

Highway Performance Monitoring System (HPMS): Concepts, Data Collection & Reporting Requirements

Module V



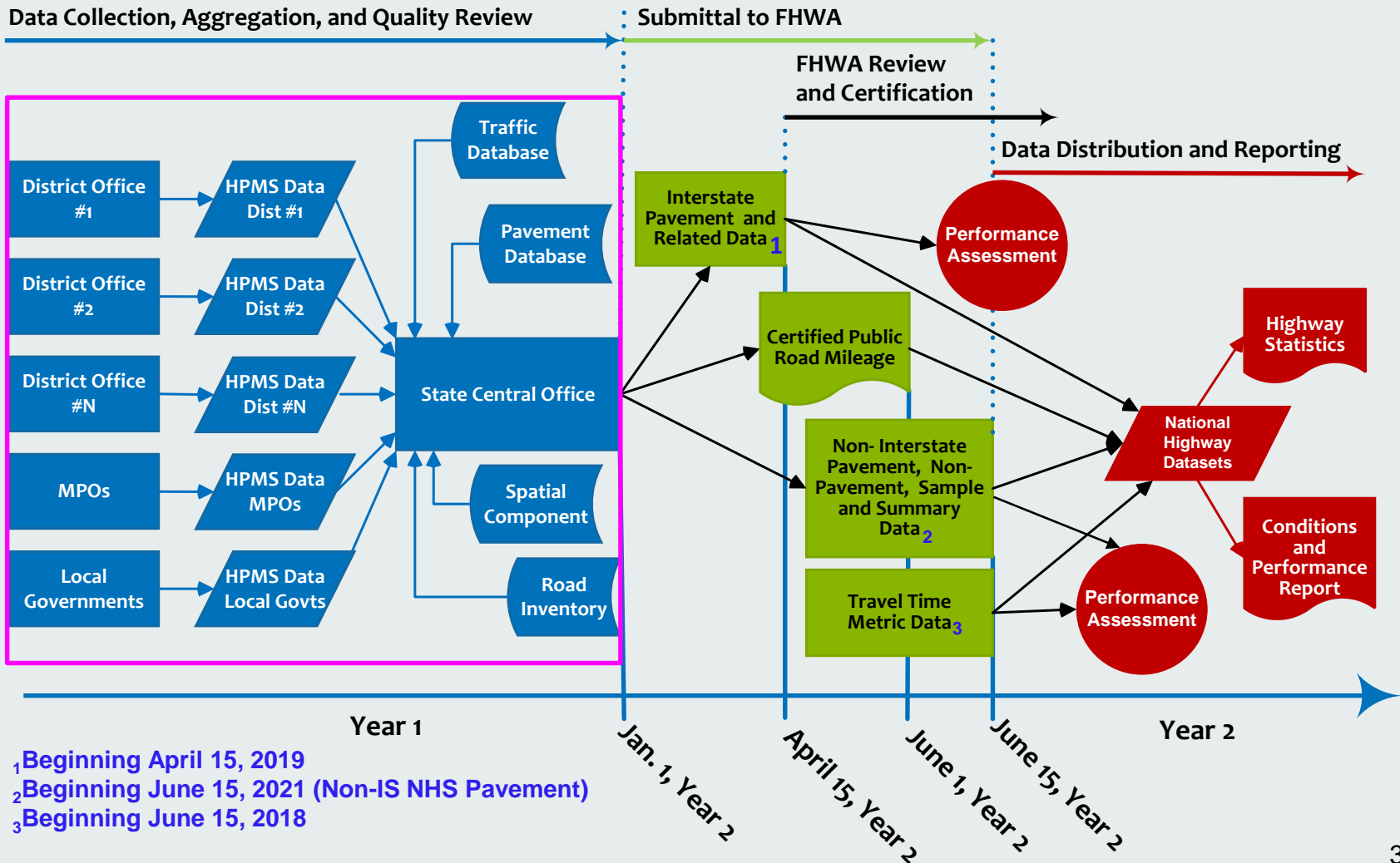
U.S. Department of Transportation
Federal Highway Administration



