

HPMS Field Manual & Software Updates

FHWA Highway Information Seminar

Arlington, VA

October 30, 2018

HPMS References & Resources

Highway Performance Monitoring System

Field Manual

Highway Performance Monitoring System

Field Manual Errata Sheet

SEPTEMBER 2014

ALL PUBLIC
ROADS GEOSPATIAL
REPRESENTATION STUDY

ALL ROAD NETWORK OF LINEAR REFERENCED DATA
ARNOLD
Reference Manual

Federal Highway Administration
(FHWA)

Highway Performance Monitoring System
Software Guide for Version 8.0

Software Guide

Traffic

Highway Performance Monitoring System

Field Manual Supplemental Guides

U.S. Department of Transportation
Federal Highway Administration

Highway Functional Classification Concepts,
Criteria and Procedures

2013 Edition

HPMS v8 - Sections - IRI - Windows Internet Explorer

AURN The Russ Parr Morning Sh... Google Maps PTP Certi

Highway Performance Monitoring System v8.0

SIS DOCUMENTATION ADMIN HELP

Year: 2013 State: 41 - Oregon

on Length	Value Numeric	Value
0.100	103.000	
0.100	106.000	
0.100	93.000	
0.100	89.000	
0.100	88.000	
0.100	98.000	
0.100	85.000	
0.020	88.000	
0.100	100.000	

Total Sections - IRI: 0000

of 2667

Trusted sites | Protected Mode: On

Field Manual



Summary of Updates

- General Discussions
- Data Items
 - Descriptions
 - Reporting Requirements
 - Coding Guidance
- References
 - Tables
 - Figures



HPMS 2010+

Field Manual Releases

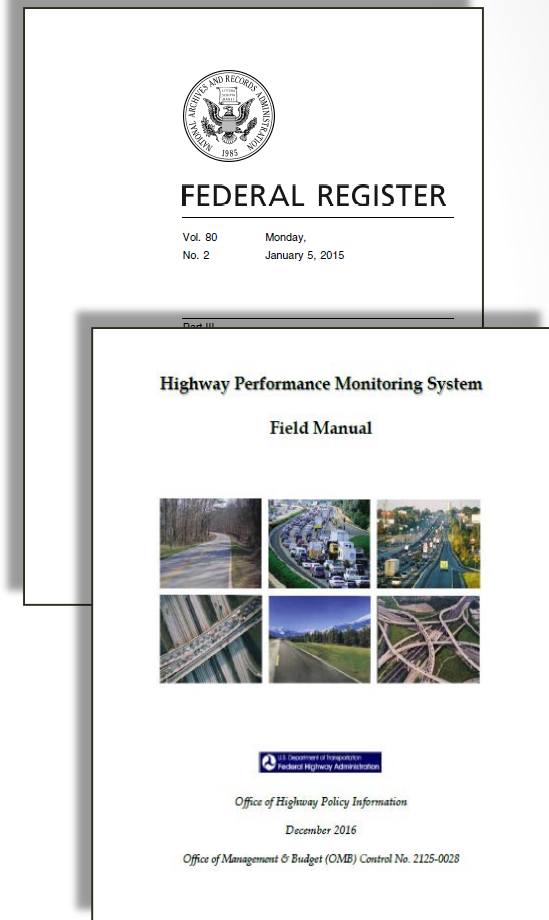
- February & September 2010
- March 2012
- March 2013
- March 2014
- March 2015 (Addendum Only)
- April 2016 (Addendum Only)
- **December 2016***

**Errata Sheet disseminated in 2017*



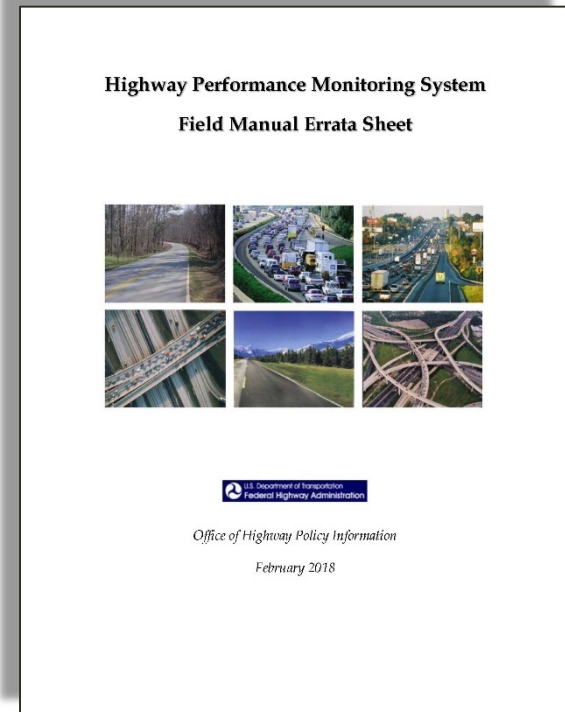
HPMS Field Manual 2016

- Addresses updated data requirements needed to support the Pavement & Bridge Performance Measures (PM2) Final Rule
- Provides additional clarification on existing data collection and reporting guidance



HPMS Field Manual Errata Sheet

- Contains revisions to various HPMS Field Manual contents
- Releases:
 - Version 1: 2/2018
 - ***Version 2: 11/2018 (Target)***

