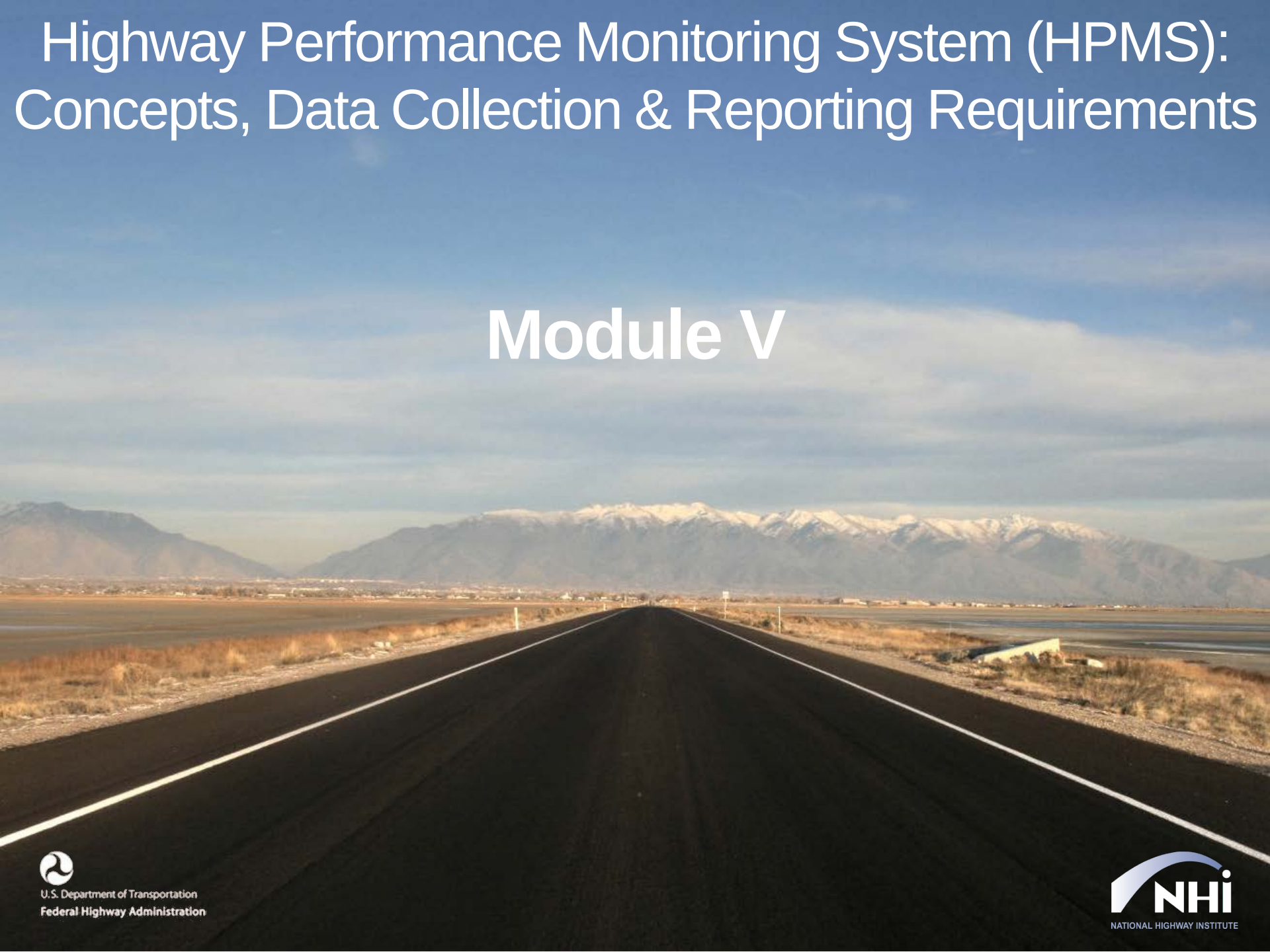
Highway Performance Monitoring System (HPMS): Concepts, Data Collection & Reporting Requirements