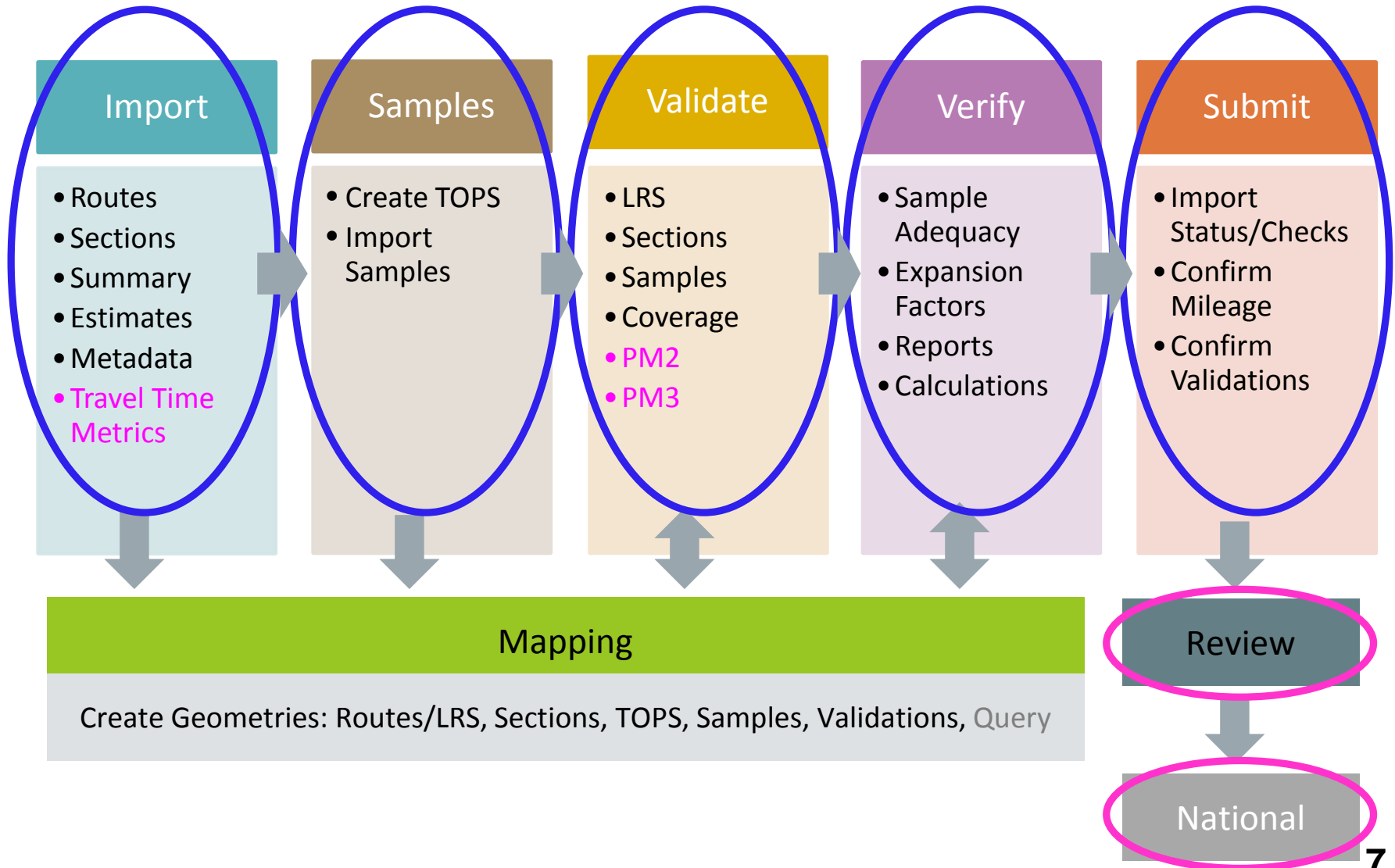
Submission Process Introduction

- States prepare submittal per their business processes
- FHWA web-based HPMS software application must be used for data submission purposes
- Attribute data must be submitted in Character Separated Value (CSV) file format
- Geospatial network data must be submitted for linear referencing purposes