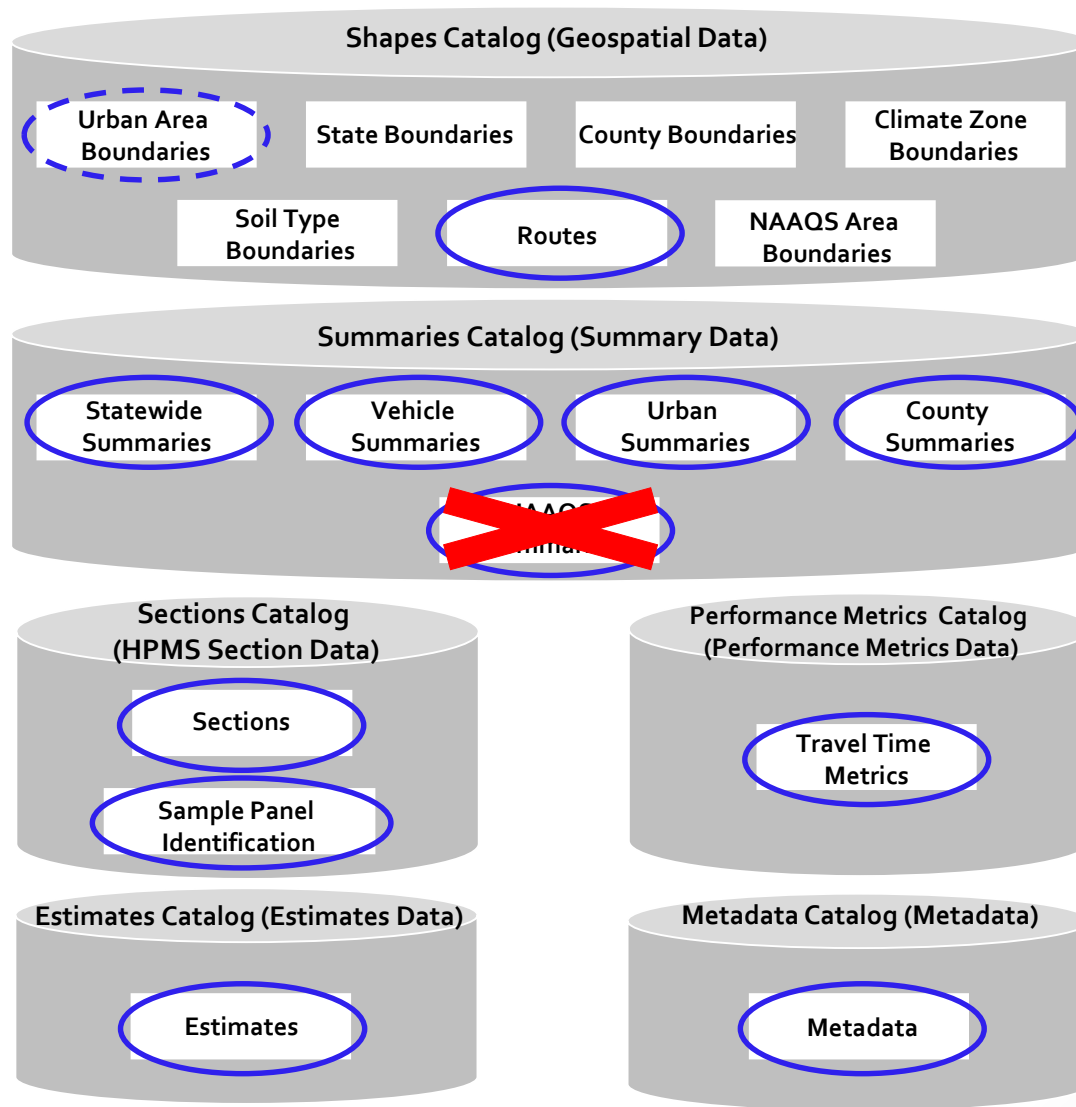


HPMS Field Manual Errata Sheet (cont'd)

- Revised the definitions for the following coverage specifications used in Table 4.2 (*“Data Items, Related Submission Deadlines and Required Reporting Formats”*)
 - Full Extent (FE), FE*, FE**, FE+R (Ramps), Sample Panel (SP), SP*
- Revised dataset reporting requirements, data item reporting requirements, guidance, and appendices



NAAQS Summary Requirement Removal



Special Networks Requirement Removal

Data Item Type	Data Item No.	Database-Specific Data Item Name	Data Item Name	Extent		Due Date	LRS Reporting Req. for Divided Highways
	61	Climate_Zone**	Climate Zone**		SP	15-Jun	I
	62	Soil_Type**	Soil Type**		SP	15-Jun	I
Inventory	63	County_Code	County Code	FE		15-Jun	I
Special Networks	64	NHS	National Highway System	FE**	-	April 15#	I&NI
	65	STRAHNET_Type	Strategic Highway Network	FE**	-	15-Jun	I
	66	Truck	National Truck Network	FE**	-	15-Jun	I
	67	Future_Facility	Future National Highway System	FE**	-	15-Jun	I
Inventory	68	Maintenance_Operations	Maintenance & Operations	FE		15-Jun	I
Traffic	69	Capacity	Capacity		SP	15-Jun	I
Inventory	70	Dir_Through_Lanes	Directional Through Lanes	FE**** #		15-Apr	I or I&NI*





Speed Limit (Data Item 14) Guidance Update

- Sections with minimum and maximum posted speed limits (PSLs) shall be coded per maximum PSL
- Sections with variable speed limits shall be coded per the PSL, or the peak period speed limit (PPSL) (when PPSL < PSL)





No. of Intersections (Data Items 31-33) Guidance Update

- At-grade crossings where pedestrian-activated signals are present shall be excluded from the count for these data items, unless a cross-street is present



Right and Left Shoulder Width (Data Items 38-39) Guidance Update

- Zero (0) values shall only be reported for sections where shoulders do not exist



Widening Potential (Data Item 42) Guidance Update

- Code the number of lanes (0-9) for which it is feasible to widen the existing road, in each direction



<https://www.fhwa.dot.gov/publications/publicroads/02mar/images/03img02.jpg>



Percent Passing Sight Distance (Data Item 46) Guidance Update

- This data item shall be coded based on the extent to which passing is permitted in the inventory direction



Source:
<http://cjonline.com/sites/default/files/imagecache/superphoto/14111984.jpg>