Module V

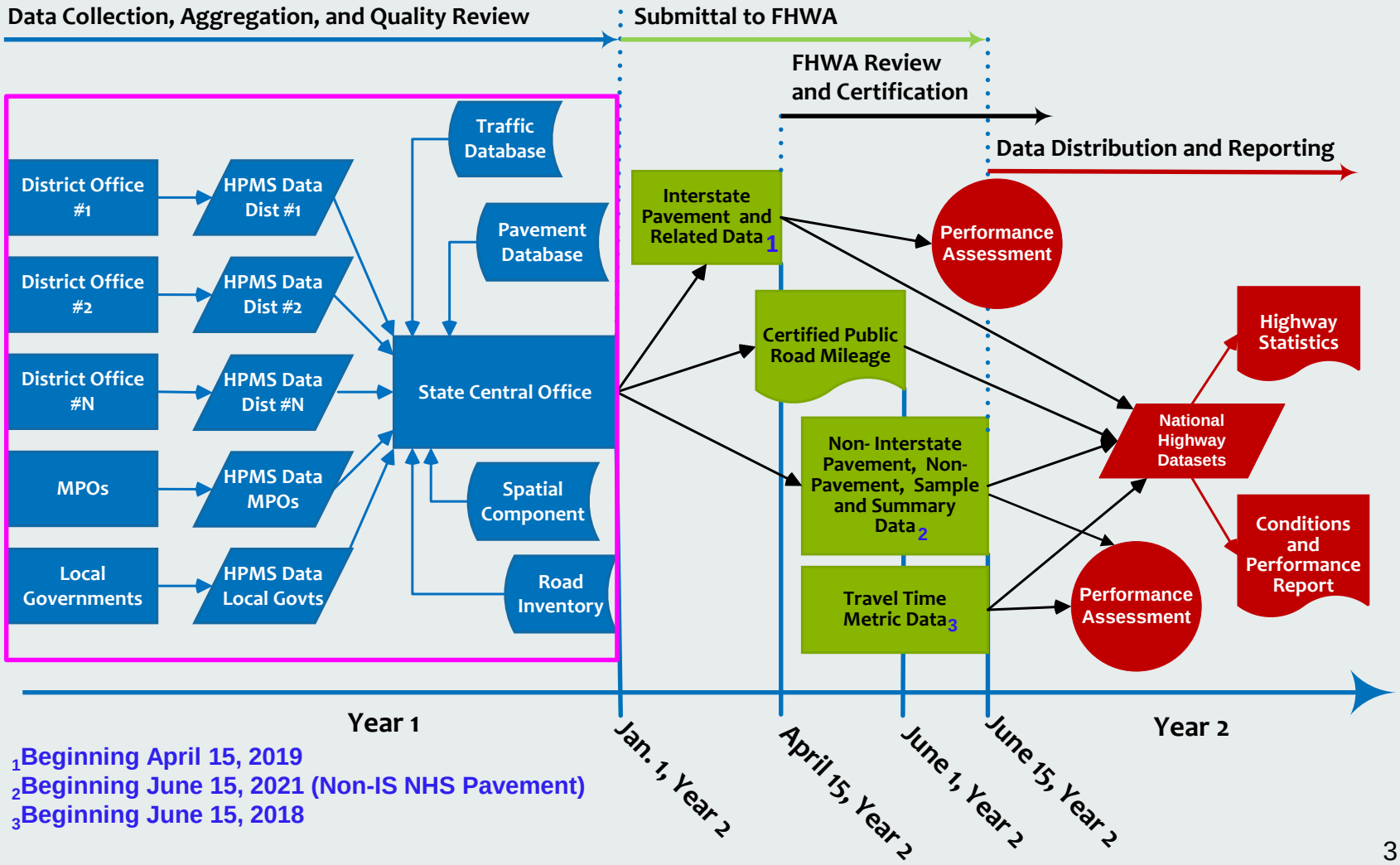
U.S. Department of Transportation
Federal Highway Administration

NHI
NATIONAL HIGHWAY INSTITUTE

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



[1]Beginning April 15, 2019
[2]Beginning June 15, 2021 (Non-IS NHS Pavement)
[3]Beginning June 15, 2018

Example DOT HPMS Workflow

December 1st	GIS prepares a new public road shape-file with LRS. This shape-file will constitute the upcoming calendar year's HPMS routes submission. All data provider's will use this LRS starting January 1st of each year.
	The current year's public roads shape-file, prepared last December, will still control the upcoming HPMS submission.
January 1st Census + VSAC	Planners supply 1) official urban boundary shape-file and 2) "csv" file containing F_System and Urban_Code data items. The F_System data should be for all roads having a functional classification greater than "local" as of this date. The "csv" file must use the LRS described in the new GIS shape-file. F_System and Urban_Code prepared here will be used in TOPS generation (see below).
	The F_System and Urban_Code data, prepared last January, will still control the upcoming HPMS submission.
February 15th	Inventory supplies "csv" file containing Facility_Type and Through_Lanes data items. At a minimum, those roads designated as Federal-Aid eligible by the planner's must be reported, however, it is preferable to match the F_System limits above. The "csv" file must use the LRS described in the new GIS shape-file. Facility_Type and Through_Lanes prepared here will be used in TOPS generation (see below).
	The Facility_Type and Through_Lanes, prepared last February, will still control the upcoming HPMS submission.
March 15th	Traffic Surveys supplies "csv" file containing AADT data item. At a minimum, those roads designated as Federal-Aid eligible by the planner's must be reported. The AADT file will consist of previous calendar year data and LRS. This data will be used for this year's HPMS submission.
April 1st	Highway Statistics will create Table of Potential Software (TOPS) using new F_System, Urban_Code, Facility_Type, Through_Lanes, and previous years AADT. Sample locations will be determined allowing various data collectors to incorporate the locations into this year's data collection season.
May 1st	Statewide Summary (for previous calendar year) 1) Inventory supplies paved and unpaved lengths for rural minor collector, rural local, and urban local functional classifications. Mileages must match County Summary. 2) Traffic Surveys supplies VMTs for rural minor collector, rural local, and urban local functional classifications. 3) Planners supply a. population for rural and small-urban areas. b. land area for rural and small-urban areas. Vehicle Summary (for previous calendar year) 1) Traffic Surveys supplies travel activities data summarized by functional system group covering all public roads.

