Highway Performance Monitoring System Field Manual

For the Collection, Coding, and Reporting of HPMS Data

Federal Highway Administration
Office of Highway Policy Information
10/1/2024
Office of Management & Budget (OMB) Control No. 2125-0028

Contents

Data Item Quick Links

List of Tables

List of Figures

Chapter 1: Introduction to HPMS

What is HPMS?

The Federal Highway Administration (FHWA) created the Highway Performance Monitoring System (HPMS) in 1978 to collect information from the State Transportation Departments (States) regarding the extent, condition, performance, use, and operating characteristics of the nation's roadways. Information submitted to the HPMS supports the Federal Highway Administration's (FHWA) responsibilities to Congress, the Administration, and the American public, and is used for the apportionment of Federal-aid highway funds. Data from HPMS are published annually by the FHWA and are used as a key data source for a variety of FHWA business processes. A growing number of stakeholders and interested parties use information from the HPMS for analytical and research purposes. Over the decades, the HPMS has evolved to meet changing business needs within the federal government. This publication, the *HPMS Field Manual, 2024 (Field Manual)*, was developed to provide definitive guidance to States regarding the collection, coding, and reporting of their surface transportation data to the newest iteration of the HPMS, HPMS 9.0. This *Field Manual* supersedes all other versions of this document, effective 10/1/2024.

What is the Legal Authority for HPMS?

The requirements outlined in the *HPMS Field Manual* are authorized under 23 U.S.C. 315, which places the responsibility on the Secretary of Transportation for management decisions affecting transportation. In addition, 23 CFR 1.5 provides the FHWA Administrator with authority to request such information deemed necessary to administer the Federal-aid highway program, and 23 CFR 420.105(b) requires States to provide data that support FHWA's responsibilities to the Congress and the public. These legal authorities enable the FHWA to develop a biennial estimate of the future highway investment needs of the Nation as is mandated by Congress (23 U.S.C 503(b)8). HPMS data are used for assessing highway system performance under FHWA's strategic planning and performance reporting process in accordance with requirements of the Government Performance and Results Act (GPRA, Sections 3 and 4), as well as for apportioning Federal-aid highway funds under TEA-21, (23 U.S.C. 104). Furthermore, HPMS supports the calculation of the National Performance Management Measures, as required under 23 CFR 490.

What Data are Submitted to HPMS?

HPMS submissions are composed of a mixture of different types of data sets. Depending on the functional classification, network status, or area type, the number of necessary data items submitted for a roadway will vary. More detailed data is required on the Interstate and National Highway System than on local roadways. In most instances, actual values are to be reported for the data items. However, factored or estimated data is permissible whenever specified in this *Field Manual*. The data submitted is categorized into 8 key components: Certified Public Road Mileage, Roadway Attributes Data, Summary Data, Estimates, Road Event Collection Methods, All Roads Network Of Linear Data (ARNOLD), Travel Time Metrics Data, and Sample Limits. Each of these data sets are briefly explained below.

- **Certified Public Road Mileage**: Each year, States must submit a certification of the total public road mileage in their State, regardless of ownership. This mileage is used as a control total in HPMS for total mileage in each State. Certifications must be signed by the Governor, or their designee, and accepted by the FHWA Division office. See Chapter 2 for additional information.

- **Roadway Attributes Data**: This data set includes attributes concerning the function, geometric characteristics, pavement, traffic, and use for all applicable public roadways on a given network or functional classification, or for defined Samples associated with the Federal-aid roadway system. See Chapter 3 for additional information
- **Summary**: This data set includes aggregate information regarding travel, system length, paved status, and vehicle classification for a variety of functional systems and area types. Area types include urbanized and rural designations. See Chapter 4 for additional information.
- **Estimates**: These are values associated with pavement-related data items, which represent the State's best estimate of current conditions or construction practices where measured data is not available. See Chapter 5 for additional information.
- **Road Event Collection Methods**: Describe data collection and post-processing procedures used by the States for HPMS data items. The collection methods are at the dataset level, as opposed to the record level. See Chapter 6 for additional information.
- **ARNOLD Routes**: This data provide a spatial reference for the Roadway Attribute and Sample Limits data. This enables roadway attributes/data items to be represented and analyzed in a Geographic Information System (GIS) environment. The ARNOLD Routes represent all public roadways. See Chapter 7 for additional information.
- **Travel Time Metrics Data (TTM)**: Travel time metric data on the National Highway System (NHS), which includes the Interstate and non-Interstate NHS, to comply with the National Performance Management Measures requirements. The TTM data set includes more than 50 discrete travel time metrics describing the travel time along specific road segments for various vehicle classes and periods of the day. See Chapter 8 for additional information.
- **Sample Limits**: Defines the begin and end points of the Sample sections. These are a randomly selected, statistically valid number of roadway sections that are monitored from year to year, and, when expanded, can be used to estimate or represent the entirety of their respective functionally classified systems. See Chapter 9 for additional information.

The information contained in HPMS submissions must be up-to-date and accurately represent the extent, conditions, and performance of the States' roadway systems. The submission of false data is a violation of the United States code, Title 18, Section 1020.

Who Submits Information To HPMS?

States are required to submit data per the requirements of this *Field Manual*. The District of Columbia and the Commonwealth of Puerto Rico are considered as States for HPMS reporting purposes. Other United States Territories (Guam, the Commonwealth of the Northern Marianas, American Samoa, and the Virgin Islands of the United States) are required to annually report certified public road mileage and limited summary data to HPMS.

When is Information Submitted to HPMS?

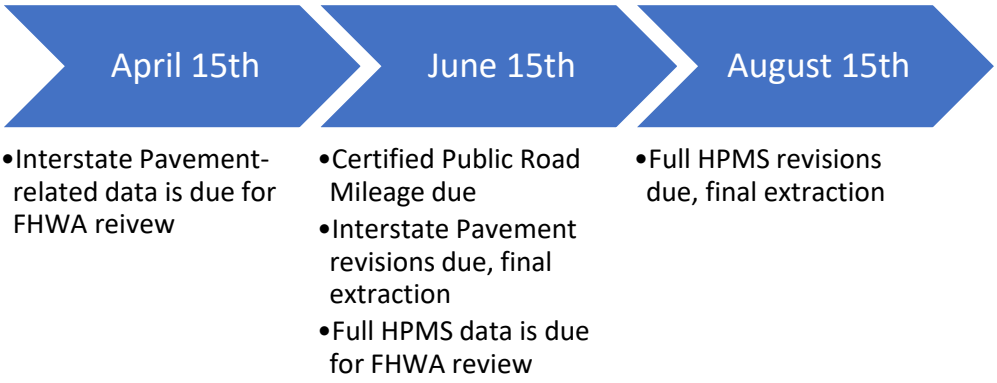
States can submit information to HPMS incrementally, as data is collected and processed by the States. The various data elements have varying collection and reporting requirements, as detailed in subsequent Chapters. However, the following dates for HPMS data remain in effect.

- Certified Public Road Mileage: The FHWA Division Field Office determines an appropriate due date for the certified public miles. However, the certified public mileage is used as a control

total for the HPMS Calculated Miles and must be received prior to the HPMS Extraction on June 15th.

- April 15th: An extraction of the Interstate pavement and related data items will be taken to review the data for compliance with the National Performance Management Measures requirements. This includes select Roadway Attribute data items (see Chapter 3), as well as the Pave_Rep_Method Collection Method (see Chapter 6). States will receive feedback from FHWA and will be provided an opportunity to revise their data based on this feedback. All revisions to Interstate pavement and related data must be submitted by June 15th. Interstate pavement and related data will be locked for editing after this date and extracted for National Performance Management Measures calculations.
- June 15th: An extraction of the complete HPMS will be taken for review. FHWA will provide feedback based on the review focusing on specific topics. States will have the opportunity to revise data based on this feedback. All revisions to this data must be submitted by August 15th. HPMS will be locked for editing after this date, and extracted for National Performance Management Measures calculations, Highway Statistics development, and all other purposes.

Figure 1: HPMS Timeline



How is Information Submitted To HPMS?

HPMS data submissions are to be done using the web-based HPMS 9.0 application. Certified public road mileage will be entered by the State into the HPMS 9.0 and supporting documentation submitted as PDF documents. The Roadway Attributes, Sample Limits, Summary, Estimates, Road Event Collection Methods, and Travel Time Metrics data sets will be submitted as separate files in Pipe-delimited Character Separated Value (CSV) format. The ARNOLD Routes and Urban Area Boundaries data must be in a ESRI shapefile or ESRI file geodatabase. Some data items can be submitted incrementally. Data items that have not changed and are not required to be reported annually or biennially (See Chapter 3) do not need to be uploaded into HPMS each year. The HPMS 9.0 Software Guide is available to assist users in navigating the software, and to provide information on the various validation procedures that are used and the automated reports that are generated. Questions pertaining to HPMS submissions should be directed to the FHWA, Office of Highway Policy Information at HPInfoMail@dot.gov or to the State's respective HPMS coach.

What is HPMS Data Used For?

The HPMS is the only official Federal government source of national level data for the nation's highways. Given this, HPMS data are widely accepted and used throughout the transportation community. A growing number of stakeholders and interested parties, including government agencies, industries, academia, and the media, use information from the HPMS for analytical and research purposes. HPMS information contributes to and is a key data source for a variety of FHWA publications, products, programs, and business processes, some of which are listed below.

- *Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance*: a biennial report to Congress on future highway investment and other transportation needs of the nation.
- *Highway Statistics*: an annual publication
- *Highway Economic Requirements System (HERS)* Model: for investment requirements modeling to calculate capacity and estimate roadway deficiencies and improvement needs. This information is used in the *Conditions and Performance* Report.
- *National Performance Management Measures:* also known as Transportation Performance Management (TPM), for performance reporting and measure computation processes for Pavement, Congestion, and Safety metrics as required by 23 CFR 490.
- Financial Management Information System (FMIS) project location identification
- Truck Size and Weight (TSW) Analysis
- Apportionment of Federal-aid highway funds
- Pavement Modeling and Cost Allocation Studies
- Congestion Analysis
- Freight Analysis Framework (FAF)

A summary of the uses of the Roadway Attribute, Estimates, and Summary data is provided in the following table:

Table 1: Uses of HPMS Data

Data Item	General Querying and Analysis	Highway Statistics	HERS	TPM	TSW	Apportion-ment	Pavement Modeling and Cost Allocation Studies	Congestion Analysis	Freight Analysis	Other
Access Control		x	x		x					
Annual Average Daily Traffic		x	x	x		x				
Base Thickness			x				x			
Base Type			x				x			
Combination Truck AADT			x		x		x		x	

Data Item	General Querying and Analysis	Highway Statistics	HERS	TPM	TSW	Apportion-ment	Pavement Modeling and Cost Allocation Studies	Congestion Analysis	Freight Analysis	Other
Counter Peak Lanes			x					x		x
County ID	x		x							
Cracking Percent		x	x	x			x			
Curve Classification			x							
Directional Factor			x				x	x		
Directional Through Lanes				x						
Facility Type	x		x				x			x
Faulting		x	x	x			x			
Functional System	x	x	x	x		x				
Future AADT			x				x			
Grade Classification			x		x					
International Roughness Index (IRI)		x	x	x			x			
Is Restricted	x	x								x
K-Factor			x				x	x		
Lane Width		x	x				x			
Last Overlay Thickness			x				x			
Left Shoulder Width			x							
Left Turn Lanes			x					x		
Maintenance and Operations										x
Managed Lane Operations Type										x
Managed Lanes										x
Median Type		x	x							
Median Width		x	x							
National Highway Freight Network	x								x	

Data Item	General Querying and Analysis	Highway Statistics	HERS	TPM	TSW	Apportion-ment	Pavement Modeling and Cost Allocation Studies	Congestion Analysis	Freight Analysis	Other
National Highway System (NHS)	x	x		x		x				
National Truck Network (NN)	x									
Number of Intersections, Type - Other			x							
Number of Signalized Intersections			x							
Number of Stop Sign-Controlled Intersections			x							
Ownership	x	x				x	x			
Peak Lanes			x					x		x
Peak Parking			x							
Percent Green Time			x					x		
Percent Passing Sight Distance			x		x					
Percent DH Combination Trucks			x							
Percent DH Single-Unit Trucks & Buses			x							
Present Serviceability Rating		x	x	x			x			
Right Shoulder Width			x							
Right Turn Lanes			x					x		
Route Number	x									
Rutting		x	x	x			x			
Shoulder Type			x							
Signal Type			x							
Single-Unit Truck & Bus AADT			x		x		x		x	
Soil Type			x				x			

Data Item	General Querying and Analysis	Highway Statistics	HERS	TPM	TSW	Apportion-ment	Pavement Modeling and Cost Allocation Studies	Congestion Analysis	Freight Analysis	Other
Speed Limit			x					x		
Strategic Highway Network (STRAHNET)	x	x								x
Structure Type	x	x	x	x						
Surface Type		x	x	x			x			
Terrain Type			x		x					
Thickness Flexible		x	x				x			
Thickness Rigid		x	x				x			
Through Lanes		x	x	x		x				
Toll ID										x
Travel Time Code				x						
Urban ID	x	x	x	x		x				
Widening Potential			x							x
Year of Last Construction			x				x			
Year of Last Improvement			x				x			
Summary Data		x		x						
Estimates			x							

Chapter 2: Certified Public Road Mileage

23 CFR 460 requires the use of public road mileage in the apportionment of 23 U.S. Code Section 402 funds to the States. The public road mileage must be determined each calendar year, must be annually certified by the Governor of the State (or designee), and is subject to the approval of the FHWA. This certification is also used by the HPMS as a control total for mileage. States should ensure that there is agreement between their certified public road mileage and the total public road system extent report in the HPMS.