Year of Last Improvement (Data Item 54) Guidance Update

- Code for resurfacing treatments of at least 0.5 inch that impact the wheelpath/traveled way
- If only certain lanes have been resurfaced, code in cases where one of those lanes is the right-most outer lane(s)

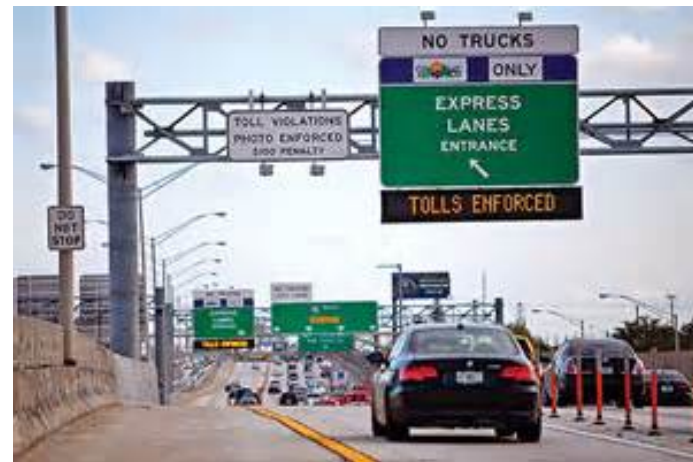


Source: <http://www.apao.org/images/pringlecrew.jpg>



Appendix D (Toll ID Table) Updates

- Toll Facility IDs
 - Additions
 - Deletions
 - Facility Name Changes



Software



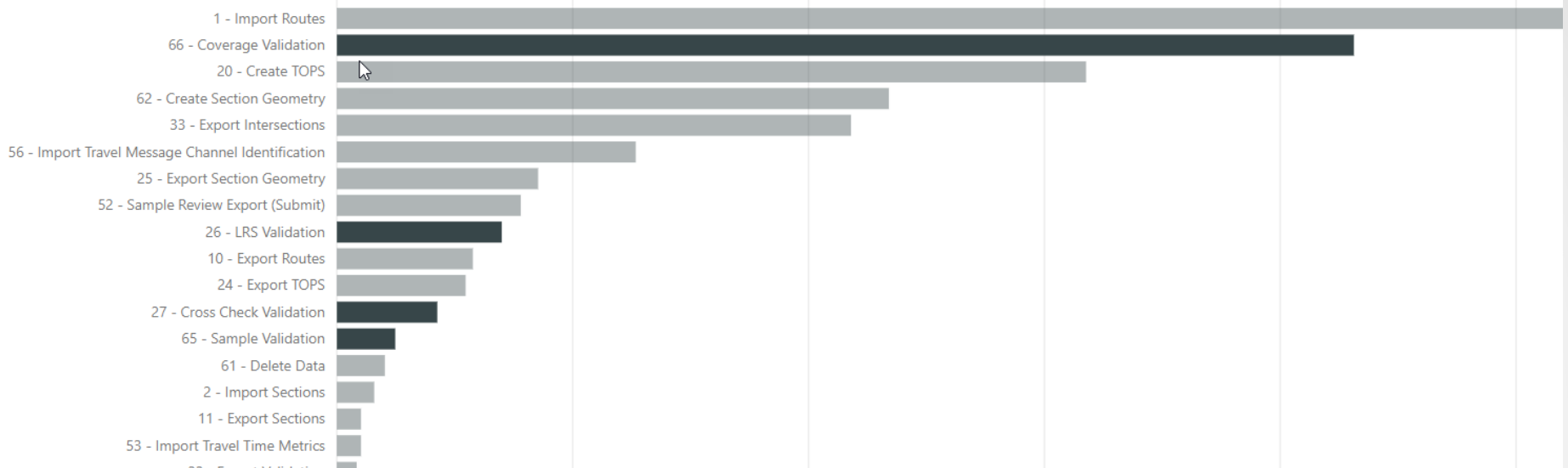
Topics

- Ongoing Software Updates
- TPM Development
 - PM2 Submission and Review
 - PM3 Review



Software Updates





Validations are a Major hurdle for states to complete submission.

On average –

Two of the top 10 most time consuming jobs are validation related.

Coverage Validation jobs take more than 80 minutes to complete.

- 54 - Export Travel Time Metrics (Submit)
- 16 - Export Vehicle Summary
- 28 - Export Samples with TOPS
- 8 - Import Estimate
- 18 - Export Metadata
- 29 - Export State Summary
- 15 - Export NAAQS Summary



Silverlight = Frenemy

Microsoft Silverlight



Keep Microsoft Silverlight up to date?

Microsoft Silverlight is not configured to update automatically. Microsoft recommends that you enable automatic updates to ensure you are using the latest and most secure version of Silverlight.

- Yes! I want to keep Silverlight up to date. (Recommended)
This will enable Microsoft Update and the Silverlight updater to keep Silverlight and other Microsoft products up to date.
- No. Do not keep Silverlight up to date.
[This setting may put your computer at risk](#)

[View the Microsoft Update Privacy Statement](#)

[View the Silverlight Privacy Statement](#)







Image: Popescu Gelu Sorin



PM2 Updates



PM2 Data Checks

1. Missing Invalid or Unresolved (MIU) Data
 1. 5% Limit
 2. Definitions
2. Through Lanes and Surface Type
3. Value Date Field
4. Section Length and Spatial Coincidence
5. Missing Metric Data for Record Keeping
6. Rounding Metric Values for Measure Computation



What is MIU Data?

- **Missing**
 - Determined with validations – **reported in Report Card**
 - Unreported data e.g. Surface Type, distress/IRI metric value, value date, etc.



What is MIU Data?

- **Missing**
 - Determined with validations – **reported in Report Card**
 - Unreported data e.g. Surface Type, distress/IRI metric value, value date, etc.
- **Invalid**
 - Determined with validations – **reported in Report Card**
 - Invalid values on any one of the required items, e.g. data collection year
 - **Length or coincidence violations for distresses and IRI**



What is MIU Data?