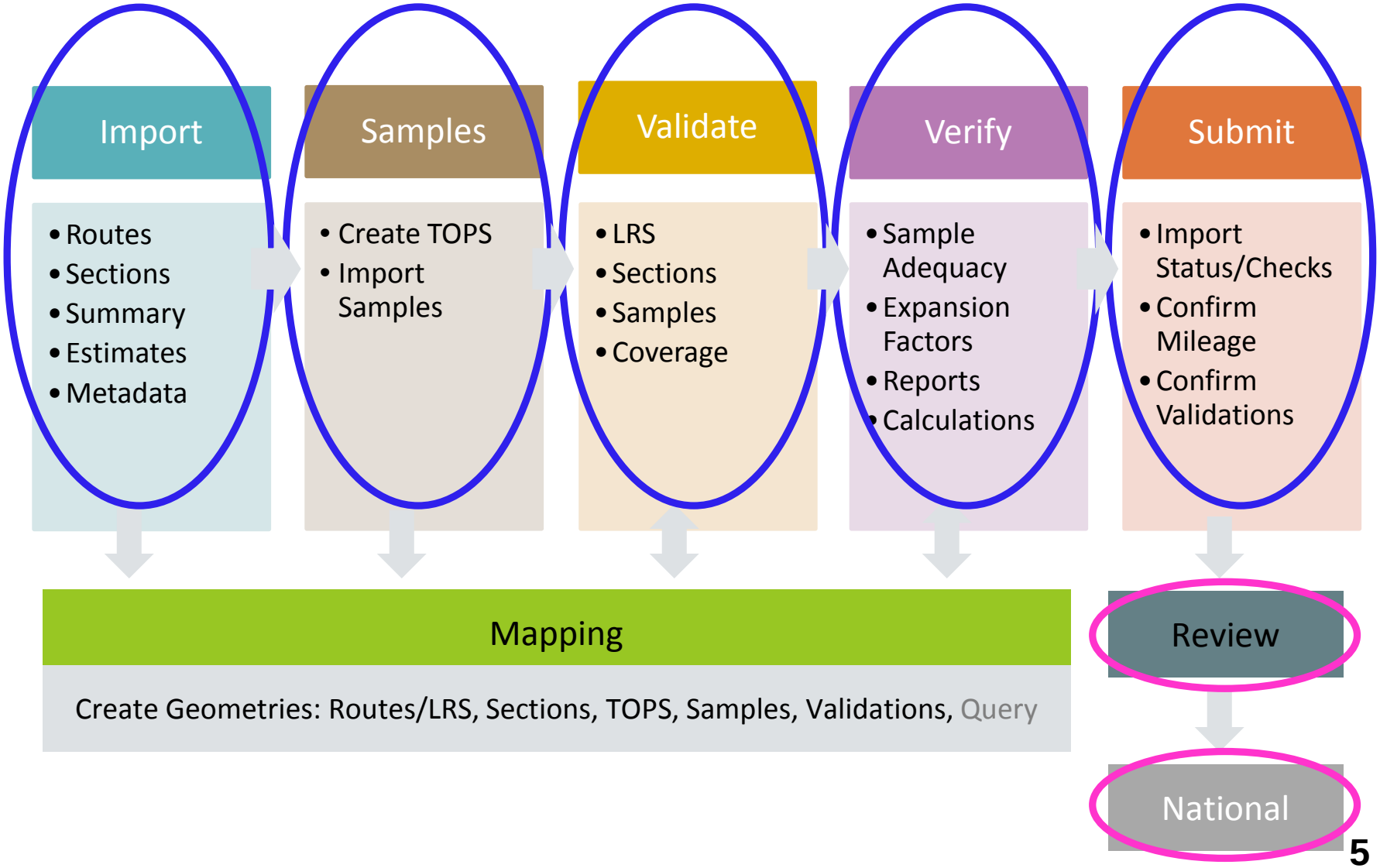
May 1st (cont.)	Urbanized Area Summary (for previous calendar year) 1) Traffic Surveys supplies VMT for Casper and Cheyenne local functional classification. 2) Planners supply population and land area for Casper and Cheyenne urbanized areas. County Summary (for previous calendar year) 1) Inventory supplies "csv" file of lengths designated as rural minor collector and rural/urban local. File must be aggregated by county, urban code, and ownership. Estimates (for previous calendar year) 1) Materials supplies "csv" file showing statewide pavement defaults for all federal-aid eligible roads. Metadata (for previous calendar year) 1) Materials supplies "csv" file describing variability of pavement collection for all federal-aid eligible roads. 2) Traffic Surveys supplies "csv" file describing variability of traffic collection for all federal-aid eligible roads. Sections (for previous calendar year) Inventory, Planners, Traffic Surveys, Traffic Operations, and Materials supply "csv" files for remaining data items collected last year. The "csv" files must use last year's LRS and not the new one. However, data items being collected this year will use this year's new LRS. This should conclude HPMS data submission for previous year.
May 15th	Inventory submits certified mileage letter for previous calendar year. Mileage must match HPMS submitted mileage.