HPMS Workflow / Timeline



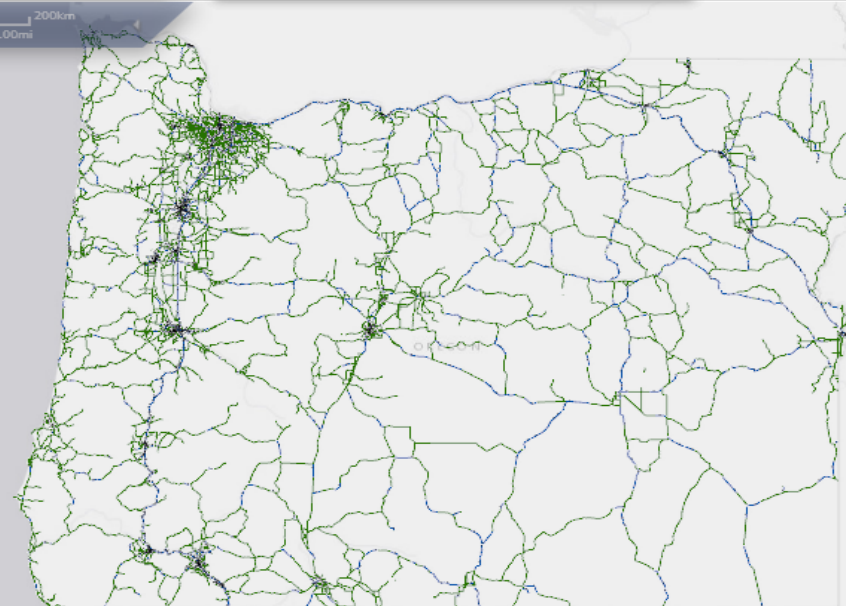
Submittal Workflow



Samples

Year: 2014 State: 41 - Oregon

Check Adequacy



Data Items →

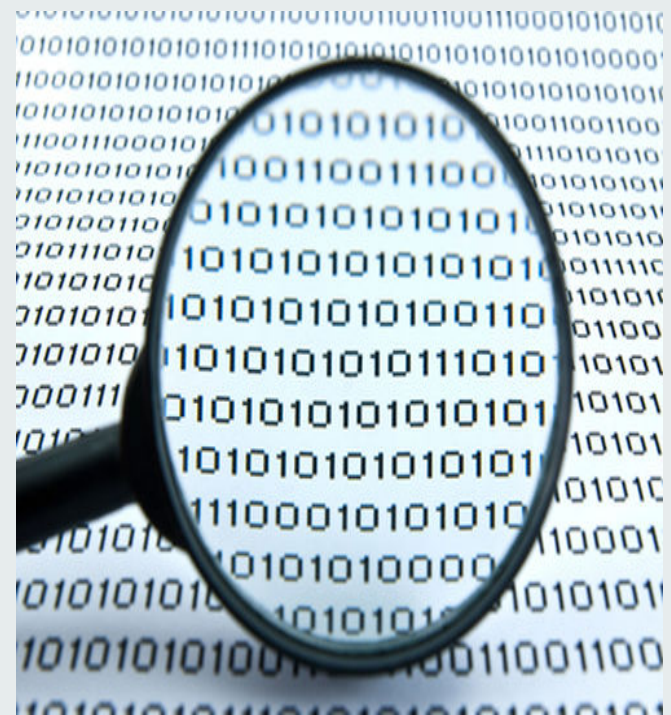
Sample ID	Route ID	Begin Point	End Point	Expansion Factor	Comments	Last Modified On	Last Modified By	Invalid	Structure Type	Access_Control	Own
000I00500000	00100I00	0.000	0.690	1.003		8/24/2015 2:47:21 PM	Campbell, Jennifer	Valid			1
000I00500075	00100I00	0.690	5.320	1.003		8/24/2015 2:47:21 PM	Campbell, Jennifer	Valid	1		1
000I00500532	00100I00	5.320	9.780	1.003		8/24/2015 2:47:21 PM	Campbell, Jennifer	Valid	1		1
000I00500978	00100I00	9.780	11.470	1.028		8/24/2015 2:47:21 PM	Campbell, Jennifer	Valid	1		1
000I00501159	00100I00	11.590	13.120	1.028		8/24/2015 2:47:21 PM	Campbell, Jennifer	Valid	1		1
000I00501322	00100I00	13.120	14.170	1.028		8/24/2015 2:47:21 PM	Campbell, Jennifer	Valid	1		1
000I00501417	00100I00	14.170	14.960	1.000		8/24/2015 2:47:21 PM	Campbell, Jennifer	Valid	1		1
000I00501496	00100I00	14.960	16.600	1.000		8/24/2015 2:47:21 PM	Campbell, Jennifer	Valid	1		1
000I00501660	00100I00	16.600	16.690	1.000		8/24/2015 2:47:21 PM	Campbell, Jennifer	Valid	1		1
000I00501668	00100I00	16.690	17.410	1.000		8/24/2015 2:47:21 PM	Campbell, Jennifer	Valid	1		1