What is Included in the Certified Mileage?

In calculating certified public road mileage, all public roads should be considered. A *public road* means any road under the jurisdiction of and maintained by a public authority and open to public travel. *Open to public travel* means that the road section is available, except during scheduled periods, extreme weather or emergency conditions, passable by four-wheel standard passenger cars, and open to the general public for use without restrictive gates, prohibitive signs, or regulation other than restrictions based on size, weight, or class of registration. Toll plazas of public toll roads are not considered restrictive gates. The certification should include mileage as it was at the end of the preceding calendar year. All public road mileage (regardless of ownership or paved status) is to be included in the State's certification.

What is the Process?

The State shall submit its public road mileage certification to HPMS 9.0 no later than June 15th, prior to the full extraction of HPMS data each year. FHWA Division offices may set an earlier date, and it has been historically recommended that Divisions use June 1st as their due date. The State will enter its certified mileage into HPMS and upload a copy of the signed certification letter. The State's certification of public road mileage letter must be signed annually by the current Governor of the State or territory, or their designee. If the Governor has delegated this responsibility, then a copy of the delegation letter should also be included with certification of mileage. These documents should be uploaded to HPMS 9.0 as a PDF document. After a State has entered its public mileage and submitted its certification, the FHWA Division office must review and accept the certified mileage in HPMS 9.0. This should involve a comparison with the previous year's mileage, as well as a consideration of other circumstances that could explain significant changes in the State's mileage. The Division must also verify that the certification letter from the State was signed by the authorized and responsible party.

Figure 2: Certified Mileage Process

Chapter 3: Roadway Attributes Data

This Chapter provides in-depth information on the collection, coding, and reporting requirements for the Roadway Attributes datasets. These datasets store each State's entire HPMS roadway attribute data, as detailed in this Chapter. The Roadway Attributes datasets consist of three separate tables: the Road Designations Table, the Road Identifications Table, and the Road Events Table. Each has its own file structure, detailed in their respective subsection of this Chapter. These tables relate to each other and to the Sample Panel Limits dataset (see Chapter 9) through the ARNOLD Routes dataset (as described in Chapter 7).

3.1 General Requirements

For each data item in the Roadway Attributes datasets, there are various attributes and specifications for the collection, coding, and reporting of this data. These attributes are presented in the following order for each data item: the database-specific name, the plain-language name, the data item number, a plain-language description, the required extent, the coding values, the collection and reporting cycle, the LRS requirement, the calculation method, as well as additional guidance to be used. **The data items are organized by dataset and item type, and not by data item numbers used in previous versions of this *Field Manual*.** However, the data item numbers have been retained for informational and reference purposes. The data item attributes are explained in greater detail below. Some of these attributes are also summarized in Table 3.

Database-Specific Name: This is the name that shall be used for the data items in the State's database submittals to the HPMS.

Plain Language Name: A simple name for the data item. Table 3 provides a list of all the database names.

Data Item Number: The number used in previous iterations of this *Field Manual*, retained for information and reference purposes. Table 3 provides a list of all data items' associated numbers.

Plain Language Description: A simple description of the data item.

Extent: The required extent to be reported for data items varies. Certain data items need to be collected for the entirety of the NHS (including Interstates and NHS Connectors) or for the entirety of certain functional classes, and this may include ramps within grade separated interchanges, depending on the data item specifications. These are referred to as Full Extent data. Other items may only need to be collected on Samples on certain functional classifications. In some instances, a data item may need to be collected for the entirety of the NHS, and on certain functional classes, as well as Samples for other functional classes. Table 3 provides the extent information for each data item.

Coding: There are three types of coding that may be used for most HPMS data items: Numeric, Text, and Date. For many data items, only one of the coding options will need to have an appropriate value

entered. However, there are some instances where multiple coding types are required. **If a data type is not listed under the entry to a particular data item, then that coding type is not required, and the State may use this field for their own use.**

Collection and Reporting: Some data items will have their associated data extracted from HPMS after June 15th, and only need to be reported with new records when changes in conditions occur. Other data items, particularly those related to the National Performance Management Measures for Interstate and non-Interstate NHS pavement conditions (referred to as **PM2** in Table 3) and certain Traffic (referred to as **Traffic** in Table 3) data items, have specific collection and submission cycles:

- Interstate pavement-related data items must be collected annually and reported the following year by April 15th. This data will be locked on June 15th for final extraction. See 23 CFR 490 for additional details on the National Performance Management Measures requirements.
- Non-Interstate NHS pavement-related data items must be collected biennially and reported by June 15th. This data will be locked on August 15th for final extraction. See 23 CFR 490 for additional details on the National Performance Management Measures requirements.
- Pavement-related data items for Samples not on the NHS would have their records collected and reported biennially by June 15th.
- Traffic data items must be collected on three-year (NHS) or six-year (non-NHS Federal-aid) cycle, and reported with actual or estimated data annually by June 15th.
- All other Roadway Attribute data items are to be reported as needed to account for recent data collection and changing conditions.

Table 3 identifies which data items must be collected and reported according particular requirements.

LRS Reporting: Certain data items are required to be reported for the Inventory direction, while others are required to be submitted for both the Inventory and non-Inventory direction facilities. For reporting purposes, one side of a facility shall be designated for inventory purposes, and the applicable data items shall be coded for the designated side of the roadway. The inventory direction should be applied on a statewide basis (e.g., South to North, East to West) and should never change once it has been designated. For certain data items (e.g., AADT and Through Lanes), the values must reflect attributes associated with both directions of travel, regardless of whether the roadways are a divided facility. Certain pavement data items can be reported either in the inventory direction or in both the inventory and non-inventory direction. The selected reporting method shall be specified in the Road Event Collection Methods appropriately (see Chapter 6). Additionally**, if a State opts to report pavement data items (IRI, PSR, Surface Type, Rutting, Faulting, and Cracking Percent) for both directions of travel for its divided Interstate roadways, then Urban ID, Structure Type, Route Number, and Directional Through Lanes shall also be reported for both directions of travel for those roadways.** Table 3 summarizes the LRS Reporting information for each data item.

Calculation Method: *Only applicable to data collected for the Sample Panel.* Certain Road Events data items collected for the limits of a Sample may have varying values over the course of it Sample Limits. States have the option of reporting the values for this data in two ways:

1) The State may choose to report the Road Event data item as it exists, in discrete, homogenous sections, so long as the cumulative begin and end points for the populated Road Event data item covers the full length of the Sample.

2) The State may choose to report the Road Event data item as a single, calculated value for the entire length of the Sample. Should a State decide to aggregate the data into a single value for the limits of the Sample, certain calculation methods be followed. These calculation methods are described below in Table 2, and the description for each data item found in this Chapter reports which calculation method is appropriate for each data item.

- No Calculation Permitted
- Combination – Reported value shall consist of a concatenation of multiple (text) values within the limits of the Sample.
- Minimum Value – Reported value shall be the lowest value in a range of values within the limits of the Sample.
- Predominance – Reported value shall be based on the most prevalent value within the limits of the Sample.
- Weighted Averaging – Reported value shall be based on an averaging of values within the limits of the Sample, weighted by the length of the sub-section for each value.

Table 2: Calculation Methods

Data Item	Calculation Method
Access Control	Predominance
Annual Average Daily Traffic	Not Appliable
Base Thickness	Predominance
Base Type	Predominance
Combination Truck AADT	Weighted Averaging
Counter Peak Lanes	Predominance
County ID	Not Applicable
Cracking Percent	No Calculation Permitted
Curve Classification	No Calculation Permitted
Directional Factor	Weighted Averaging
Directional Through Lanes	Not Applicable
Facility Type	Not Applicable
Faulting	No Calculation Permitted
Grade Classification	No Calculation Permitted
International Roughness Index (IRI)	No Calculation Permitted
Is Restricted	Not Applicable
K-Factor	Weighted Averaging
Lane Width	Predominance
Last Overlay Thickness	Predominance
Left Shoulder Width	Predominance
Left Turn Lanes	Predominance
Maintenance and Operations	Not Applicable
Managed Lane Operations Type	Not Applicable
Managed Lanes	Not Applicable

Median Type	Predominance
Median Width	Predominance
Number of Intersections, Type - Other	No Calculation Permitted
Number of Signalized Intersections	No Calculation Permitted
Number of Stop Sign-Controlled Intersections	No Calculation Permitted
Ownership	Not Applicable
Peak Lanes	Predominance
Peak Parking	Predominance
Percent Green Time	Weighted Averaging
Percent Passing Sight Distance	Minimum Value
Percent Design Hour Combination Trucks	Weighted Averaging
Percent Design Hour Single-Unit Trucks & Buses	Weighted Averaging
Present Serviceability Rating	No Calculation Permitted
Right Shoulder Width	Predominance
Right Turn Lanes	Predominance
Rutting	No Calculation Permitted
Shoulder Type	Predominance
Signal Type	Predominance
Single-Unit Truck & Bus AADT	Weighted Averaging
Soil Type	Predominance
Speed Limit	Predominance
Structure Type	Not Applicable
Surface Type	No Calculation Permitted
Terrain Type	Predominance
Thickness Flexible	Predominance
Thickness Rigid	Predominance
Through Lanes	Not Applicable
Toll ID	Not Applicable
Travel Time Code	Not Applicable
Urban ID	Not Applicable
Widening Potential	Predominance for Value Numeric, Combination for Value Text
Year of Last Construction	Predominance
Year of Last Improvement	Predominance

Guidance: Attempts to address frequently asked questions or provide additional guidance regarding the collection, coding, or reporting of the data items.

Table 3: Roadway Attributes Data Items

Data Type		Data Item Name	Data Item #	Required Extent						Collection and Reporting Cycle	LRS Reporting for divided facilities
				Full Extent				Samples Only			Inventory (I) Non-Inventory (NI)
				NHS	Functional Classes		Ramps	Functional Classes			
					Urban	Rural		Urban	Rural		
Designations		Functional System	1	Yes	1-7	1-7	Yes	-	-	PM2	I & NI
		National Highway System (NHS)	64	Yes	1-7	1-7	-	-	-	PM2	I & NI
		Strategic Highway Network (STRAHNET)	65	-	1-7	1-7	-	-	-	-	I
		National Truck Network (NN)	66	-	1-7	1-7	-	-	-	-	I
		National Highway Freight Network (NHFN)	72	-	1-7	1-7	-	-	-	-	I & NI
Identifications		Route Number	17	-	1-7	1-7	-	-	-	-	I, NI optional
Road Events	Inventory	Urban ID	2	Yes	1-7	1-7	Yes	-	-	PM2	I, NI optional
		Facility Type	3	Yes	1-7	1-7	Yes	-	-	PM2	I & NI
		Structure Type	4	Yes	1-6	1-5	-	-	-	PM2	I, NI optional
		Ownership	6	-	1-7	1-7	-	-	-	-	I & NI
		County ID	63	-	1-7	1-7	-	-	-	-	I
		Maintenance and Operations	68	-	1-7	1-7	-	-	-	-	I
		Is Restricted	73	-	1-7	1-7	Yes	-	-	-	I & NI
	Lanes	Through Lanes	7	Yes	1-6	1-5	Yes	-	-	PM2	I

Data Type		Data Item Name	Data Item #	Required Extent						Collection and Reporting Cycle	LRS Reporting for divided facilities
				Full Extent				Samples Only			Inventory (I) Non-Inventory (NI)
				NHS	Functional Classes		Ramps	Functional Classes			
					Urban	Rural		Urban	Rural		
		Managed Lane Operations Type	8	-	1-6	1-5	-	-	-	-	I
		Managed Lanes	9	-	1-6	1-5	-	-	-	-	I
		Peak Lanes	10	-	-	-	-	1-6	1-5	-	I
		Counter Peak Lanes	11	-	-	-	-	1-6	1-5	-	I
		Toll ID	15	-	1-7	1-7	-	-	-	-	I
		Lane Width	34	-	-	-	-	1-6	1-5	-	I
		Median Type	35	-	-	-	-	1-6	1-5	-	I
		Median Width	36	-	-	-	-	1-6	1-5	-	I
		Shoulder Type	37	-	-	-	-	1-6	1-5	-	I
		Right Shoulder Width	38	-	-	-	-	1-6	1-5	-	I
		Left Shoulder Width	39	-	-	-	-	1-6	1-5	-	I
		Peak Parking	40	-	-	-	-	1-6	-	-	I
		Directional Through Lanes	70	-	1	1	-	-	-	PM2	I, NI optional
	Intersections	Right Turn Lanes	12	-	-	-	-	1-6	-	-	I
		Left Turn Lanes	13	-	-	-	-	1-6	-	-	I
		Signal Type	29	-	-	-	-	1-6	-	-	I
		Percent Green Time	30	-	-	-	-	1-6	-	-	I
		Number of Signalized Intersections	31	-	-	-	-	1-6	1-5	-	I
		Number of Stop Sign-Controlled Intersections	32	-	-	-	-	1-6	1-5	-	I