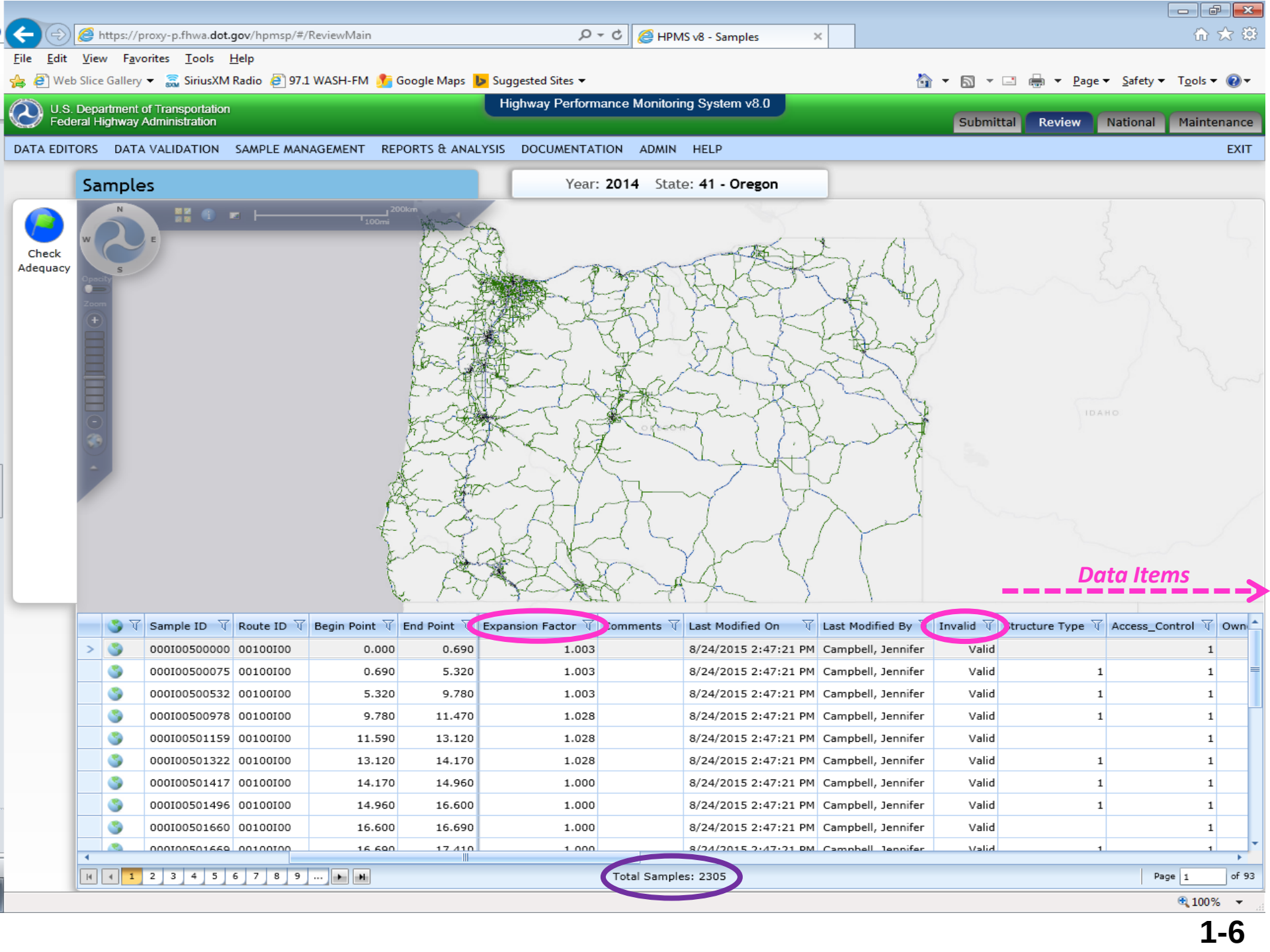
Note 1: TOPS uses the data from F_System, Urban_Code, Facility_Type, Through_Lanes, and AADT to provide a table of "potential" samples. Whenever possible, selected sample locations will correspond to previously used sample locations. However, FHWA's sample adequacy requirements will always cause a few new locations to be selected every year.

Note 2: Data for the previous year can always be submitted earlier than the shown dates. The above dates should be considered an absolute deadline. Earlier submission will facilitate the fixing of errors in a group's data and is highly encouraged.

Note 3: All "section" data items must be processed through a computer program that removes milepost equations. If milepost equations are used during data collection or are just part of the source data, the data provider should not try to remove them. GIS has developed a computer program to accomplish the task.

Submittal Workflow




https://proxy-p.fhwa.dot.gov/hpmsp/#/ReviewMain
HPMS v8 - Samples
File Edit View Favorites Tools Help
Web Slice Gallery SiriusXM Radio 97.1 WASH-FM Google Maps Suggested Sites
Page Safety Tools
U.S. Department of Transportation
Federal Highway Administration
Highway Performance Monitoring System v8.0
Submittal Review National Maintenance
DATA EDITORS DATA VALIDATION SAMPLE MANAGEMENT REPORTS & ANALYSIS DOCUMENTATION ADMIN HELP EXIT
Samples
Year: 2014 State: 41 - Oregon
Check Adequacy
IDAHO
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
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 2 3 4 5 6 7 8 9 ...
Total Samples: 2305
Page 1 of 93
100%

Software Validations

Sections data is checked to ensure that:

- The data is formatted correctly
- All required data fields contain values
- The coding for data items is logical with respect to other data items

