA held consultations with the software developer community to evaluate the technical feasibility of ideas generated in the stakeholder sessions.

Recommended Changes

FHWA's consultations with stakeholders and data partners produced the following recommended changes to HPMS. FHWA will implement these recommendations with the next version of HPMS (HPMS 9.0). Release of HPMS 9.0 is scheduled for the 2021 submittal from state departments of transportation (due Spring 2022).

Designation Process

Designation of roads on the National Highway System, the National Highway Freight Network, and various other networks, along with the functional classifications of highways, are proposed by State departments of transportation and then approved by FHWA. Currently, the designation of these roads relies on a manual process that is currently inconsistent between State departments of transportation and the official record approved by FHWA. This designation process will be implemented within the HPMS software application. States would submit a designation proposal via an HPMS interface, which FHWA would also use for review, approval, and adoption (with documentation). This process would provide access to the most current version of these critical highway systems, eliminate multiple versions of the same data, and establish a single version of record with a built-in update and approval process.

Incremental Data Reporting Process

Most data reported to HPMS from State departments of transportation do not change from year to year. For example, highway geometrics such as lane widths, shoulder type, and median widths are static; most data change only as a result of construction projects or natural disasters. Although most data do not vary, States are currently required to report all data annually. Greater efficiency could be gained by allowing States to report only on specific data items as they change rather than reporting the same data year after year.

Third-party Sources

The current HPMS program relies on State departments of transportation to provide all required data annually as specified in the *HPMS Field Manual*. Much of these data could be obtained through third-party vendors, crowdsourcing, and other means, which could relieve some of the burden from States, improve national consistency for some types of data, and potentially improve data accuracy. FHWA is currently evaluating the benefits and risks of such an approach. When an analysis of submitted data would affect their Federal-aid program funds, as is the case with performance targets, States would still be required to report data directly (rather than FHWA outsourcing data collection to a third-party vendor).

Data Economy

During the stakeholder outreach process, data collectors from partner State departments of transportation requested that data be reported in their native format. For example, the number of stop signs located on an identified road segment is an important consideration in determining highway capacity. Many States keep data on the location of stop signs, but when reporting to HPMS they need to go through the extra step of determining the number of stop signs on a given segment of road. It would be more efficient for States to report data in the form in which they were originally collected, rather than having to process data to meet the needs of individual specific applications. The recommended data economy strategy includes:

Removal of Calculated Data Items

HPMS includes several data items that States must derive from raw data. For example, in order to report on the number of turn lanes, State departments of transportation must process data from three or four attributes of an intersection into the code structure specified by the *HPMS Field Manual*. It would more efficient for States to simply report intersection attributes rather than report the derived turn lane data.

Hierarchical Data Structure

HPMS 8.0 includes two conflicting components: the spatial network known as the All Road Network of Linear Data (ARNOLD) and the attribution in HPMS of the roads represented by ARNOLD.

ARNOLD represents data at an individual road segment, whereas HPMS attributes represent the highway facility. For example, a divided highway is represented by a single feature in HPMS whereas ARNOLD would represent the highway as two road elements. The same concept is applied to intersections, interchanges, and roundabouts.

The data model for HPMS 9.0 should include a hierarchical structure that defines road features on multiple levels. This provides a more accurate and useful description of specific road features that are derived from a common collection effort.

Modernization Study

The results and details of the evaluation of the Highway Performance Monitoring System have been documented in a report titled *HPMS 9.0: Modernization Study*. It can be found on the FHWA Office of Highway Policy Information website (https://www.fhwa.dot.gov/policyinformation/).