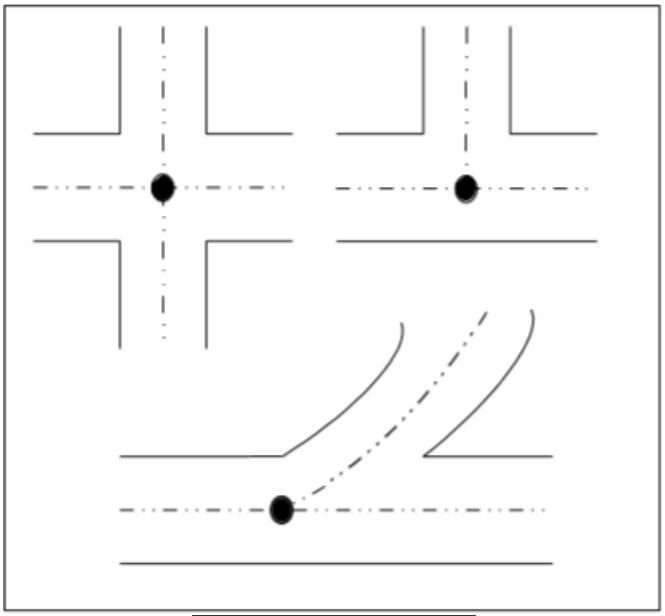
Data Type		Data Item Name	Data Item #	Required Extent						Collection and Reporting Cycle	LRS Reporting for divided facilities
				Full Extent				Samples Only			Inventory (I) Non-Inventory (NI)
				NHS	Functional Classes		Ramps	Functional Classes			
					Urban	Rural		Urban	Rural		
		Number of Intersections, Type - Other	33	-	-	-	-	1-6	1-5	-	I
	Traffic	Annual Average Daily Traffic	21	Yes	1-6	1-5	Yes	-	-	Traffic	I
		Single-Unit Truck & Bus AADT	22	Yes	1	1	-	2-6	2-5	Traffic	I
		Percent Design Hour Single-Unit Trucks & Buses	23	-	-	-	-	1-6	1-5	Traffic	I
		Combination Truck AADT	24	Yes	1	1	-	2-6	2-5	Traffic	I
		Percent Design Hour Combination Trucks	25	-	-	-	-	1-6	1-5	Traffic	I
		K-Factor	26	-	-	-	-	1-6	1-5	Traffic	I
		Directional Factor	27	-	-	-	-	1-6	1-5	Traffic	I
		Future AADT	28	-	-	-	-	1-6	1-5	-	I
	Control	Access Control	5	Yes	1-3	1-3	-	4-6	4-5	-	I
		Speed Limit	14	Yes	1	1	-	2-6	2-5	-	I
	Pavement	International Roughness Index (IRI)	47	Yes	1-3	1-3	-	4-6	4-5	PM2	I, NI optional
		Present Serviceability Rating	48	Yes	1	1	-	4-6	5	PM2	I, NI optional
		Surface Type	49	Yes	1	1	-	2-6	2-5	PM2	I, NI optional
		Rutting	50	Yes	1	1	-	2-6	2-5	PM2	I, NI optional
		Faulting	51	Yes	1	1	-	2-6	2-5	PM2	I, NI optional

Data Type		Data Item Name	Data Item #	Required Extent						Collection and Reporting Cycle	LRS Reporting for divided facilities
				Full Extent				Samples Only			Inventory (I) Non-Inventory (NI)
				NHS	Functional Classes		Ramps	Functional Classes			
					Urban	Rural		Urban	Rural		
		Cracking Percent	52	Yes	1	1	-	2-6	2-5	PM2	I, NI optional
		Year of Last Improvement	54	-	-	-	-	1-6	1-5	-	I
		Year of Last Construction	55	-	-	-	-	1-6	1-5	-	I
		Last Overlay Thickness	56	-	-	-	-	1-6	1-5	-	I
		Thickness Rigid	57	-	-	-	-	1-6	1-5	-	I
		Thickness Flexible	58	-	-	-	-	1-6	1-5	-	I
		Base Type	59	-	-	-	-	1-6	1-5	-	I
		Base Thickness	60	-	-	-	-	1-6	1-5	-	I
		Soil Type	62	-	-	-	-	1-6	1-5	-	I
	Terrain	Widening Potential	42	-	-	-	-	1-6	1-5	-	I
		Curve Classification	43	-	-	-	-	1-3	1-4	-	I
		Terrain Type	44	-	-	-	-	-	1-5	-	I
		Grade Classification	45	-	-	-	-	1-3	1-4	-	I
		Percent Passing Sight Distance	46	-	-	-	-	-	1-5	-	I
		Travel Time Code	71	Yes	1	1	-	-	-	Annually	I & NI

Section Length Measurement and Reporting

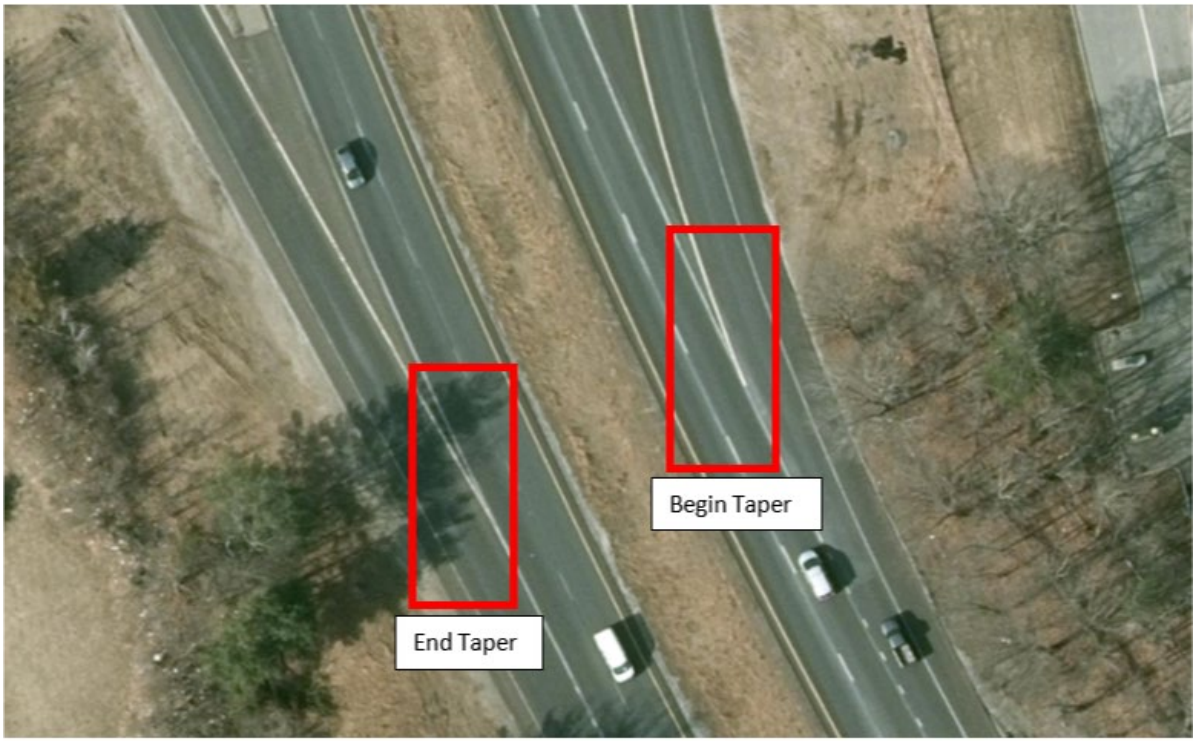
Section Length is a computed measurement, calculated by finding the difference between a section's Beginning and Ending milepoints. This computed measure shall be consistent with the length that is reported in the State's certified public road mileage. For undivided facilities, the inventoried length shall be measured along the centerline in the designated inventory direction (i.e., cardinal direction). For divided highways, the length shall be measured in accordance with the designated inventory direction, for both the cardinal and non-cardinal sides of the roadway. For "one-way pairs" (i.e., divided non-Interstate roadway sections located along a given route), measure and report the length of each roadway section independently; do not average the length of the two roadways. When measuring the length between at-grade intersections, use the center point of the intersecting roadways as the points of reference (i.e., origin, or terminus) for the section as shown in Figure 3. If the intersection is grade-separated, measure to the theoretical center-most point of the intersecting roadways. For ramps, the length should be measured from taper to taper, and should be noted as such in the Road Event Collection Methods for ramp reporting. Figure 4 provides examples of begin and end taper points. The begin taper point is the point at which the exit (deceleration) lane separates from the outermost lane of the mainline roadway, becoming a separate lane. The end taper point is the point at which the entrance (acceleration) lane joins the outermost lane of the mainline roadway to become one lane.

Figure 3: At-Grade Intersection Reference Points



Source: FHWA, OHPI

Figure 4: Taper Points



Source: FHWA, OHPI

3.2 Road Designations Data

The Designations dataset is to be updated as needed, either as a single table or divided into multiple tables (i.e. tables by District, Functional Classification, etc.), and imported into HPMS in a Pipe-delimited Character Separated Value (CSV) format. Table 4 provides detailed information on the format for this database. The specific requirements and guidance for the information to be reported in the Data Item field are also further defined. Unique to these data items is an approval process. HPMS is FHWA's system of record for Functional Classification, National Highway System (NHS), National Truck Network (NN), National Highway Freight Network (NHFN), and Strategic Highway Network (STRAHNET). With the implementation of HPMS 9.0, States submit Designation change requests through the HPMS program. The FHWA Division offices and headquarters take their approval actions on these requests through HPMS 9.0.

Table 4: Road Designations Table

Field Name	Data Type (characters)	Description	Valid Values
BeginDate*	Date	Date at which the data becomes active.	MM/DD/YYYY
StateID*	Numeric (2)	State FIPS code	Up to two digits for the FIPS code**
RouteID*	VarChar (120)	Location reference ID for the linear feature	Up to 120 alpha-numeric digits that identify the route; this ID must be consistent with the Route ID in the State's LRS
BeginPoint*	Decimal (9,4)	Beginning milepoint	Identifies the point of origin for a given section, using a decimal value in thousandths of a mile
EndPoint*	Decimal (9,4)	Ending milepoint	Identifies the terminus point for a given section, using a decimal value in thousandths of a mile
DataItem*	Text	HPMS Data Items	States must use the database-specific data item names
ValueNumeric	Numeric	Numeric value for data item	Must be a numeric value
ValueText	VarChar (50)	Text value for data item	Must be a text value
Comments (Optional)	VarChar (100)	Comment for State use	Variable text up to 100 characters; this field is optional

*Primary Key **FIPS codes

F_SYSTEM *(Functional Classification, Item 1)*

Description

The FHWA approved Functional Classification System.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1-7	1-7	Yes	-	-

Coding

Value Numeric: Code the value that represents the FHWA approved functional system. Use the following codes:

Code	Description
1	Interstate
2	Principal Arterial – Other Freeways and Expressways
3	Principal Arterial – Other
4	Minor Arterial
5	Major Collector
6	Minor Collector
7	Local

If a section is defined as a ramp, then it shall be coded the same as the highest order Functional System roadway that traverses the interchange.

Collection and Reporting

Interstate must be collected and reported each year, no later than April 15th. Non-Interstate NHS must be collected and reported every other year, due no later than June 15th. All other sections or Samples are to be reported as needed.

LRS

Inventory direction for all roads, non-Inventory direction for divided facilities.

Calculation Method

Not Applicable

Guidance

Additional guidance on functional classification can be found in the Highway Functional Classification Concepts, Criteria and Procedures.

NHS *(National Highway System, Item 64)*

Description

A roadway that is a component of the National Highway System (NHS).

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1-7	1-7	-	-	-

Only report where data item is applicable.

Coding

Value Numeric: Code the value that represents the type of NHS facility as follows:

Code	Description
1	Non Connector NHS
2	Major Airport
3	Major Port Facility
4	Major Amtrak Station
5	Major Rail/Truck Terminal
6	Major Inter City Bus Terminal
7	Major Public Transportation or Multi-Modal Passenger Terminal
8	Major Pipeline Terminal
9	Major Ferry Terminal

Collection and Reporting

Interstate must be collected and reported each year, no later than April 15th. Non-Interstate NHS must be collected and reported every other year, due no later than June 15th. All other sections or Samples are to be reported as needed.