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

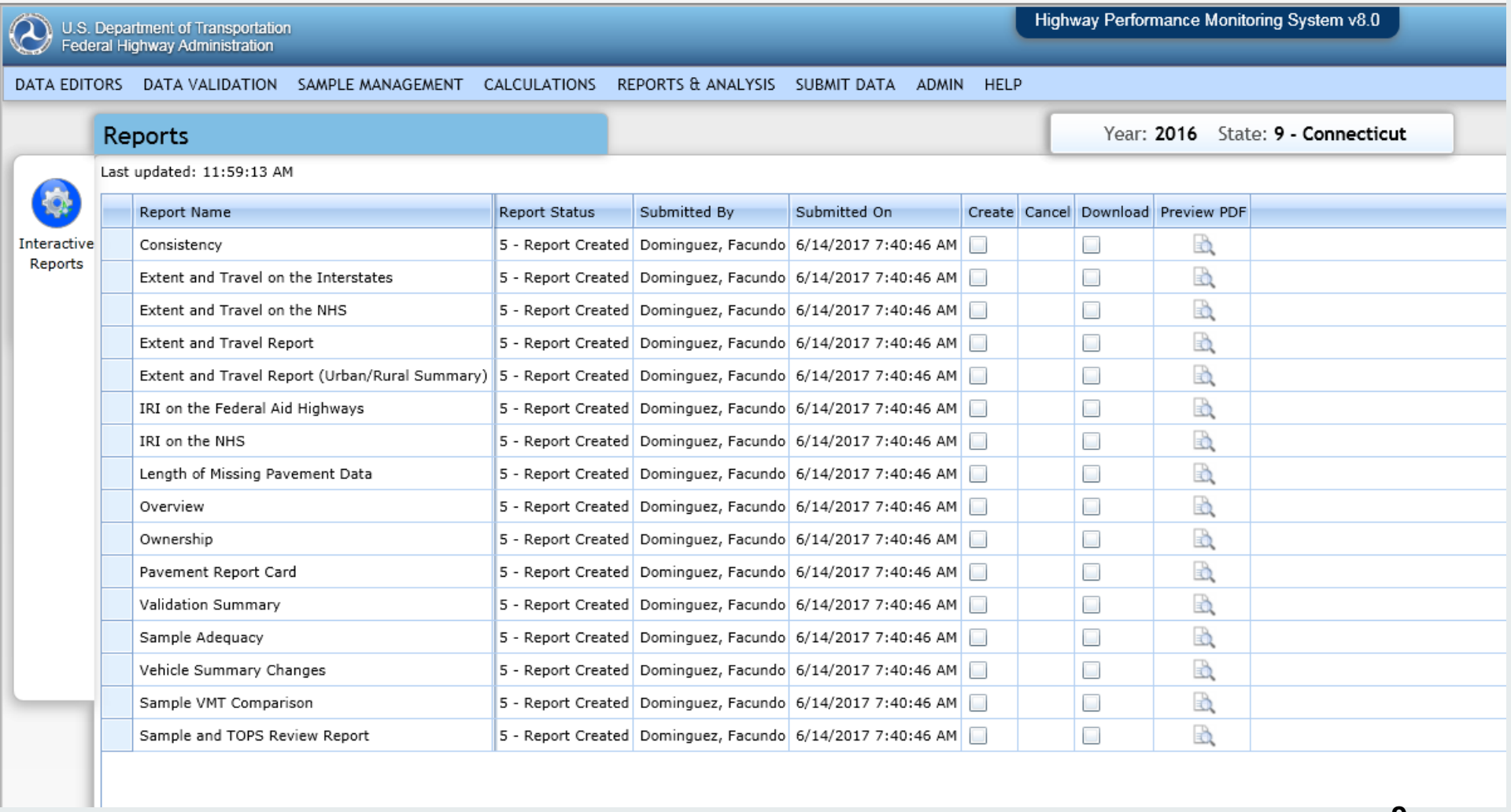
Software Validations (cont'd)

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

http://booki.flossmanuals.net/openstreetmap/_full/static/256px-Public-images-osm_logo.svg.png

HPMS Software Reports



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				
Extent and Travel on the Interstates	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				
Extent and Travel on the NHS	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				
Extent and Travel Report	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				
Extent and Travel Report (Urban/Rural Summary)	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				
IRI on the Federal Aid Highways	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				
IRI on the NHS	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				
Length of Missing Pavement Data	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				
Overview	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				
Ownership	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				
Pavement Report Card	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				
Validation Summary	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				
Sample Adequacy	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				
Vehicle Summary Changes	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				
Sample VMT Comparison	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				
Sample and TOPS Review Report	5 - Report Created	Dominguez, Facundo	6/14/2017 7:40:46 AM				