- **Missing**
 - Determined with validations – **reported in Report Card**
 - Unreported data e.g. Surface Type, distress/IRI metric value, value date, etc.
- **Invalid**
 - Determined with validations – **reported in Report Card**
 - Invalid values on any one of the required items, e.g. data collection year
 - Length or coincidence violations for distresses and IRI
- **Unresolved**
 - Data that FHWA determines is unreasonable
 - Suspected default metric values, excessive or no structure type data, unpaved/other surface types on NHS
 - **Reported in Report Card after review**



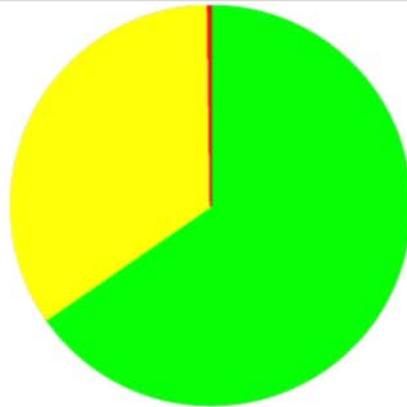
MIU Limit = 5%

HPMS 8.0.1

FULL EXTENT LANE MILES RATING (INTERSTATE)

Stage:
Year:
State:
Date:

LANE MILES FULL EXTENT GOOD	2,688.137
LANE MILES FULL EXTENT FAIR	1,414.729
LANE MILES FULL EXTENT POOR	9.081
TOTAL	4,111.947
ESTIMATED TOTAL INTERSTATE LANE MILES MISSING OR INVALID DATA	10.442
% ESTIMATED TOTAL INTERSTATE LANE MILES MISSING OR INVALID DATA - LIMIT 5.0%	0.25 %
SAMPLE SIZE	38.32 %
% SURFACE TYPE BETWEEN 2 AND 10 RATED AS G-F-P	99.75 %



- LANE MILES FULL EXTENT GOOD (65.37%)
- LANE MILES FULL EXTENT FAIR (34.41%)
- LANE MILES FULL EXTENT POOR (0.22%)

THE HPMS PAVEMENT REPORT CARD'S PURPOSE IS TO PROVIDE FEEDBACK TO DIVISIONS AND STATES ON THEIR HPMS PAVEMENT SUBMITTAL DATA IN RESPONSE TO REQUIREMENTS OF 23 CFR 490. THE REPORT CARD IS FOR INFORMATION ONLY AND SHOULD NOT BE CONSIDERED THE OFFICIAL CALCULATION OF MEASURES OR MISSING OR INVALID DATA FOR A STATE.

BASED ON 23 CFR 490 THE REPORT CARD IS ANALYZING FULL EXTENT, NOT SAMPLE BASED, PAVEMENT DATA. STATES ARE ENCOURAGED TO SUBMIT FULL EXTENT DATA PRIOR TO ITS REQUIREMENT SO THEY CAN BETTER ASSESS THEIR DATA SUBMISSION.

ITEMS SHADED ORANGE ARE HPMS PAVEMENT PERFORMANCE DATA IMPROVEMENT ZONES WHERE DATA SHOULD BE VERIFIED OR CORRECTED

Report Generated On - 06/01/2018 6:27:21 PM

Page 1 of 38



SL and SC Checks

- **Section Length**
 - IRI, Cracking Percent, Rutting, Faulting and PSR
 - >0.11 Miles = Invalid
 - **Section Level Check**
- **Spatial Coincidence**
 - Cracking Percent, Rutting and Faulting sections must align with IRI sections
 - Does not relate to PSR sections
 - Where SC violation exists, data will be marked Invalid



Through Lanes & Surface Type

- **Through Lanes**
 - If any one of the segments on the Interstate or non-Interstate NHS is missing a Through Lanes Value, **the entire system** will be flagged as **invalid**.
- **Surface Type**
 - If a **segment** has a missing surface type, that entire segment will be considered **invalid** regardless of any IRI or distress data that may be reported on that section.



Value Date Reporting

- **If Value_Date is not reported = Missing Data**
 - Interstates IRI and distress data – collected and reported in the data year
 - Non-Interstate NHS IRI and distress data – collected and reported in two year cycles
- **Coding where data can't be collected**
 - Construction, closure, disaster, deterioration
 - Use Value_Text codes
 - Report latest available data with appropriate data year
 - Data will be identified as Invalid



Rounding of Metric Values

- Done to ensure consistency in pavement condition rating
- HPMS data model precision does not match the Pavement Performance Rule requirements
 - IRI – nearest inch per mile
 - Cracking Percent – nearest whole percent
 - Rutting – nearest hundredth (0.01) inch
 - Faulting - nearest hundredth (0.01) inch
 - PSR – nearest tenth
- **FHWA will not alter data stored in the HPMS database**
Rounding of state submitted data will only be used for pavement measure computation



PM2 Data Checks

- Incorporated into the Dual Submission Process
- Reported in the Pavement Report Card...
- ...and the FHWA review
- Determined using
 - HPMS sections data and
 - Intersected HPMS sections data
- **Must be resolved or corrected by:**
 - June 15 for the Interstate System and
 - August 15 for the non-Interstate NHS