LRS

Inventory direction for all roads, non-Inventory direction for divided facilities.

Calculation Method

Not Applicable

Guidance

Code this data item for roadway sections that reside on an official NHS route.

Use Code '1' (non-connector NHS) to identify STRAHNET connectors.

FHWA assumes the role of maintaining these datasets, the States will be responsible for submitting additions, deletions, and changes to these networks to FHWA for approval, as directed by the procedures outlined in the appropriate sections of Title 23 CFR, U.S.C.

STRAHNET_TYPE *(Strategic Highway Network, Item 65)*

Description

A roadway section that is a component of the Strategic Highway Network (STRAHNET).

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	1-7	1-7	-	-	-

Only report where data item is applicable.

Coding

Value Numeric: Code the value that represents the type of STRAHNET facility as follows:

Code	Description
1	Regular STRAHNET
2	Connector

Value Text: Military Base Name (if one exists).

Collection and Reporting

Reported as needed.

LRS

Inventory direction reporting required.

Calculation Method

Not Applicable

Guidance

Code this data item for roadway sections that reside on an official STRAHNET route.

NN *(National Truck Network, Item 66)*

Description

A roadway section that is a component of the National Truck Network (NN) as defined by 23 CFR 658.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	1-7	1-7	-	-	-

Only report where data item is applicable.

Coding

Value Numeric: Code the value that represents the type of truck facility as follows:

Code	Description
1	Section is on the National Network (NN)
2	Other State-designated truck route (optional)

Collection and Reporting

Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Not Applicable

Guidance
Code this data item for roadway sections that reside on an official National Network route.

Additions or deletions to the National Network must follow the approval process detailed in 23 CFR 658. Some approvals require a Notice of Proposed Rulemaking.

NHFN *(National Highway Freight Network, Item 72)*

Description
A roadway section that is a component of the National Highway Freight Network (NHFN).

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	1-7	1-7	-	-	-

Only report where data item is applicable.

Coding
Value Numeric: Code the value that represents the type of NHFN facility as follows:

Code	Description
1	Primary Highway Freight System
2	Critical Urban Freight Corridor
3	Critical Rural Freight Corridor

Collection and Reporting
Reported as needed.

LRS
Inventory and non-Inventory direction reporting required.

Calculation Method
Not Applicable

Guidance

Code this data item for roadway sections that reside on an official National Highway Freight Network. The NHFN shall include the Primary Highway Freight System as designated by the Federal Highway Administration, all Interstates not on the Primary Highway Freight System, Critical Urban Freight Corridors as designated by the State in consultation with the MPOs, and Critical Rural Freight Corridors as designated by the State.

Interstates not on the Primary Highway Freight System are still considered to be part of the National Highway Freight Network, and therefore do not need to be coded.

Critical Rural and Critical Urban Freight Corridors have no relationship to the National Highway System or intermodal connector designations or urban codes.

Primary Highway Freight System redesignations will be initiated every 5 years by the FHWA. Critical Rural and Urban Freight Corridor redesignations will be initiated by the States and approved by the FHWA Division Office.

For more information, visit the FHWA's NHFN website.

3.3 Road Identifications Data

The Identifications dataset is to be updated as needed, either as a single table or divided into multiple tables (i.e. tables by District, Functional Classification, etc.), and imported into HPMS in a Pipe-delimited Character Separated Value (CSV) format. Table 5 provides detailed information on the format for the database. The specific requirements and coding guidance for the information to be reported are also further defined. The coding for this table is based on records for each Route Number, with descriptive information provided via the Route Name, Route Qualifier, Route Signing, and Is Primary fields. Note that instead of using Value Numeric, Value Text, or Value Date, this table item uses various *Route* fields as described in Table 5.

Table 5: Road Identifications Table

Field Name	Data Type (characters)	Description	Valid Values
BeginDate*	Date	Date at which the data becomes active.	MM/DD/YYYY
StateID*	Numeric (2)	State FIPS code	Up to two digits for the FIPS code**
RouteID*	VarChar (120)	Location reference ID for the linear feature	Up to 120 alpha-numeric digits that identify the route; this ID must be consistent with the Route ID in the State's LRS
BeginPoint*	Decimal (9,4)	Beginning milepoint	Identifies the point of origin for a given section, using a decimal value in thousandths of a mile

Field Name	Data Type (characters)	Description	Valid Values
EndPoint*	Decimal (9,4)	Ending milepoint	Identifies the terminus point for a given section, using a decimal value in thousandths of a mile
RouteNumber	Numeric	The appropriate route number	Code only the appropriate route number (leading zeroes shall not be used). For example, Interstate 35W shall be coded as 35.
RouteName	Text	A familiar, non-numeric designation for a route. Synonymous with a road name.	
IsPrimary	Numeric	Is this the highest order, lowest number route designation	Code 0 for no, or 1 for yes
RouteQualifier	Numeric	The route signing descriptive qualifier.	See Look-Up Table below. Code the value which best represents the manner in which the roadway section is signed on the route markers.
RouteSigning	Numeric	The type of route signing	See Look-Up Table below. Code the value that best represents the manner in which the roadway section is signed with route markers.
Comments (Optional)	VarChar (100)	Comment for State use	Variable text up to 100 characters; this field is optional

*Primary Key **FIPS codes

ROUTE_NUMBER *(Route Number, Item 17)*

Description

The signed route number and related information.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	1-7	1-7	-	-	-

Coding

RouteNumber: Enter the appropriate numeric route number. If a Route Number is not entered, a Route Name must be provided.

RouteName: Enter the non-numeric, familiar designation for the roadway. Route Name is synonymous with Road Name. If a Route Name is not entered, a Route Number must be provided.

IsPrimary: Code 1 if this is the highest order (e.g. Route Signing) and lowest number (e.g. Route Number) route. Otherwise, code 0. Route signing takes precedence over Route Number. For instance, if a road is signed I-66 and I 81, I-66 would be the primary record. If a road is signed US-40 and State 10, US-40 would be the primary record.

RouteQualifier: Use the appropriate code.

Code	Route Qualifier
1	No qualifier or Not Signed
2	Alternate
3	Business Route
4	Bypass Business
5	Spur
6	Loop
7	Proposed
8	Temporary
9	Truck
10	Other

RouteSigning: Use the appropriate code.

Code	Route Signing
1	Not Signed
2	Interstate
3	U.S.
4	State
5	Off-Interstate Business Marker
6	County
7	Township
8	Municipal
9	Parkway Marker or Forest Route Marker
10	Other

Collection and Reporting

Reported as needed.

LRS

Inventory direction for all roads. Non-Inventory direction for divided facilities is optional except where pavement data items (IRI, PSR, Surface Type, Rutting, Faulting, or Cracking Percent) have been reported for the non-Inventory direction.

Calculation Method

Not Applicable

Guidance

For Route Number, if the official route number contains an alphabetic character (e.g. 32A), then code the numeric portion of this value in the Route Number field, and the entire value in Route Name field. Where a route is designated with alphabetic characters only (e.g. W), then don't code the Route Number field for this item and use the Route Name field for the route name. If two or more routes of the same route signing are signed along the same roadway section (e.g., Interstate 64 and Interstate 81), code the lowest route number (i.e., Interstate 64). If two or more routes of differing route signing are signed along the same roadway section (e.g., Interstate 83 and U.S. 32), code this Data Item in accordance with the highest route signing on the route (in this example, Interstate).

For Route Name: examples for this data item would be the 'Pacific Coast Highway' (in California), or the 'Garden State Parkway' (in New Jersey). If Route Signing or Route Qualifier are coded 10, Other, enter the text name in the Route Name field for this data item.

Figure 5: Road Name

Source: FHWA OHPI

For Route Qualifier: If more than one code is applicable, use the lowest value code.

Figure 6: Business Route (Code 3) Example

Source: FDOT RCI Field Handbook

Figure 7: Proposed Route (Code 7) Example

Source: FDOT RCI Field Handbook

Figure 8: Temporary Route (Code 8) Example

Source: FDOT RCI Field Handbook

For Route Signing: When a section is signed with two or more identifiers (e.g. Interstate 83 and U.S. 32), code the highest order identifier on the route (in this example, code Interstate). Follow the hierarchy as ordered above.

3.4 Road Events Data

The Road Events dataset is to be updated annually (for select data items) or as needed (for other data items), either as a single table or divided into multiple tables (i.e. tables by District, Functional Classification, etc.), and imported into HPMS in a Pipe-delimited Character Separated Value (CSV) format. Table 6 provides detailed information on the format for the database. The specific

requirements and guidance for the information to be reported in the Data Item field are also further defined. The data items are presented by data type categories, which include: Inventory, Lanes, Intersections, Traffic, Control, Pavement, Terrain, and Travel Time Code.

Table 6: Road Events Table

Field Name	Data Type (characters)	Description	Valid Values
BeginDate*	Date	Date at which the data becomes active.	MM/DD/YYYY
StateID*	Numeric (2)	State FIPS code	Up to two digits for the FIPS code**
RouteID*	VarChar (120)	Location reference ID for the linear feature	Up to 120 alpha-numeric digits that identify the route; this ID must be consistent with the Route ID in the State's LRS
BeginPoint*	Decimal (9,4)	Beginning milepoint	Identifies the point of origin for a given section, using a decimal value in thousandths of a mile
EndPoint*	Decimal (9,4)	Ending milepoint	Identifies the terminus point for a given section, using a decimal value in thousandths of a mile
DataItem*	Text	HPMS Data Items	States must use the database-specific data item names
ValueNumeric	Numeric	Numeric value for data item	Must be a numeric value
ValueText	VarChar (50)	Text value for data item	Must be a text value
ValueDate	Date	Date value for data item	Valid values are specified by data item
Comments (Optional)	VarChar (100)	Comment for State use	Variable text up to 100 characters; this field is optional

*Primary Key **FIPS codes

Example Record

The following example shows a potential arrangement of records for three data items (AADT, IRI, and Through Lanes) for a State, based on the file structure described in Table 6. In most cases, the Value Numeric field shall be used to report the primary information for each data item. However, the Value Text and Value Date fields may also be required or may be used by the State when not required.

BeginDate|StateID|RouteID|BeginPoint|EndPoint|DataItem|ValueNumeric|ValueText|ValueDate|Comments
09/01/2020|43|000100200S00|0|0.75|AADT|14800|A|2006||
09/01/2020|43|000100200S00|0.75|5.32|AADT|14700|A|2009||
09/01/2020|43|000100200S00|0|0.75|IRI|118||03/2009|
09/01/2020|43|000100200S00|0.75|5.32|IRI||A|||
09/01/2020|43|000100200S00|5.32|5.69|IRI|66||04/2008|
09/01/2020|43|000100200S00|0|0.75|Through_Lanes |4||||
09/01/2020|43|000100200S00|0.75|5.32|Through_Lanes|4|||Widened in ‘08

Inventory Data Items

URBAN_ID (Urban ID, Item 2)

Description
The FHWA adjusted urban area designation.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1-7	1-7	Yes	-	-

Coding
Value Numeric: Enter up to five digits for the applicable Census urban area code. Leading zeroes are not required. Where there is no urban area code, code '99998' for small urban roadway sections and '99999' for rural area roadway sections.

Collection and Reporting
Interstate must be collected and reported each year, no later than April 15th. Non-Interstate NHS must be collected and reported every other year, due no later than June 15th. All other sections or Samples are to be reported as needed.

LRS
Inventory direction for all roads. Non-Inventory direction for divided facilities is optional except where pavement data items (IRI, PSR, Surface Type, Rutting, Faulting, or Cracking Percent) have been reported for the non-Inventory direction.

Calculation Method
Not Applicable

Guidance
A small urban area shall be derived from Census Urban Clusters that are not located within an urbanized area, with a Census defined population of at least 5,000 people. Coding for this Data Item shall match the Urban Area boundaries. A Census Urbanized Area can be expanded for transportation purposes. This Adjusted Urbanized Area, once approved by FHWA, shall be identified using the most recent U.S. Decennial Census for Code for the Urbanized Area upon which the adjusted area is based upon. For more information and guidance on the FHWA Urban Boundary adjustment and approval process, see Highway Functional Classification Concepts, Criteria and Procedures.

FACILITY_TYPE *(Facility Type, Item 3)*

Description

The operational characteristic of the roadway.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1-7	1-7	Yes	-	-

Coding

Value Numeric: Use one of the following codes as applicable regardless of whether the section is on a structure. The definition for each code is as follows:

Code	Description	
1	One Way Roadway	Roadway that operates with traffic moving in a single direction during non-peak period hours.
2	Two Way Roadway	Roadway that operates with traffic moving in both directions during non-peak period hours. Code this for the inventory direction on dual carriageway facilities.
3		*Deprecated*
4	Ramp	Non-mainline junction or connector facility contained within a grade-separated interchange.
5	Non Mainline	All non-mainline facilities excluding ramps.
6	Non Inventory Direction	Individual road/roads of a multi-road facility that is/are not used for determining the primary length for the facility. Code this for the non-inventory direction on dual carriageway facilities.
7	Planned/Unbuilt	Planned roadway that has yet to be constructed.