Pavement Report Card

Preview Report

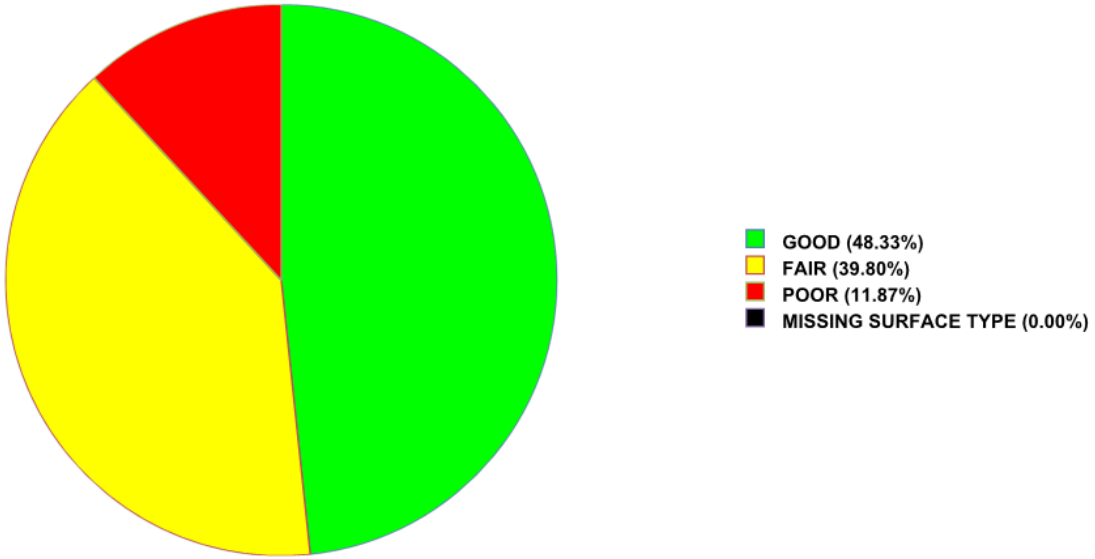
100%

HPMS 8.0.1

EXPANDED SAMPLE LANE MILES RATING
(INTERSTATE)

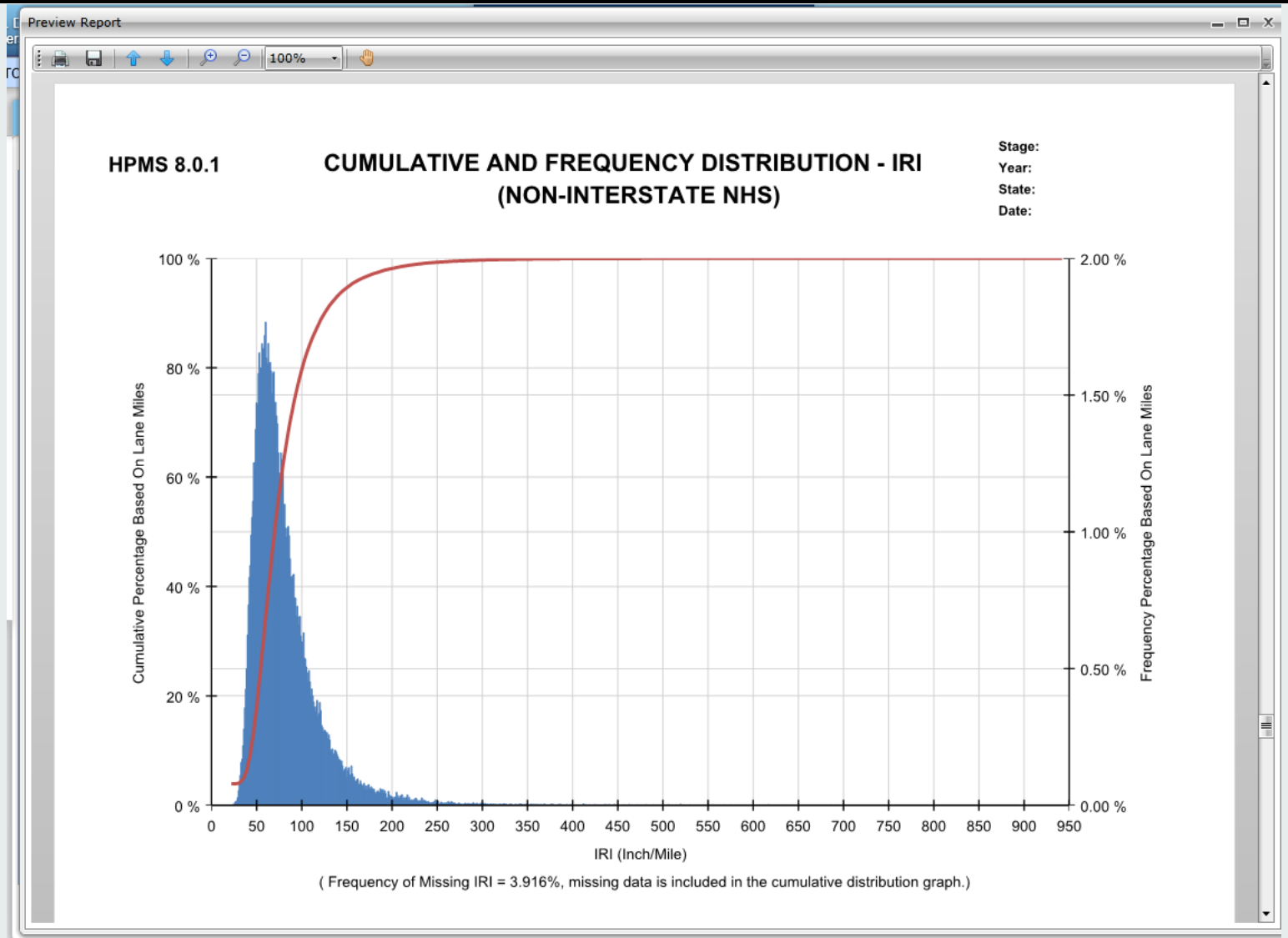
Stage:
Year:
State:
Date:

LANE MILES EXPANDED SAMPLE GOOD	3,841.854
LANE MILES EXPANDED SAMPLE FAIR	3,164.088
LANE MILES EXPANDED SAMPLE POOR	944.061
LANE MILES EXPANDED SAMPLE MISSING SURFACE TYPE	0.000
TOTAL	7,950.003
SAMPLE SIZE	34.12 %