HPMS 8.0.1

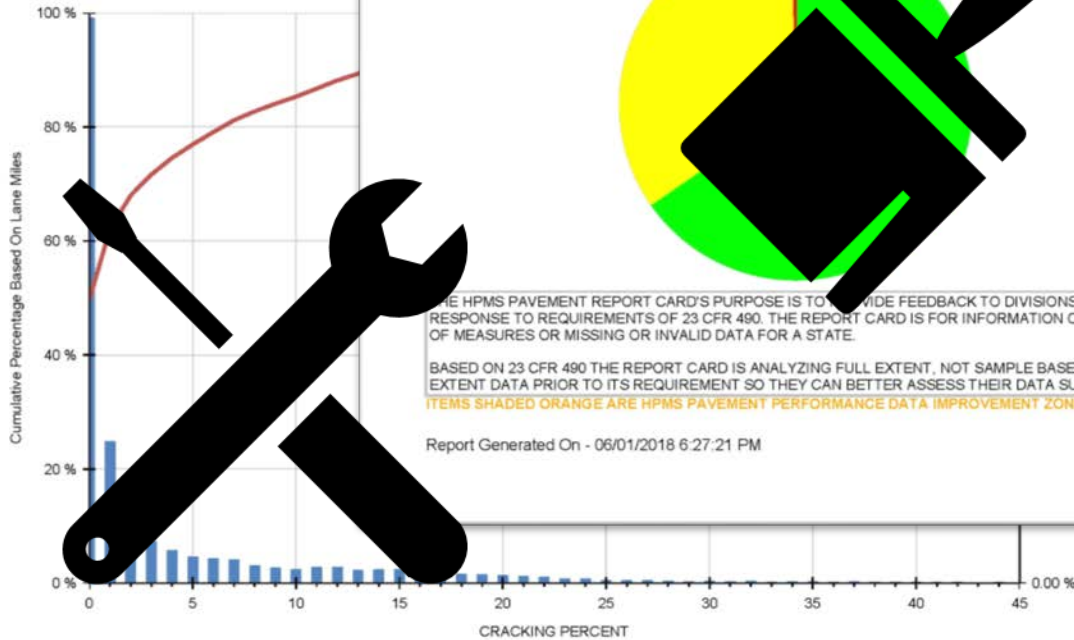
FULL EXTENT LANE MILES RATING (INTERSTATE)



LANE MILES FULL EXTENT GOOD	
LANE MILES FULL EXTENT FAIR	
LANE MILES FULL EXTENT POOR	
TOTAL	
ESTIMATED TOTAL INTERSTATE LANE MILES MISSING OR INVALID DATA	
% ESTIMATED TOTAL INTERSTATE LANE MILES MISSING OR INVALID DATA - LIMIT 5.0%	
SAMPLE SIZE	
% SURFACE TYPE BETWEEN 2 AND 10 RATED AS G-F-P	99.75 %

HPMS 8.0.1

CUMULATIVE A



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Report Generated On - 06/01/2018 6:27:21 PM

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(Frequency of Missing CRACKING_PERCENT = 0.154%, missing data is included in the cumulative distribution graph)

Report Generated On - 06/01/2018 6:27:21 PM

Page 11 of 38

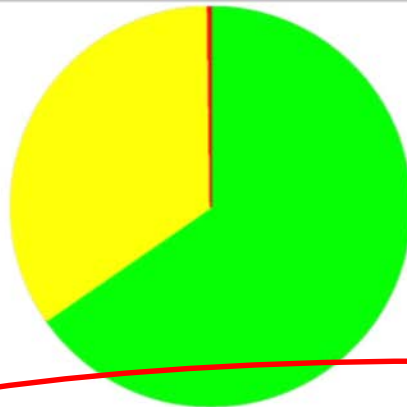


HPMS 8.0.1

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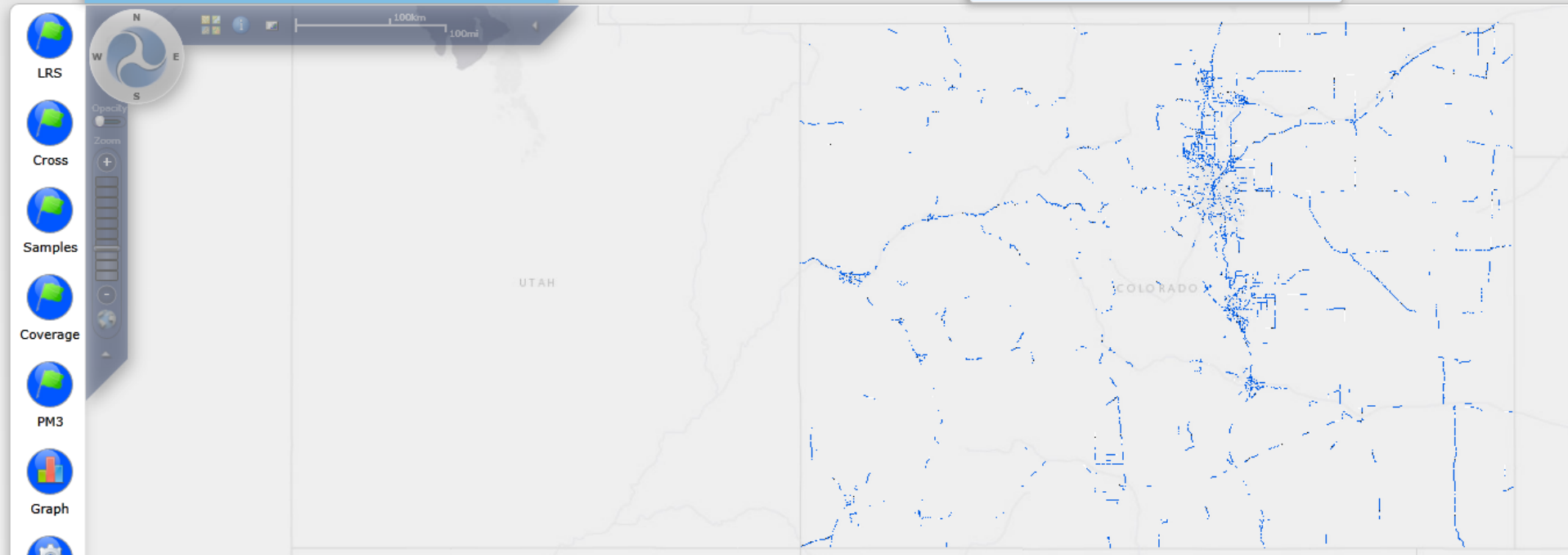
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Validation