Total Samples: 2305

Software Validations

Sections data is checked to ensure:

- Data is formatted correctly
- All required data fields contain values
- The coding for data items is logical with respect to other data items
- Data meets TPM Metric reporting requirements



http://media.bestofmicro.com/C/D/416461/gallery/MagnifyingGlassData-shutterstock_95398735_w_500.jpg

Software Validations (cont'd)

Routes data is checked to ensure that:

- Measures exist over entire extent of each route
- Measures consistently increase over entire extent of each route
- Measures on each route are logical



HPMS Software Reports

Reports

Year: 2016 State: 9 - Connecticut

Last updated: 11:59:13 AM



Report Name	Report Status	Submitted By	Submitted On	Create	Cancel	Download	Preview PDF
Consistency	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
Extent and Travel on the Interstates	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
Extent and Travel on the NHS	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
Extent and Travel Report	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
Extent and Travel Report (Urban/Rural Summary)	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
IRI on the Federal Aid Highways	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
IRI on the NHS	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
Length of Missing Pavement Data	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
Overview	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
Ownership	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
Pavement Report Card	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
Validation Summary	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
Sample Adequacy	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
Vehicle Summary Changes	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
Sample VMT Comparison	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	
Sample and TOPS Review Report	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM	<input type="checkbox"/>		<input type="checkbox"/>	

Pavement Report Card

HPMS 8.0.1

FULL EXTENT LANE MILES RATING (INTERSTATE)

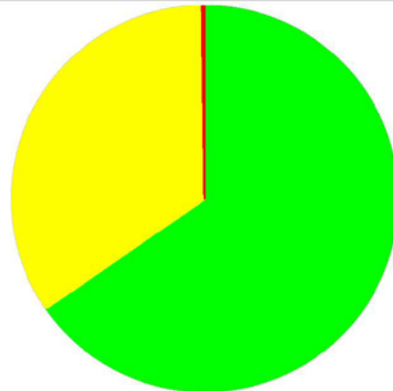
Stage: Review

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 (66.37%)
- 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.

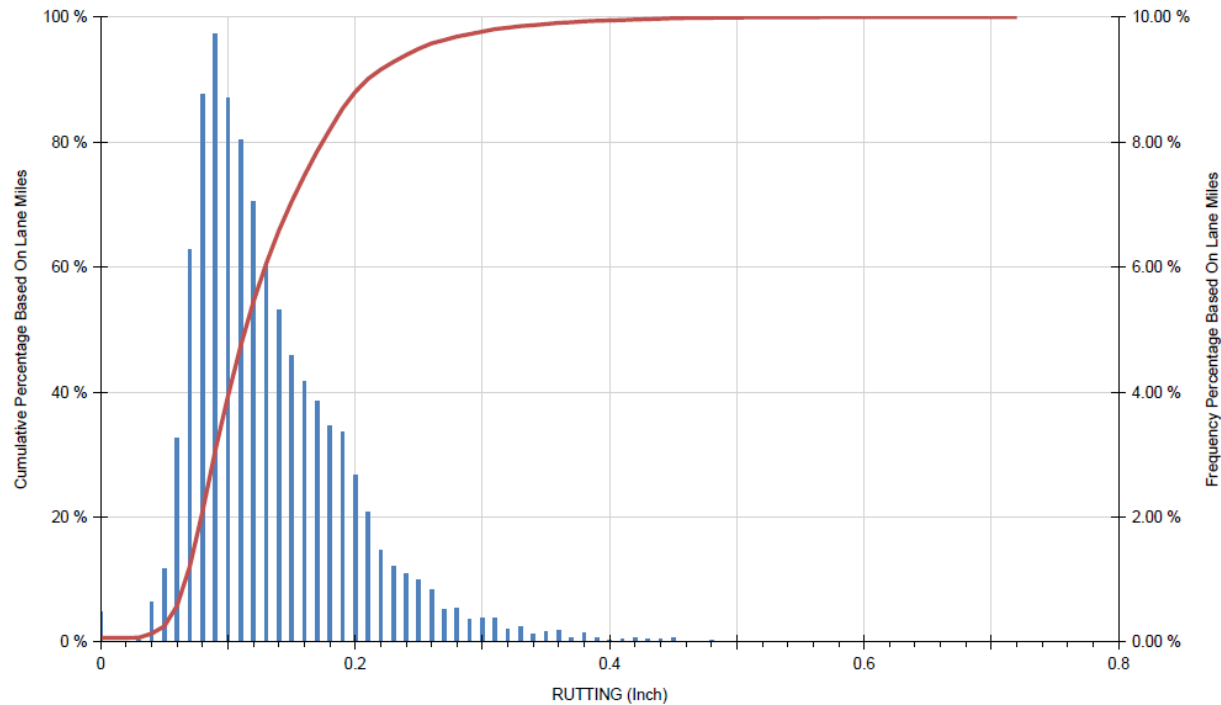
ITEMS SHADED ORANGE ARE HPMS PAVEMENT PERFORMANCE DATA IMPROVEMENT ZONES WHERE DATA SHOULD BE VERIFIED OR CORRECTED