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

Pavement Report Card (cont'd)



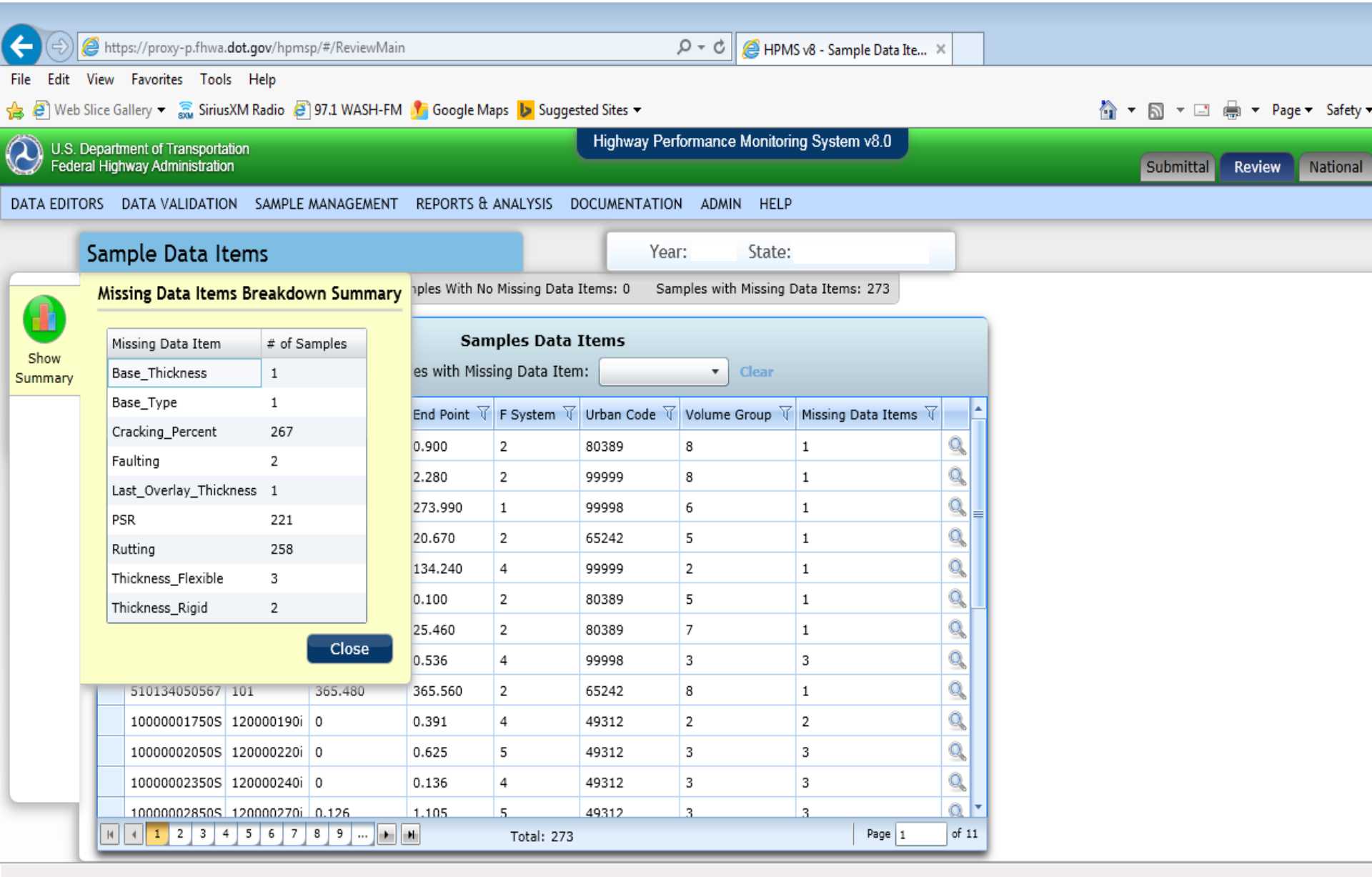
HPMS 8.0.1 **Validation Summary Report**