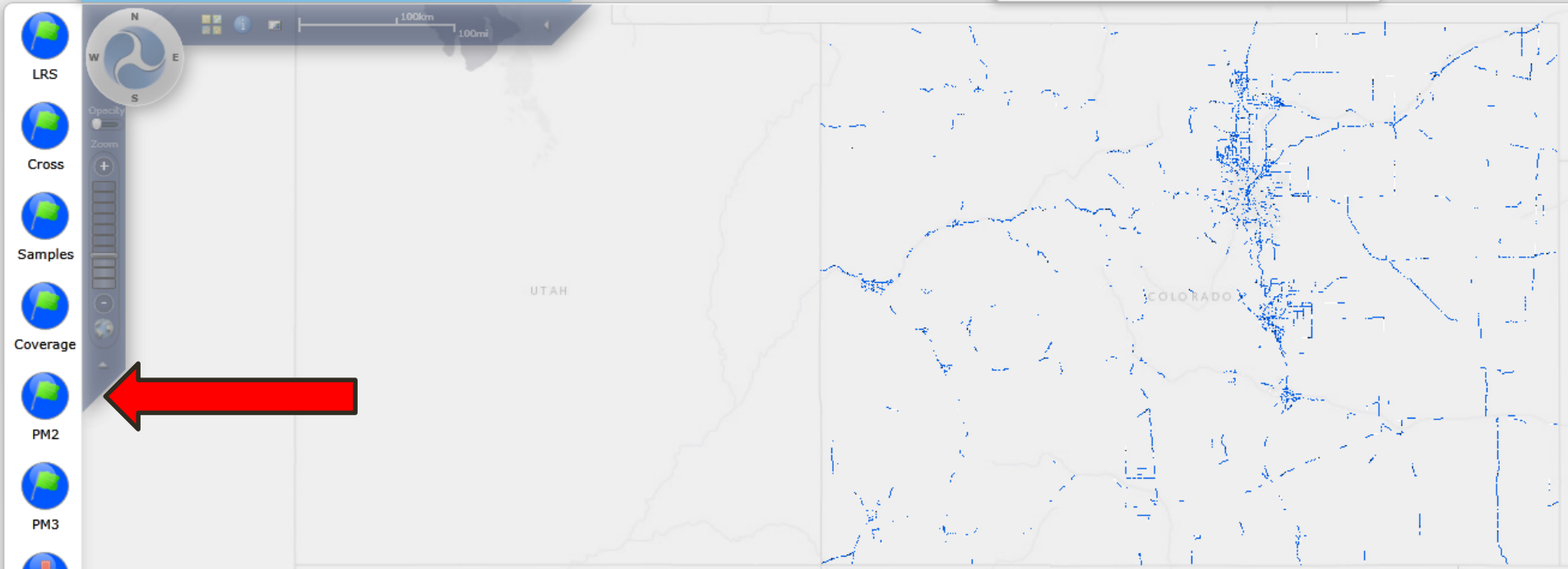
Year: 2017 State: 8 - Colorado



			Type	Route ID	Begin Point	End Point	Data Item	Error Code	Error Message	Error Description
>	⚠	🌐	Coverage	001-0-2013-0090	0.830	1.640	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-9468-000,Samp
	⚠	🌐	Coverage	001-0-2013-0090	1.640	1.970	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-2015-178,Samp
	⚠	🌐	Coverage	001-0-2013-0174	1.009	1.989	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001A0034-000,Samp
	⚠	🌐	Coverage	001-0-2013-0516	1.620	2.630	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-9845-000,Samp
	⚠	🌐	Coverage	001-0-2013-0516	2.630	3.600	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-2006-105,Samp
	⚠	🌐	Coverage	001-0-2013-0567	0	0.480	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-2005-140,Samp
	⚠	🌐	Coverage	001-0-2013-0873	4.300	6.320	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-2015-179,Samp
	⚠	🌐	Coverage	001-0-2013-1183	0.650	1.460	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-0087-000,Samp
	⚠	🌐	Coverage	001-0-2013-1183	2.460	2.970	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-0083-000,Samp
	⚠	🌐	Coverage	001-0-2013-1467	0.300	1.300	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-2004-044,Samp
	⚠	🌐	Coverage	001-0-2013-1623	0.523	1.743	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-0478-000,Samp

Validation

Year: 2017 State: 8 - Colorado



			Type	Route ID	Begin Point	End Point	Data Item	Error Code	Error Message	Error Description
>	⚠	🌐	Coverage	001-0-2013-0090	0.830	1.640	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-9468-000
	⚠	🌐	Coverage	001-0-2013-0090	1.640	1.970	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-2015-178
	⚠	🌐	Coverage	001-0-2013-0174	1.009	1.989	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001A0034-000
	⚠	🌐	Coverage	001-0-2013-0516	1.620	2.630	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-9845-000
	⚠	🌐	Coverage	001-0-2013-0516	2.630	3.600	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-2006-105
	⚠	🌐	Coverage	001-0-2013-0567	0	0.480	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-2005-140
	⚠	🌐	Coverage	001-0-2013-0873	4.300	6.320	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-2015-178
	⚠	🌐	Coverage	001-0-2013-1183	0.650	1.460	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-0117-000
	⚠	🌐	Coverage	001-0-2013-1183	2.460	2.970	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-0083-000
	⚠	🌐	Coverage	001-0-2013-1467	0.300	1.300	BASE_TYPE	89	Base_Type Must Exist on Sample Where Surface_Type > 1 (Coverage Criteria 59)	Sample_ID=001-2004-044