Pavement Report Card (cont'd)

HPMS 8.0.1

CUMULATIVE AND FREQUENCY DISTRIBUTION - RUTTING (INTERSTATE)

Stage:
Year:
State:
Date:



(Frequency of Missing RUTTING = 0.164%, missing data is included in the cumulative distribution graph.)

HPMS 8.0.1 Validation Summary Report

Stage: Review
 Year:
 State:
 Date:

Validation Category: Cross Check Validation

Error Message	Records
IRI Must be ≤ 400 AND ≥ 30 (Criteria 1)	14183
AADT_Single + AADT_Combination $< 0.8 * \text{AADT}$ (Criteria 17)	8
DIR_Factor Must be ≤ 70 and ≥ 50 Where Facility Type = 2 (Criteria 40)	195
Future_AADT Must be $\leq 3 * \text{AADT}$ and $> \text{AADT}$ (Criteria 41)	13
AADT_Combination Must be $< \text{AADT} / 2.5$ (Criteria 44)	379
AADT_Single_Unit Must be $< \text{AADT} / 2.5$ (Criteria 45)	77
Value_Date Must \geq Year_Record - 2 for Data Items IRI,Rutting,Faulting or Cracking_Percent Where Sample OR Value_Text is NULL AND F_System > 1 AND NHS in (1,2,3,4,5,6,7,8,9) (Criteria 46)	96
K_Factor Must be > 4 and < 20 (Criteria 49)	3
Cracking_Percent Should be < 75 Where Surface_Type IN (3,4,5,9,10) (Criteria 51)	135
Rutting Should be < 1 (Criteria 52)	2
Through_Lanes Must be > 1 Where Facility_Type = 2 (Criteria 53)	26
AADT_Combination Should be > 0 (Criteria 54)	10743
AADT_Single_Unit Should be > 0 (Criteria 55)	661
Pct_Peak_Combination Must be > 0 AND $< 20\%$ (Criteria 56)	795
Pct_Peak_Single Must be > 0 and $< 20\%$ (Criteria 57)	7
Value_Date Must Be = Year_Record for Data Items IRI,Rutting,Faulting or Cracking_Percent Where Value_Text is NULL AND F_System=1 (Criteria 61)	144
Cracking_Percent Should be $\leq 81.3, 72.2, 65, 59.1, 54.2, 50, 46.4, 43.3$ and 40.6 on a Lane_Width of 8,9,10,11,12,13,14,15 and 16, respectively Where Surface_Type in (2,6,7,8) (Criteria 63)	1
Value_Date Must \geq Year_Record - 2 for Data Items IRI,Rutting,Faulting or Cracking_Percent Where Sample OR Value_Text is NULL AND F_System > 1 AND NHS in (1,2,3,4,5,6,7,8,9) (Criteria 46)	399



HPMS Sample Management Module

Sample Data Items

Year: State:

Samples With No Missing Data Items: 0 Samples with Missing Data Items: 273

Missing Data Items Breakdown Summary

Missing Data Item	# of Samples
Base_Thickness	1
Base_Type	1
Cracking_Percent	267
Faulting	2
Last_Overlay_Thickness	1
PSR	221
Rutting	258
Thickness_Flexible	3
Thickness_Rigid	2