Collection and Reporting

Interstate must be collected and reported each year, no later than April 15th. Non-Interstate NHS must be collected and reported every other year, due no later than June 15th. All other sections or Samples are to be reported as needed. See 23 CFR 490 for additional details on the National Performance Management Measures requirements. All other roadway sections or Samples are to be reported as needed.

LRS

Inventory direction for all roads, non-Inventory direction for divided facilities.

Calculation Method

Not Applicable

Guidance

General

Mainline is defined in 23 CFR 490 as the through travel lanes of any highway. Mainline highways specifically exclude ramps, shoulders, turn lanes, crossovers, rest areas, and other pavement surfaces that are not part of the roadway normally travelled by through traffic. Certified public road mileage is based only on sections coded with Facility Type '1,' or '2' and only in the inventory direction. This includes only those roads that are open to public travel, regardless of the ownership or maintenance responsibilities. Ramps are not included in the certified public road mileage calculation.

Code '6' for non-inventory directions of dual carriageway facilities.

Frontage roads and service roads that are public roads shall be coded either as one-way (Code '1') or two-way (Code '2') roadways.

Use Code '7' to identify a new roadway section that has been approved per the State Transportation Improvement Plan (STIP), but has yet to be built. The LRS may or may not exist when using this code.

One-way Pairs (See Figure 10)

Characteristics of one-way pairs include:

- Divided roadway sections that have the same route designation (e.g., Route 1), but different street names (e.g., West Avenue, and East Avenue);
- Typically located in an urban area or a city/town;
- Usually connects to roadways with two-way traffic;
- Are typically separated by some physical or visual element other than a curb or barrier, such as buildings, landscaping, or terrain;
- Parallel roadway sections which complement each other in providing access at both termini; and
- Not designated as an Interstate

Ramps

Ramps allow ingress and egress to grade separated highways. They may consist of directional connectors from one road to another. Ramps may also consist of traditional ramps, acceleration and deceleration lanes, as well as collector-distributor lanes. Ramps shall be coded with the highest order functional system within the interchange that it functions. A mainline facility that terminates at the junction with another mainline facility is not a ramp and shall be coded '1.'

Non-Mainlines

Non-mainline facilities include roads or lanes that provide access to and from sites that are adjacent to a roadway such as bus terminals, park and ride lots, and rest areas. These may include, but is not limited to: special bus lanes, limited access truck roads, ramps to truck weigh stations, or a turn-around. Exclusive turn lanes on a separate alignment from the mainline (and are not ramps) may be coded as Non-Mainline.

Figure 9 shows an example of a street (E. Baltimore St.), for which traffic is only permitted to move in

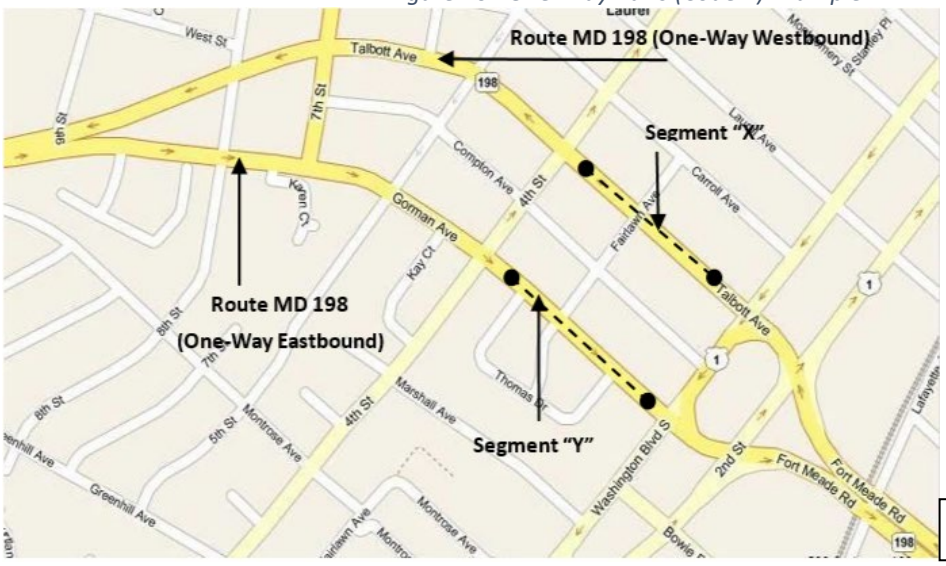
the eastbound direction. In this case, this data item shall be assigned a Code '1' for a given section (Segment "X") along this stretch of road.

Figure 9: One-Way Roadway (Code 1) Example

Source: Bing Maps

Figure 10 shows an example of a street (MD 198), for which traffic moves in the east and westbound directions along a set of one-way pairs (i.e., divided sections located along a given route). In this case, this data item shall be assigned a Code '1' for Segment "X", and Segment "Y".

Figure 10: One-Way Pairs (Code 1) Example



Source: Bing Maps

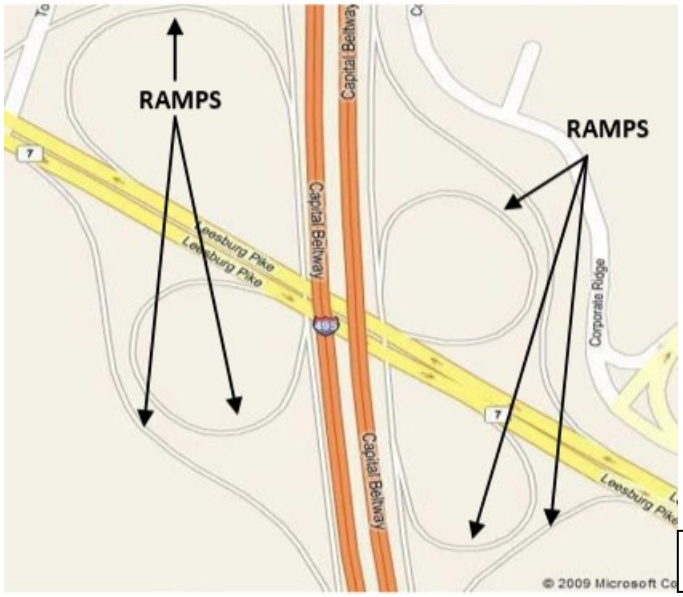
Figure 11 shows an example of a street (7th St. NW), for which traffic is permitted to move in both the north and southbound directions. In this case, this data item shall be assigned a Code '2' for a given section (Segment "X") along this stretch of road.

Figure 11: Two-Way Roadway (Code 2) Example

Source: Bing Maps

Figure 12 shows an example of ramps contained within a grade-separated interchange located on a highway (Interstate 495). In this case, this data item shall be assigned a Code '4' for all applicable ramp sections (denoted as "Ramps" in the Figure).

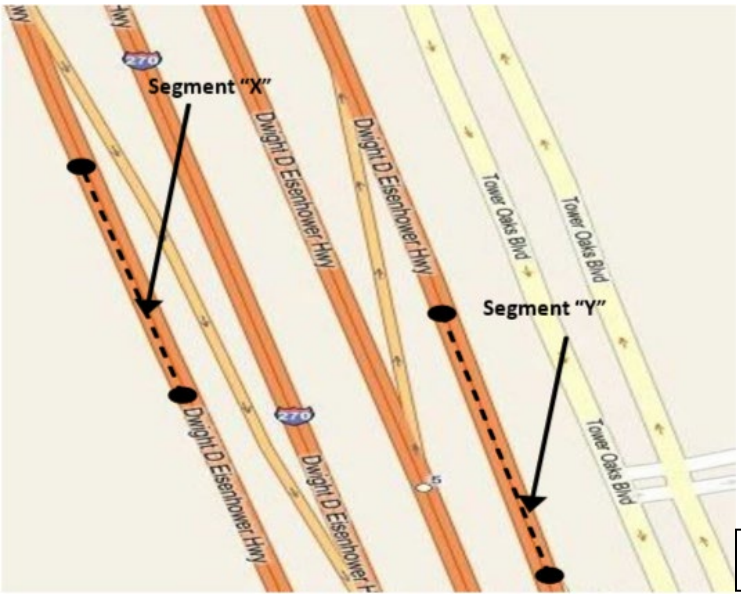
Figure 12: Ramp (Code 4) Example



Source: Bing Maps

Figure 13 shows an example of a highway (Interstate 270), which consists of express and local lanes in both the north and southbound directions. In this case, this data item shall be assigned a Code '5' for Segments "X" and "Y" to indicate that they are non-mainline facilities.

Figure 13: Non-Mainline (Code 5) Example



Source: Bing Maps

Figure 14 shows an example of a highway (Interstate 270), for which an inventory direction is defined (northbound). In this case, this data item shall be assigned a Code '6' for Segment "X", as the southbound side of the roadway would be defined as the non-inventory direction.

Figure 14: Non-Inventory Direction (Code 6) Example

Source: Bing Maps

STRUCTURE_TYPE *(Structure Type, Item 4)*

Description

Roadway section that is a bridge, tunnel or causeway.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1-6	1-5	-	-	-

Only report where data item is applicable.

Coding

Value Numeric: Use the following codes only where a bridge, tunnel, or causeway exists:

Code	Description
1	Section is a Bridge
2	Section is a Tunnel
3	Section is a Causeway

Value Text: Report the National Bridge Inventory or National Tunnel Inventory Bridge/Tunnel Number

Value Date: Report the date in MM/YYYY format for when the data was collected.

Collection and Reporting

Interstate must be collected and reported each year, no later than April 15th. Non-Interstate NHS must be collected and reported every other year, due no later than June 15th. All other sections or Samples are to be reported as needed. See 23 CFR 490 for additional details on the National Performance Management Measures requirements.

LRS

Inventory direction for all roads. Non-Inventory direction for divided facilities is optional except where pavement data items (IRI, PSR, Surface Type, Rutting, Faulting, or Cracking Percent) have been reported for the non-Inventory direction.

Calculation Method

Not Applicable

Guidance

A bridge is a structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between

undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening (23 CFR 650). Culverts that meet the definition of a bridge shall be reported for this data item; all other culverts are to be excluded.

A tunnel is a an enclosed roadway for motor vehicle traffic with vehicle access limited to portals, regardless of type of structure or method of construction, that requires, based on the owner's determination, special design considerations that may include lighting, ventilation, fire protection systems, and emergency egress capacity. The term "tunnel" does not include bridges or culverts (23 CFR 650).

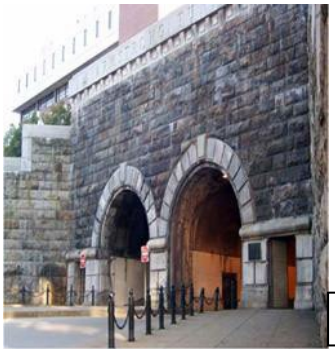
A causeway is a low-lying raised roadway, usually providing a passageway over some type of vehicular travel impediment (e.g. a river, swamp, earth dam, wetlands, etc.).

The begin and end points for this data item shall be coded in accordance with the points of origin and terminus for the associated bridge, tunnel or causeway. Furthermore, the points of origin and terminus for structures shall exclude approach slabs.

Figure 15: Bridge (Code 1) Example

Source: PennDOT

Figure 16: Tunnel (Code 2) Example



Source: PennDOT

Figure 17: Causeway (Code 3) Example

Source: PennDOT Video-log

OWNERSHIP *(Ownership, Item 6)*

Description

The entity that has legal ownership of a roadway.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	1-7	1-7	-	-	-

Coding

Value Numeric: Use the code that best represents the highway owner, irrespective of maintenance or other agreements. If more than one code applies, code the lowest numerical value.

Code	Description
1	State Highway Agency
2	County Highway Agency
3	Town or Township Highway Agency
4	City or Municipal Highway Agency
11	State Park, Forest, or Reservation Agency
12	Local Park Forest, or Reservation Agency
21	Other State Agency
25	Other Local Agency
26	Private (other than Railroad)
27	Railroad
31	State Toll Authority
32	Local Toll Authority
40	Other Public Instrumentality (i.e. Airport)
50	Indian Tribe Nation
60	Other Federal Agency
62	Bureau of Indian Affairs
63	Bureau of Fish and Wildlife
64	U.S. Forest Service
66	National Park Service
67	Tennessee Valley Authority
68	Bureau of Land Management
69	Bureau of Reclamation
70	U.S. Army Corps of Engineers
72	U.S. Air Force

Code	Description
73	U.S. Navy/Marines
74	U.S. Army
80	Other

Value Text: Optional. Code secondary ownership information, if applicable.

Collection and Reporting
Reported as needed.

LRS
Inventory direction for all roads, non-Inventory direction for divided facilities.

Calculation Method
Not Applicable

Guidance
"State" means owned by one of the 50 States, the District of Columbia, or the Commonwealth of Puerto Rico highway agencies, including quasi-official State commissions or organizations. "County, local, municipal, town, or township" means owned by one of the officially recognized governments established under State authority;

"Federal" means owned by one of the branches of the U.S. Government or independent establishments, government corporations, quasi-official agencies, organizations, or instrumentalities;

"Other" means any other group not already described above or nongovernmental organizations with the authority to build, operate, or maintain toll or free highway facilities.