Submit Data

Year: 2017 State: 8 - Colorado



Submit Data



Unlock



Check Status

Last Submitted On: 8/13/2018 4:23:11 PM (MT) Last Submitted By: Abbott, Kelley J

Summary Validation

- ✓ County Summary
- ✓ Demography Summary
- ✓ NAAQS Summary
- ✓ Pavement Summary
- ✓ Travel Summary
- ✓ Urban Summary
- ✓ Vehicle Summary - Rural
- ✓ Vehicle Summary - Urban

Data Editor Validation

- ⚠ Coverage Validation
- ⚠ Crosscheck Validation
- ✓ LRS Validation
- ✓ Sample Validation

Travel Time Performance Metrics

- ⚠ Travel Time Code Data Item
- ✓ Travel Time Metrics Specifications Dataset
- ⚠ Travel Time Metrics Validations

Certified Miles

HPMS Calculated Miles:

State Certified Miles:

Submittal Comment (Required)

Comment:

Save Comments Without Submitting

Save

Cancel



Submit Data

Year: 2017 State: 8 - Colorado



Submit Data



Unlock



Check Status

Last Submitted On: 8/13/2018 4:23:11 PM (MT) Last Submitted By: Abbott, Kelley J

Summary Validation

- ✓ County Summary
- ✓ Demography Summary
- ✓ NAAQS Summary
- ✓ Pavement Summary
- ✓ Travel Summary
- ✓ Urban Summary
- ✓ Vehicle Summary - Rural
- ✓ Vehicle Summary - Urban

Data Editor Validation

- ✗ Coverage Validation
- ✗ Crosscheck Validation
- ✗ LRS Validation
- ✗ Sample Validation

Travel Time Performance Metrics

- ⚠ Travel Time Code Data Item
- ✓ Travel Time Metrics Specifications Dataset
- ✗ Travel Time Metrics Validations

Pavement Metrics

- ✓ Metadata
- ⚠ PM2 Validation

Sections	Length Violation	Spatial Coincidence	Unresolved	Locked
Interstate NHS	0	61	0	0
Non-Interstate NHS	0	65	0	0

Submit Interstate NHS Pavement Metrics Only

Summary and/or Data Editor that need to be validated before submitting.

Certified Miles

HPMS Calculated Miles: 88818.014

State Certified Miles: 88818.000

Submittal Comment (Required)

Comment: 2017 HPMS Submittal Comments will be sent by email

Text area for submittal comment.

PM3 Updates

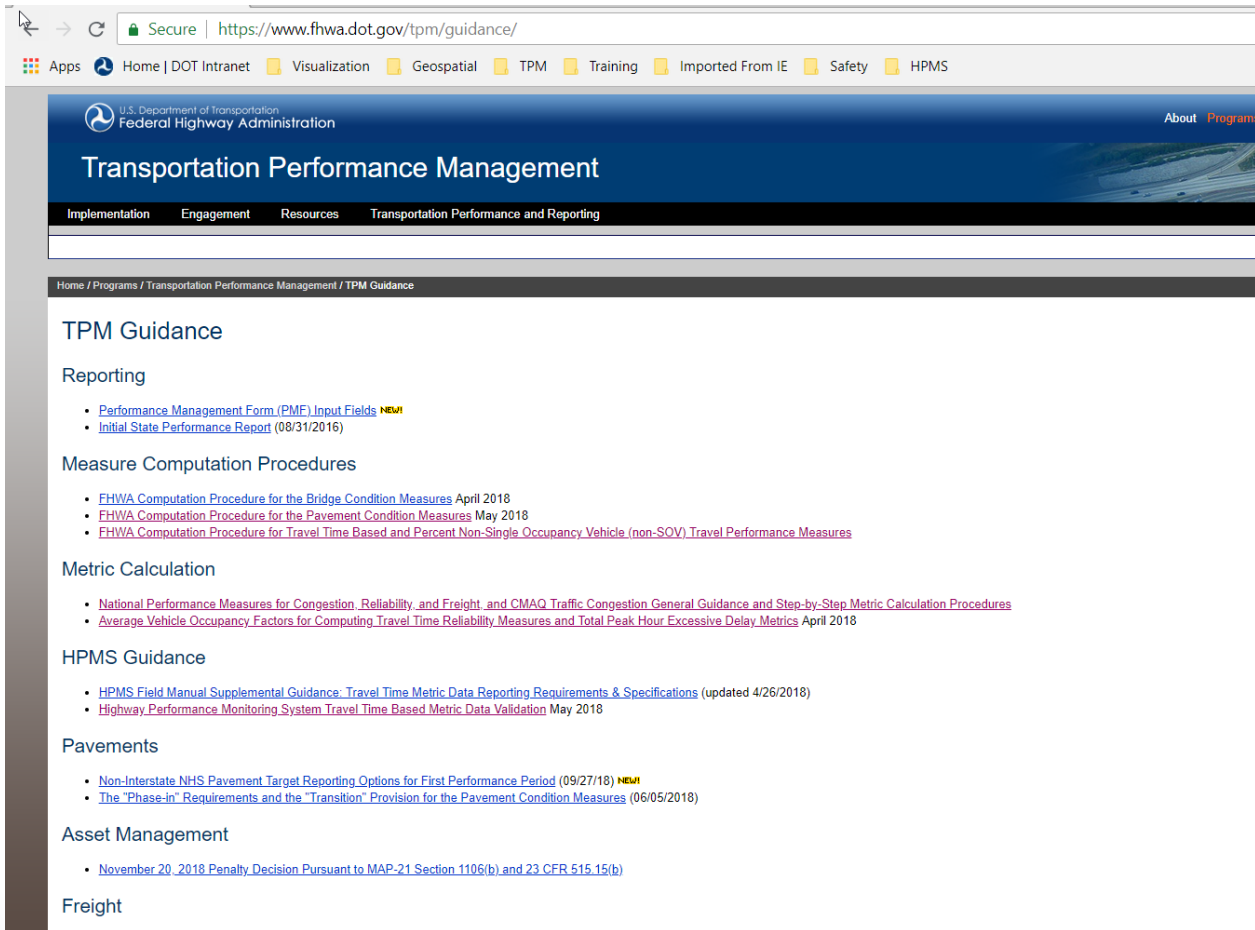


Travel Time Metrics

- Travel Time Metric Validations
- Feedback/Review
 - Missing Segments
 - Directional AADT
 - Segment Lengths
 - NULL LOTTR and TTTR Metric Values
 - Missing PHED metrics for “applicable” reporting segments