Stage: Review
Year: 2012
State:
Date: 10/01/2013

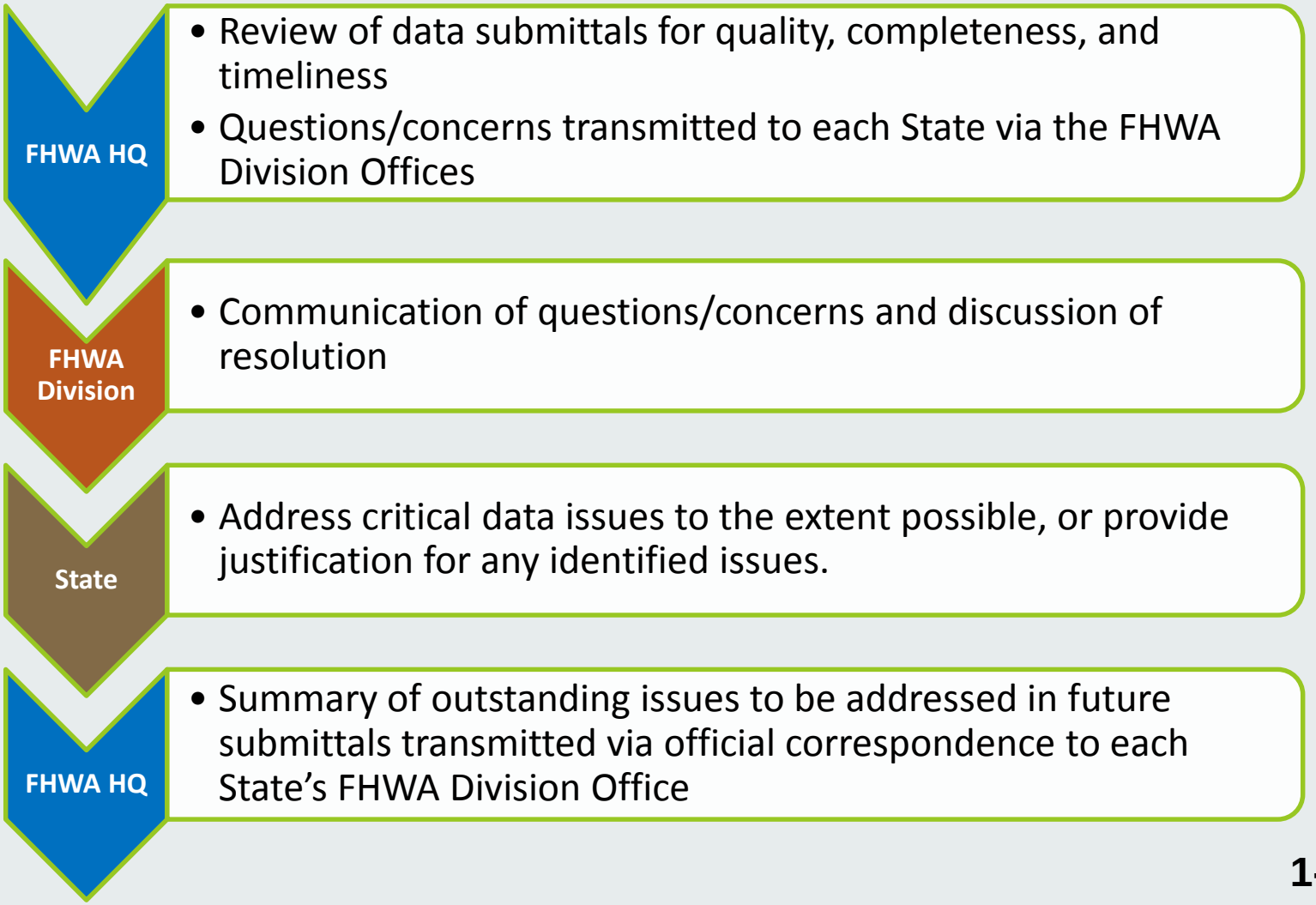
Validation Category: Coverage Validation

Error Message	Records
Pct_Peak_Combination Must Exist on Sample (Coverage Criteria 25)	13
Rutting Must Exist on Sample Where Surface_Type in (2,6,7,8) (Coverage Criteria 50)	2138
Cracking_Percent Must Exist on Sample Where Surface_Type in (2,3,4,5,6,7,8,9,10) (Coverage Criteria 52)	408
Counter_Peak_Lanes Must Exist on Sample Where Facility_Type = 2 AND (Urban_Code < 99999 OR Through_Lanes>=4) (Coverage Criteria 11)	30
IRI Must Exist Where (F_System in (1,2,3) or NHS) and Facility_Type (1,2,3) or (Sample and F_System = 4 and Urban_Code = 99999) (Coverage Criteria 47)	1908
PSR Must Exist on Sample Where IRI is NULL and (F_System in (4,5,6) and Urban_Code < 99999 and Facility_Type in (1,2,3) or F_System in (5) and Facility_Type in (1,2,3) and Urban_Code = 99999) (Coverage Criteria 48)	141
F_System Must Exist Where Facility_Type in (1,2,3,4) (Coverage Criteria 1)	53
AADT_Combination Must Exist Where (F_System in (1) or NHS) and Facility_Type in (1,2,3) or Sample (Coverage Criteria 24)	931
Thickness_Flexible Must Exist on Sample Where Surface_Type in (2,6,7,8) (Coverage Criteria 58)	1
Access_Control Must Exist Where Facility_Type in (1,2,3) and (F_System in (1,2,3) or Sample or NHS) (Coverage Criteria 5)	151
AADT_Single_Unit Must Exist Where (F_System in (1) or NHS) and Facility_Type in (1,2,3) or Sample (Coverage Criteria 22)	926
Pct_Peak_Single Must Exist on Sample (Coverage Criteria 23)	13
Cracking_Length Must Exist on Sample Where Surface_Type in (2,6,7,8) (Coverage Criteria 53)	305
Last_Overlay_Thickness Must Exist on Sample Where Year_Last_Improv Exists (Coverage Criteria 56)	857
Grades BP/EP Must Align with Samples BP/EP (Coverage Criteria 71)	3
Sum of Curves Length Must Equal to the Sample Length Where Sample and F_System in (1,2,3) or Sample and F_System in (4) and Urban_Code=99999 (Coverage Criteria 72)	72
Sum of Grades Length Must Equal to the Sample Length Where Sample and F_System in (1,2,3) or Sample and F_System in (4) and Urban_Code=99999 (Coverage Criteria 73)	1

HPMS Sample Management Module



Post-Submittal Expectations - Flowchart



Questions???

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