Only private roads that are open to public travel (e.g., toll bridges) are to be reported in HPMS.

In cases where ownership responsibilities are shared between multiple entities, this item shall be coded based on the primary owner (i.e., the entity that has the larger degree of ownership), if applicable. Information on additional owners shall be entered in the Comments field for this item.

COUNTY_ID ***(County ID, Item 63)***

Description
The County Federal Information Processing Standard (FIPS) code.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	1-7	1-7	-	-	-

Coding

Value Numeric: Enter the three-digit County FIPS code. An alternate source for FIPS codes can be found here.

Collection and Reporting

Reported as needed.

LRS

Inventory direction reporting required.

Calculation Method

Not Applicable

Guidance

N/A

MAINTENANCE_OPERATIONS ***(Maintenance and Operations, Item 68)***

Description

The legal entity that maintains and operates a roadway.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	1-7	1-7	-	-	-

This data item only needs to be reported if different from Ownership.

Coding

Value Numeric: Code the level of government that best represents who maintains and operates the highway irrespective of ownership or agreements for other purposes. If more than one code applies, use the lowest numerical value from the following:

Code	Description
1	State Highway Agency
2	County Highway Agency
3	Town or Township Highway Agency
4	City or Municipal Highway Agency
11	State Park, Forest, or Reservation Agency
12	Local Park, Forest, or Reservation Agency
21	Other State Agency
25	Other Local Agency
26	Private (other than Railroad)
27	Railroad
31	State Toll Authority
32	Local Toll Authority
40	Other Public Instrumentality (i.e. Airport)
50	Indian Tribe Nation
60	Other Federal Agency
62	Bureau of Indian Affairs
63	Bureau of Fish and Wildlife
64	U.S. Forest Service
66	National Park Service
67	Tennessee Valley Authority
68	Bureau of Land Management
69	Bureau of Reclamation
70	U.S. Army Corps of Engineers
72	U.S. Air Force
73	U.S. Navy/Marines
74	U.S. Army
80	Other

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Not Applicable

Guidance
The term ‘maintenance and operations’ covers the preservation and performance of the highway, including surface, shoulders, roadsides, structures, and such traffic-control devices as are necessary for safe and efficient utilization of the highway.

'State' means maintained by one of the 50 States, the District of Columbia, or the Commonwealth of Puerto Rico highway agencies, including quasi-official State commissions or organizations.

'County', 'local', 'municipal', 'town', or 'township' means maintained by one of the officially recognized governments established under State authority.

'Federal' means maintained by one of the branches of the U.S. Government or independent establishments, government corporations, quasi-official agencies, organizations, or instrumentalities.

'Other' means any other group not already described above or nongovernmental organization that maintains the highway.

In cases where maintenance and operations responsibilities are shared between multiple entities, this item shall be coded based on the entity that has the larger degree of responsibility for maintenance and operations. Information on additional entities shall be entered in the Value Text field for this data item.

IS_RESTRICTED *(Is Restricted, Item 73)*

Description
An optional data item to identify publicly owned roadways where public travel is restricted, and the mileage is not considered in the certification of public roadway mileage.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	1-7	1-7	Yes	-	-

Coding
Value Numeric: Code 1 for public roadways that are restricted.

Collection and Reporting
Reported as needed.

LRS
Inventory and non-Inventory direction reporting optional.

Calculation Method
Not Applicable

Guidance
This data item should include facilities such as public roadways on military bases that are restricted to select personnel or family members.

The data item should not include privately owned roadways.

Do not include public roadways that are closed during specific hours or that have seasonal restrictions, but are otherwise open to the traveling public.

Other data items are not expected to be collected and reported on restricted roadways.

Figure 18: Is Restricted Examples

Source: USDA Forest Service, *Vehicle Barriers*, 2006

Lanes Data Items

THROUGH_LANES (Through Lanes, Item 7)

Description
The number of lanes designated for through-traffic.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1-6	1-5	Yes	-	-

Coding
Value Numeric: Enter the number of through lanes in both directions carrying through traffic in the off-peak period.

Value Date: Report the date in MM/YYYY format for when the data was collected.

Collection and Reporting
Interstate must be collected and reported each year, no later than April 15th. Non-Interstate NHS must be collected and reported every other year, due no later than June 15th. All other sections or Samples are to be reported as needed.

LRS
Inventory direction for all roads.

Calculation Method
Not Applicable

Guidance
Code the number of through lanes according to the striping, if present, on multilane facilities, or according to traffic use or State/local design guidelines if no striping or only centerline striping is present.

For one-way or two-way roadways, exclude all ramps and sections defined as auxiliary lanes, such as: collector-distributor lanes, weaving lanes, frontage road lanes, parking and turning lanes, acceleration/deceleration lanes, toll collection lanes, passing lanes, truck climbing lanes, or shoulders.

When coding the number of through lanes for ramps (i.e., where Data Item 3 = Code '4'), include the predominant number of (through) lanes on the ramp. Do not include turn lanes (exclusive or combined) at the termini unless they are continuous (turn) lanes over the entire length of the ramp.

Managed lanes (e.g., High Occupancy Vehicle (HOV), High Occupancy Toll (HOT), Express Toll Lanes (ETL)) operating during the off-peak period are to be included in the total count of through lanes.

Figure 19: A Roadway with Four Through-Lanes

Source: TxDOT, Transportation Planning and Programming Division

MANAGED_LANES_TYPE *(Managed Lane Operations Type, Item 8)*

Description

The type of managed lane operations (e.g. HOV, HOT, ETL, etc.)

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	1-6	1-5	-	-	-

Only report where data item is applicable. Section limits shall correspond with the information reported for Data Item 9 (Managed Lanes).

Coding

Value Numeric: Use the following codes:

Code	Description	
1	Full-time Managed Lanes	Section has 24-hour exclusive managed lanes (e.g., HOV use only; no other use permitted)
2	Part-time Managed Lanes: normal through lanes	Normal through lanes used for exclusive managed lanes during specified time periods
3	Part-time Managed Lanes: shoulder/parking lanes	Shoulder/Parking lanes used for exclusive managed lanes during specified time periods

Value Text: If more than one type of managed lane operation exists, the secondary type may be indicated here.

Collection and Reporting

Reported as needed.

LRS

Inventory direction reporting required.

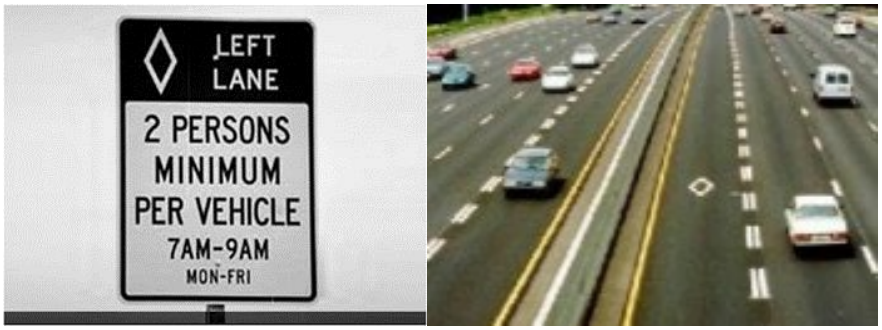
Calculation Method

Not Applicable

Guidance

Code this data item considering both directions to reflect existing managed lane operations, even though it's reported in the inventory direction. If more than one type of managed lane is present for the section, code the lesser of the two applicable codes (e.g., if codes 2 and 3 are applicable for a section, then the section should be coded as 2). This information may be indicated by either managed lane signing or the presence of pavement markings (large diamond-shaped markings), or both.

Figure 20: HOV Signage



Source: FDOT RCI Field Handbook, Nov. 2021

MANAGED_LANES *(Managed Lanes, Item 9)*

Description

Maximum number of lanes in both directions designated for managed lane operations.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	1-6	1-5	-	-	-

Only report where data item is applicable. Section limits shall correspond with the information reported for Data Item 8 (Managed Lane Operations Type).

Coding

Value Numeric: Enter the number of managed lanes in both directions.

Value Text: Use when more than one type of managed lane operations exists on this section. Indicate how many lanes apply to the Managed Lane Operations Type reported in Data Item 8.

Collection and Reporting

Reported as needed.

LRS

Inventory direction reporting required.

Calculation Method
Not Applicable

Guidance
N/A

PEAK_LANES ***(Peak Lanes, Item 10)***

Description
The number of lanes in the peak direction of flow during the peak period.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: Code the number of through lanes used during the peak period in the peak direction.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance
Include reversible lanes, parking lanes, or shoulders that are legally used for through-traffic for both non-HOV and HOV operation. For urban roads, code based on the peak direction of travel. For rural 2 or 3-lane roads, code both directions. For rural roads with 4 or more lanes, code based on the peak direction of travel. The peak period is represented by the period of the day when observed traffic volumes are the highest.

Figure 21: Peak Lanes (Code 3) Example

Source: Mike Kahn/Green Stock Media

Figure 22: Reversible Lanes Example

Source: The Salt Lake Tribune, 2013

COUNTER_PEAK_LANES *(Counter-Peak Lanes, Item 11)*

Description

The number of lanes in the counter-peak direction of flow during the peak period.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: Code the number of through lanes used during the peak period (per Data Item 10) in the counter-peak direction of flow.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance
Include reversible lanes, parking lanes, or shoulders that are legally used for through-traffic for both non-HOV and HOV operation. For urban roads, code based on the counter-peak (i.e. opposite-peak) direction of travel. For rural 2 or 3-lane roads, do not code this data item. For rural roads with 4 or more lanes, code based on the counter-peak direction of travel.

Visual inspection should be used as the principle method used to determine the number of peak lanes and counter-peak lanes.

The number of peak and counter-peak lanes should be greater than or equal to the total number of through lanes. The number of peak lanes and counter-peak lanes can be greater than the number of through lanes if shoulders, parking lanes, or other peak-period-only lanes are used during the peak period.

The peak period is represented by the period of the day when observed traffic volumes are the highest.

TOLL_ID ***(Toll ID, Item 15)***

Description
Identifies sections that are toll facilities by their FHWA Toll ID number.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	1-7	1-7	-	-	-

Only report where data item is applicable.

Coding

Value Numeric: Assign the appropriate FHWA Toll ID. Existing Toll IDs can be found in the FHWA publication *Toll Facilities in the United States*. For new Toll ID designations, contact the FHWA Office of Highway Policy Information at HPInfoMail@dot.gov.

Collection and Reporting

Reported as needed.

LRS

Inventory direction reporting required.

Calculation Method

Not Applicable

Guidance

N/A

LANE_WIDTH *(Lane Width, Item 34)*

Description

The measure of existing lane width.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding

Value Numeric: Enter the predominant through-lane width to the nearest whole foot.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance
Lane width should be coded according to where the pavement/shoulder surface changes, or to the pavement lane striping (if the shoulder and pavement surface are the same).

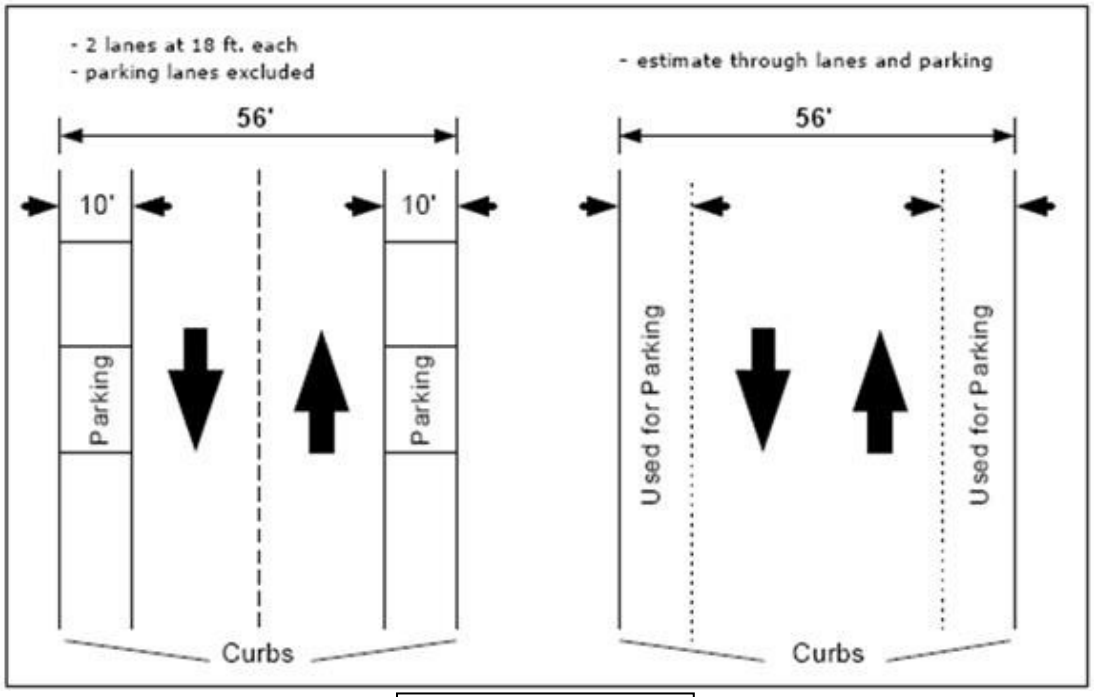
Where there is no delineation between the through-traffic lane and the shoulder or parking lane, or where there is no centerline, estimate a reasonable split between the actual width used by traffic and the shoulder or parking lane based on State/local design guides.