Close

Samples Data Items

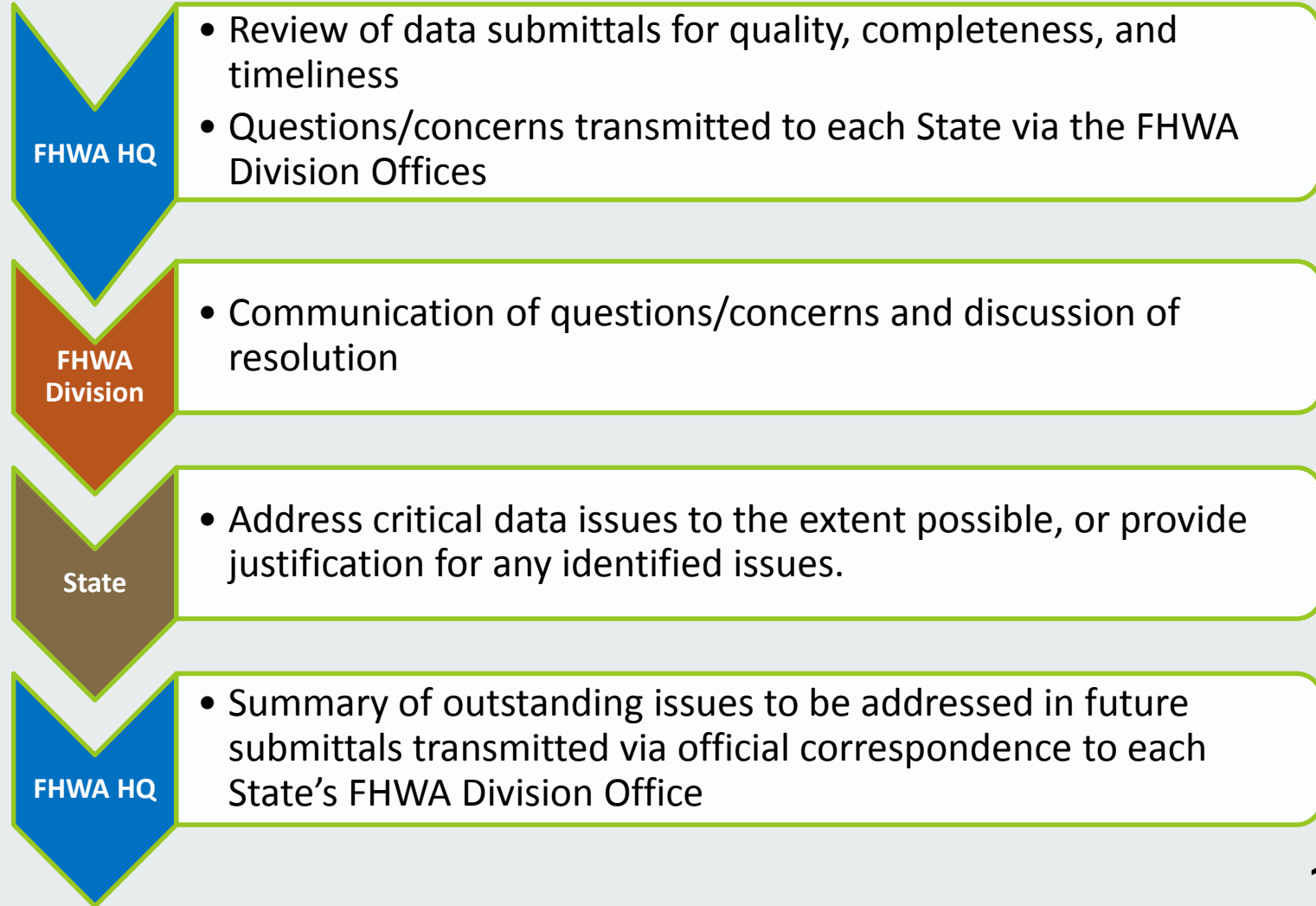
Filter with Missing Data Item: [Clear](#)

End Point	F System	Urban Code	Volume Group	Missing Data Items			
0.900	2	80389	8	1			
2.280	2	99999	8	1			
273.990	1	99998	6	1			
20.670	2	65242	5	1			
134.240	4	99999	2	1			
0.100	2	80389	5	1			
25.460	2	80389	7	1			
0.536	4	99998	3	3			
510134050567	101	365.480	365.560	2	65242	8	1
10000001750S	120000190i	0	0.391	4	49312	2	2
10000002050S	120000220i	0	0.625	5	49312	3	3
10000002350S	120000240i	0	0.136	4	49312	3	3
10000002850S	120000270i	0.126	1.105	5	49312	3	3

Total: 273

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Post-Submittal Expectations - Flowchart



Questions???



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