TPM Guidance



The screenshot shows the homepage of the FHWA Transportation Performance Management (TPM) Guidance website. The browser address bar shows the URL <https://www.fhwa.dot.gov/tpm/guidance/>. The navigation menu includes links for Implementation, Engagement, Resources, and Transportation Performance and Reporting. The main content area is titled "TPM Guidance" and lists several categories of resources:

- Reporting**
 - [Performance Management Form \(PMF\) Input Fields](#) **NEW!**
 - [Initial State Performance Report](#) (08/31/2016)
- Measure Computation Procedures**
 - [FHWA Computation Procedure for the Bridge Condition Measures](#) April 2018
 - [FHWA Computation Procedure for the Pavement Condition Measures](#) May 2018
 - [FHWA Computation Procedure for Travel Time Based and Percent Non-Single Occupancy Vehicle \(non-SOV\) Travel Performance Measures](#)
- Metric Calculation**
 - [National Performance Measures for Congestion, Reliability, and Freight, and CMAQ Traffic Congestion General Guidance and Step-by-Step Metric Calculation Procedures](#)
 - [Average Vehicle Occupancy Factors for Computing Travel Time Reliability Measures and Total Peak Hour Excessive Delay Metrics](#) April 2018
- HPMS Guidance**
 - [HPMS Field Manual Supplemental Guidance: Travel Time Metric Data Reporting Requirements & Specifications](#) (updated 4/26/2018)
 - [Highway Performance Monitoring System Travel Time Based Metric Data Validation](#) May 2018
- Pavements**
 - [Non-Interstate NHS Pavement Target Reporting Options for First Performance Period](#) (09/27/18) **NEW!**
 - [The "Phase-in" Requirements and the "Transition" Provision for the Pavement Condition Measures](#) (06/05/2018)
- Asset Management**
 - [November 20, 2018 Penalty Decision Pursuant to MAP-21 Section 1106\(b\) and 23 CFR 515.15\(b\)](#)
- Freight**

<https://www.fhwa.dot.gov/tpm/guidance/>
SOPs, validations, FAQs

HPMS Support



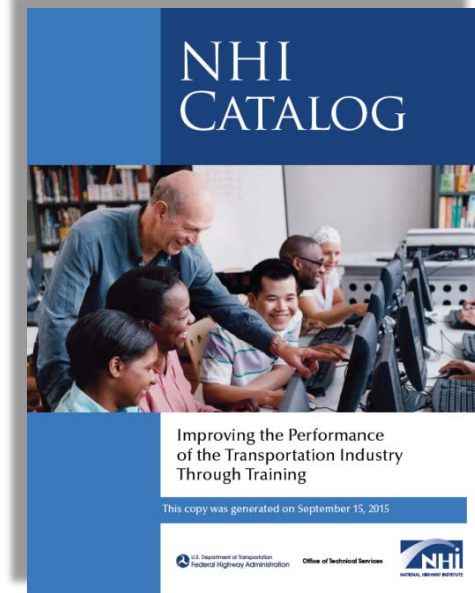
HPMS Services Offered

- Custom Training Delivery
- On-site Program/Field Review Support
- Technical Assistance Visits
- Web conferencing
- National Highway Institute (NHI) HPMS Workshop Delivery



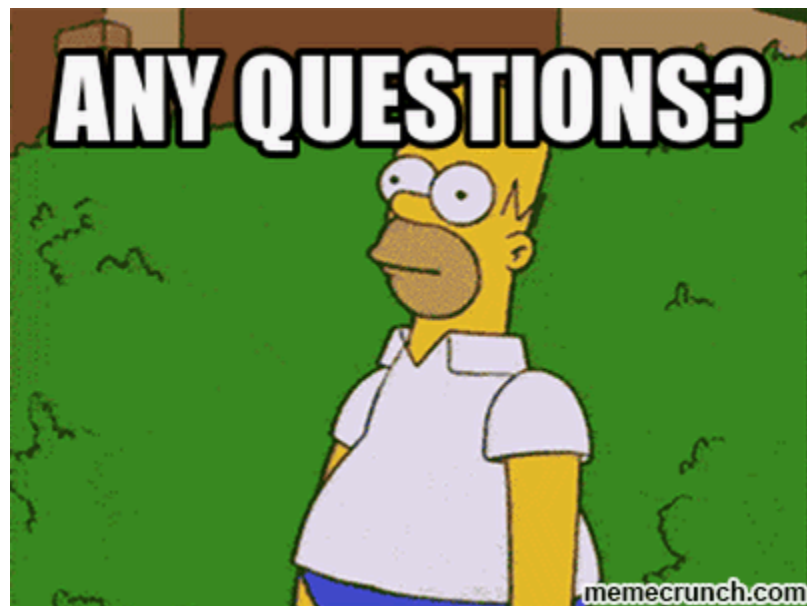
HPMS Workshop Structure

- Instructor-led (2 total)
- Two days
- Class size: 20-30 participants
- Cost: \$425/participant
- Target Audience
 - HPMS Program Coordinators
 - Data Program Managers/Providers (Road Inventory, Traffic, Pavement)
 - IT / GIS Managers/Specialists
 - MPO and Local Agency Staff



Workshop Participation (since 2/2016)





Contacts

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