When striping is placed inside the edge of the pavement (within approximately one foot) to keep traffic from breaking the pavement edge, ignore the striping and measure from the pavement edge to the center of a single centerline stripe. Or, if double centerline striping exists, measure to the center of the two stripes.

If more than one lane exists, measure all lanes in the inventory direction and use the average value to the nearest foot. If lane widths vary over the extent of the Sample section, use the predominant width(s) for measuring and reporting purposes.

In Figure 23, the number of through lanes is 2; deducting 10 feet for parking on each side, which is either striped or from design practices, would leave width for two 18 foot lanes.

Figure 23: An Example for Measuring Lane Width



Source: FHWA, OHPI

MEDIAN_TYPE *(Median Type, Item 35)*

Description

The type of median.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding

Value Numeric: Code the type of median using the following codes.

Code	Description	
1	None	No median or unprotected area less than 4 feet wide.
2	Unprotected	Median exists with a width of 4 feet or more.
3	Curbed	Barrier or mountable curbs with a minimum height of 4 inches.
4	Positive Barrier - unspecified	Prevents vehicles from crossing median.
5	Positive Barrier - flexible	Considerable deflection upon impact.
6	Positive Barrier - semi-rigid	Some deflection upon impact.
7	Positive Barrier - rigid	No deflection upon impact.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance
Median - The portion of a divided highway separating the traveled way for traffic in opposing directions. The principal functions of a median are to:

- Minimize interference of opposing traffic;
- Provide a recovery area for out-of-control vehicles;
- Provide a stopping area in case of emergencies;
- Provide open or green space;
- Minimize headlight glare from opposing vehicles;
- Provide width for future lanes;
- Provide space for speed-change lanes and storage areas for left- and U-turn vehicles; and
- Restrict left turns except where median openings are provided.

A positive barrier normally consists of a guardrail or concrete barrier, but could consist of thick, impenetrable vegetation. All positive barrier medians, regardless of their width, must be considered for reporting purposes.

Turning lanes or bays are not considered medians unless the turning lanes/bays are cut into an existing median at intersections, site entrances (e.g., a shopping center), etc.; a continuous turning lane is not a median.

Figure 24: An Example of Median Type (Code 2) Unprotected

Source: TxDOT, Transportation Planning and Programming Division

---

MEDIAN_WIDTH *(Median Width, Item 36)*

Description
The existing median width.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: Enter the predominant median width including left shoulders, if any, measured between the inside edges of the left-most through lanes in both directions, to the nearest foot.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

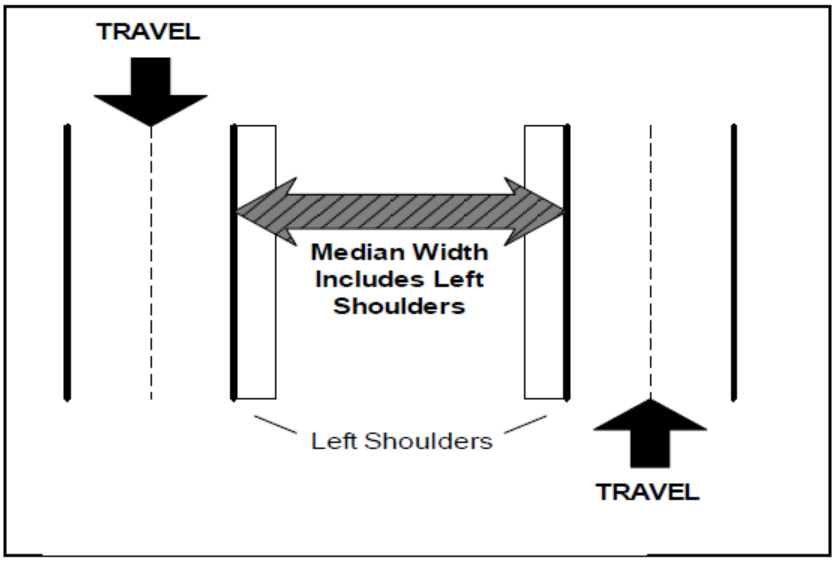
Calculation Method
Predominance

Guidance
Enter '99' where the median width is 100 feet or greater.

The edge of through lane is determined by paint striping, difference in pavement/shoulder construction material, or according to traffic use. If the median is raised or a ditch, do not add the contour as part of the median width measure.

For measurement purposes, ignore turning bays cut into the median.

Figure 25: An Example for Measuring Median Width



Source: FHWA, OHPI

Figure 26: Median Width Measurement

Source: FDOR RCI Field Handbook, Nov. 2008

SHOULDER_TYPE *(Shoulder Type, Item 37)*

Description
The type of shoulder.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: Enter the code for the type of shoulder on the Sample.

Code	Description
1	None
2	Surfaced shoulder exists - bituminous concrete (AC)
3	Surfaced shoulder exists - Portland Cement Concrete surface (PCC)
4	Stabilized shoulder exists (stabilized gravel or other granular material with or without admixture)
5	Combination shoulder exists (shoulder width has two or more surface types; e.g. part of the shoulder width is surfaced and part of the width is earth)
6	Earth shoulder exists
7	*Deprecated*

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance
If the shoulder type varies over the extent of the section, code the predominant type.

If left and right shoulder types differ on a divided facility, code the right shoulder type as the predominant type.

Disregard curbs for HPMS reporting purposes. If there is a shoulder in front of a curb, code this Data

Item and Data Item 38 (Shoulder Width).

If a bike lane abuts the through lane, there cannot be a shoulder unless it is used as a combined shoulder/bike lane (sometimes indicated by signage or symbols on the pavement). If a bike lane or parking is completely separated from the roadway, it should not be considered.

If the section has parking abutting the through lane, there cannot be a shoulder. If there is parking on one side of a divided roadway and a shoulder on the other side, then both, Data Item 38 (Shoulder Width) and Data Item 40 (Peak Parking) need to be coded appropriately. A shoulder cannot exist between a traffic lane and a parking lane.

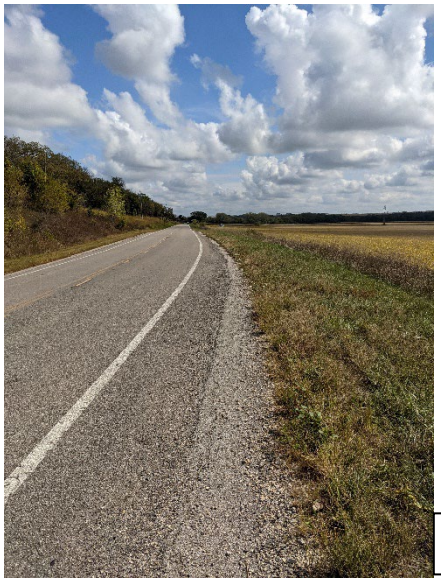
Figure 27: Bituminous (Code 2)

Source: FHWA, OHPI

Figure 28: Stabilized (Code 4)

Source: FHWA, OHPI

Figure 29: Combination (Code 5)



Source: FHWA, OHPI

Figure 30: Earth (Code 6)

Source: FHWA, OHPI

SHOULDER_WIDTH_R ***(Right Shoulder Width, Item 38)***

Description

The existing right shoulder width.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding

Value Numeric: Enter the width of the right shoulder to the nearest whole foot. Zero (0) values shall only be reported for sections where shoulders do not exist.

Collection and Reporting

Reported as needed.

LRS

Inventory direction reporting required.

Calculation Method

Predominance

Guidance

Do not include parking or bicycle lanes in the shoulder width as further illustrated in Figures below.

Code the predominant width where it changes back and forth along a roadway section.

Ensure that the total width of combination shoulders is reported.

Include rumble strips and gutter pans in shoulder width.

This width shall be measured from the outer edge of the right-most through lane to the outer edge of the shoulder.

Figure 31: Earth Shoulder Measurement

Measure from the white stripe to the break point of the shoulder.

Figure 32: Bituminous Shoulder Measurement

Measure from the white stripe to the edge of the paved area.

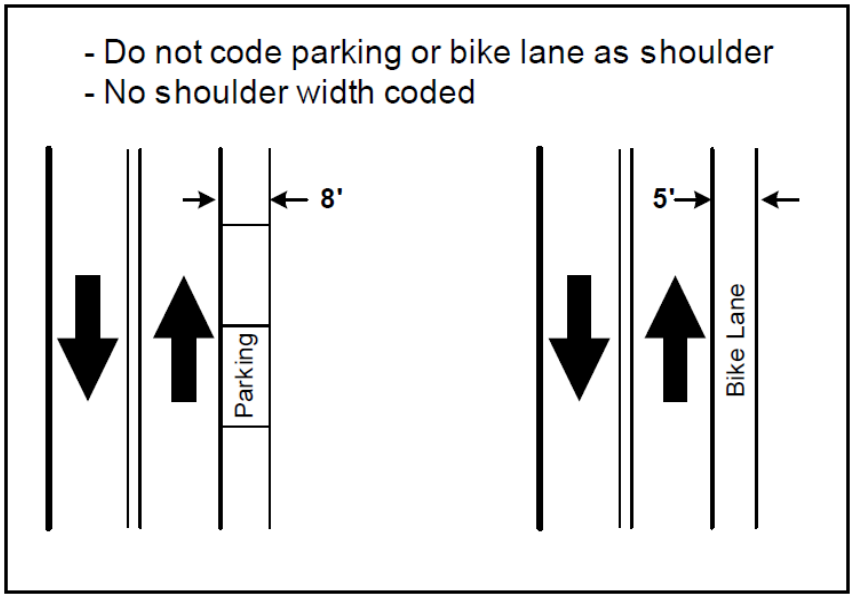
Source: FHWA, OHPI

Figure 33: Measuring Shoulders with Guardrails

Measure from the edge of the through lane to the face of the guardrail.

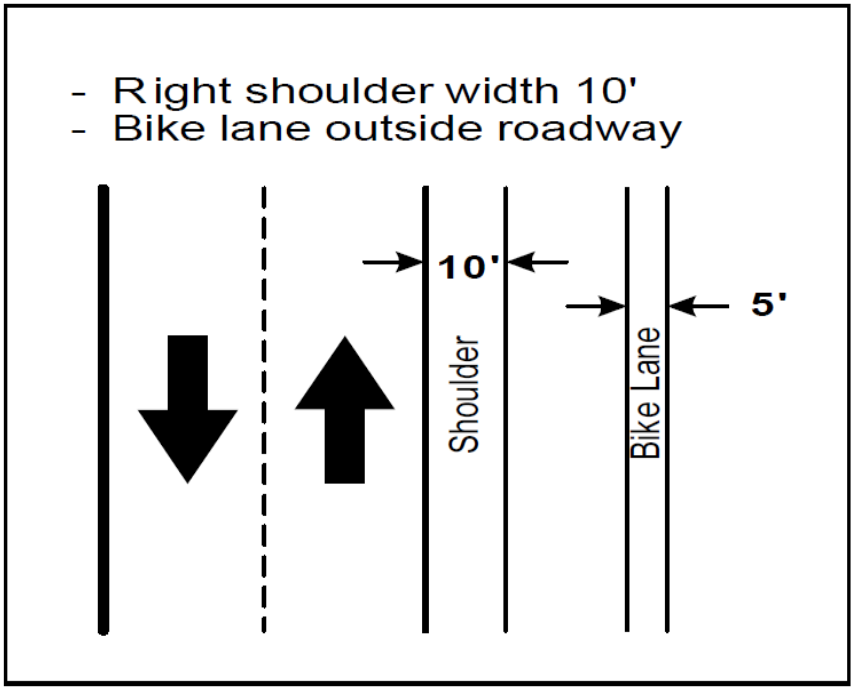
Source: FHWA, OHPI

Figure 34: Measuring Shoulders with Parking/Bike Lanes



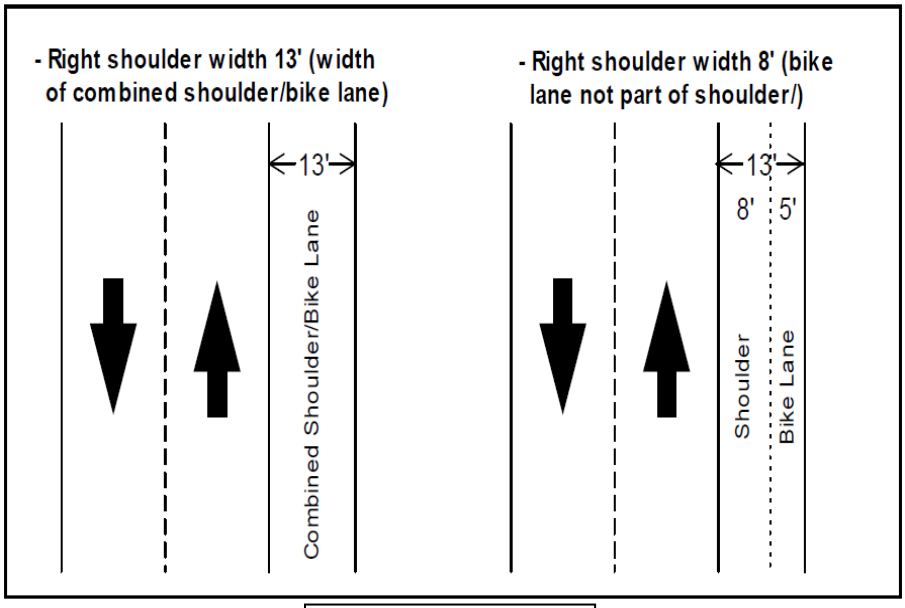
Source: FHWA, OHPI

Figure 35: Measuring Shoulders with Parking and Bike Lanes



Source: FHWA, OHPI

Figure 36: Measuring Shoulders with Combined Parking/Bike Lanes



Source: FHWA, OHPI

SHOULDER_WIDTH_L *(Left Shoulder Width, Item 39)*

Description
The existing left shoulder width.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: Enter the width of the left (median) shoulder to the nearest whole foot. Zero (0) values shall only be report for sections where shoulders do not exist. Left shoulders shall only be coded for divided highway sections.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance
Do not include parking or bicycle lanes in the shoulder width measurement.

Code the predominant width where it changes back and forth along a roadway section.

Ensure that the total width of combination shoulders is reported.

Include rumble strips and gutter pans in shoulder width.

This width shall be measured from the outer edge of the left-most through lanes to the left-most edge of the inside shoulder.

PEAK_PARKING *(Peak Parking, Item 40)*

Description
Specific information about the presence of parking during the peak period.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	-

Coding
Value Numeric: Enter the code that best reflects the type of peak parking that exists using the following codes:

Code	Description
1	Parking allowed on one side.
2	Parking allowed on both sides.
3	No parking allowed or none available.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance
Code this Data Item to reflect the permitted use, even if the Sample is not formally signed or striped for parking.

If parking is observed beyond the shoulder or the pavement-edge where there is no shoulder, use code 3.

If parking lanes are legally used for through-traffic or turning lanes during the peak period, code the appropriate in-use condition.

Interstates and Freeways are usually assigned a code 3.

The codes are applicable regardless of whether the roadway is a one-way or two-way street, or a divided or undivided facility.

Figure 37: Parking on One Side (Code 1) Example

Source: FDOR RCI Field Handbook, Nov. 2008

Figure 38: Parking on Both Sides (Code 2) Example

Source: FDOR RCI Field Handbook, Nov. 2008

Figure 39: No Parking Allowed (Code 3) Example

Source: FHWA, OHPI, 2021

DIR_THROUGH_LANES *(Directional Through Lanes, Item 70)*

Description

The number of lanes designated for through-traffic, for a given direction of travel on an Interstate highway section.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	1	1	-	-	-

This data item is only required to be reported when pavement distresses and other related data items (e.g. IRI, Surface Type, Rutting, etc.) have been reported independently for the inventory and non-inventory directions of travel associated with Interstate highway sections.

Coding
Value Numeric: Enter the number of through lanes designated for through-traffic in a given direction of travel (e.g. westbound only) associated with an Interstate highway section.

Value Date: Report the date in MM/YYYY format for when the data was collected.

Collection and Reporting
Interstate sections must be collected and reported each year, no later than April 15th.

LRS
Inventory direction for all roads. Non-Inventory direction is optional except where pavement data items (IRI, PSR, Surface Type, Rutting, Faulting, or Cracking Percent) have been reported for the non-Inventory direction.

Calculation Method
Not Applicable

Guidance
The number of lanes reported for this Data Item shall be designated for through-traffic during the off-peak period. Code the number of through lanes according to the striping, if present, on multilane facilities, or according to traffic use or State/local design guidelines if no striping or only centerline striping is present.

Exclude all ramps and sections defined as auxiliary lanes, such as: collector-distributor lanes, weaving lanes, frontage road lanes, parking and turning lanes, acceleration/deceleration lanes, toll collection lanes, truck climbing lanes, or shoulder.

Managed lanes (e.g., High Occupancy Vehicle (HOV), High Occupancy Toll (HOT), Express Toll Lanes (ETL)) operating during the off-peak period are to be included in the total count of through lanes.

Please note that Data Items 7, 9, 10 and 11 (Through Lanes, Managed Lanes, Peak Lanes, and Counter-peak Lanes, respectively) contain similar, but unique travel lane information. The distinction between the requirements for these data items and Directional Through Lanes is described in Table 7.

Table 7: Travel-Lane Reporting Requirements/Specifications

Data Item	Description	Reporting Extent	Peak Period Representation	Directionality
Directional Through Lanes	The number of lanes designated for through-traffic, for a given direction of travel.	All Interstate sections, where pavement distress items are reported independently for both directions of travel.	Off-peak	Report the number of lanes independently for each direction of travel.
Through Lanes	The number of lanes designated for through-traffic.	All Federal-aid system roadway sections, including ramps.	Off-peak	Report the total number of lanes in both directions of travel.
Managed Lanes	The maximum number of lanes designated for managed lane operations.	All Federal-aid system roadway sections, where applicable.	Peak and Off-peak	Report the total number of lanes in both directions of travel.
Peak Lanes	The number of lanes in the peak direction of flow during the peak period.	Sample Panel Sections	Peak	Report the number of lanes associated with the peak direction of flow only.
Counter Peak Lanes	Number of lanes in the counter-peak direction of flow during the peak period.	Sample Panel Sections	Peak	Report the number of lanes associated with the counter-peak direction of flow only.

Intersections Data Items

TURN_LANES_R *(Right Turn Lanes, Item 12)*

Description

The presence of right turn lanes at a typical intersection.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	-

Coding

Value Numeric: Enter the code from the following table that best describes the peak-period turning lane operation in the inventory direction. This data item shall be coded based on the same intersection that is used for identifying the percent green time for a given roadway section.

Code	Description
1	No intersection where a right turning movement is permitted exists on this section.
2	Turns permitted; multiple exclusive right turning lanes exist. Through movements are prohibited in these lanes. Multiple turning lanes allow for simultaneous turns from all turning lanes.
3	Turns permitted; a continuous exclusive right turning lane exists from intersection to intersection. Through movements are prohibited in this lane.
4	Turns permitted; a single exclusive right turning lane exists.
5	Turns permitted; no exclusive right turning lanes exist.
6	No right turns are permitted during the peak period.

Collection and Reporting

Reported as needed.

LRS

Inventory direction reporting required.

Calculation Method

Predominance

Guidance

Include turning lanes that are located at entrances to shopping centers, industrial parks, and other large traffic generating enterprises as well as public cross streets.

Where peak capacity for a section is governed by a particular intersection that is on the section, code the turning lane operation at that location (referred to as most controlling intersection); otherwise code for a typical intersection.

Through movements are prohibited in exclusive turn lanes.

Use codes 2 through 6 for turn lanes at a signalized or stop sign controlled intersection that is critical to

the flow of traffic; otherwise enter the code that best describes the peak-hour turning lane situation for typical intersections on the Sample.

Code a continuous turning lane with painted turn bays as a continuous turning lane (3). Code a through lane that becomes an exclusive turning lane at an intersection as a shared (through/right turn) lane (5); however, if through and turning movements can be made from a lane at an intersection, it is not an exclusive turning lane.

Roundabouts (as shown in Figure 40: Roundabout Configuration Example Figure 40) should be considered as an intersection where turns are permitted with no exclusive lanes. Use code 5 for this item since traffic can either turn or go through the roundabout from the same lane. However, if an exclusive turning lane exists (as indicated by pavement markings), use code 4. Code if the roundabout controls the capacity of the entire HPMS section. If there is not a controlling intersection, then code for a typical intersection.

Painted islands (Figure 41) located in the center of a roadway should be considered a median for the purpose of determining whether or not a turn lane exists.

Slip-ramp movements should not be considered for the purpose of determining turn lanes.

On-ramps and off-ramps which provide access to and from grade-separated, intersecting roadways are to be excluded from turn lane consideration.

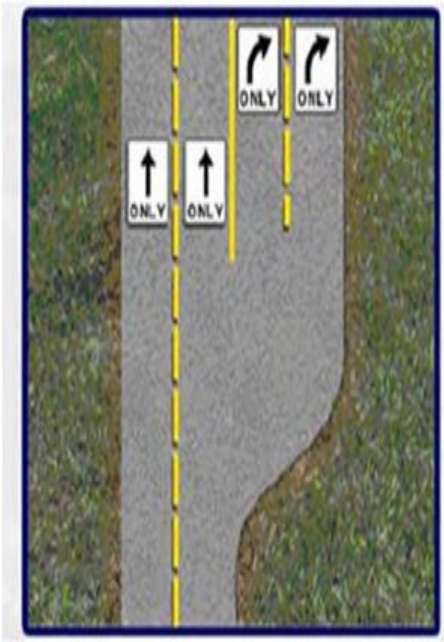
Figure 40: Roundabout Configuration Example

Source: SRA Consulting Group, Nov. 2008

Figure 41: Painted Island Example

Source: TxDOT, Transportation Planning and Programming Division

Figure 42: Multiple Turn Lanes (Code 2) Example



Turns permitted; multiple exclusive right turn lanes exist. Through movements are prohibited in these lanes. Multiple turn lanes allow for simultaneous turns from all turn lanes.

Source: FDOT RCI Field Handbook, Nov. 2008

Figure 43: Continuous Turn Lane (Code 3) Example

Source: MnDOT

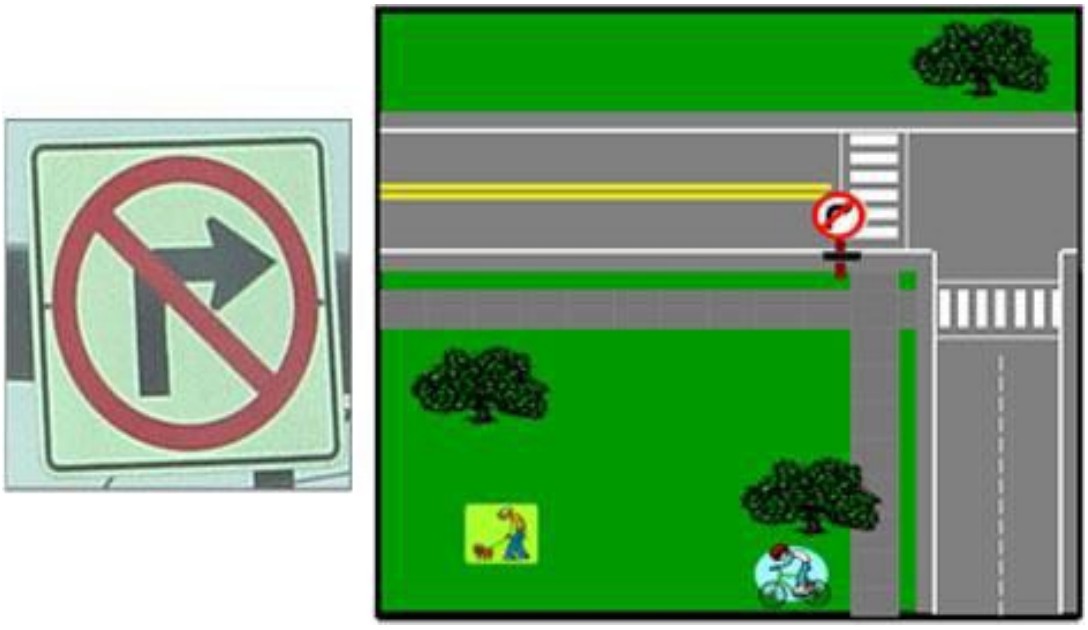
Figure 44: Single Turn Lane (Code 4) Example

Source: MoveTransport.com

Figure 45: No Exclusive Turn Lane (Code 4) Example

Source: FDOT RCI Field Handbook, Nov. 2008

Figure 46: No Right Turn Permitted (Code 6) Example



Source: TxDOT, Transportation Planning and Programming Division

TURN_LANES_L (Left Turn Lanes, Item 13)

Description

The presence of left turn lanes at a typical intersection.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	-

Coding

Value Numeric: Enter the code from the following table that best describes the peak-period turning lane operation in the inventory direction. This data item shall be coded based on the same intersection that is used for identifying the percent green time for a given roadway section.

Code	Description
1	No intersection where a left turning movement is permitted exists on this section.
2	Turns permitted; multiple exclusive left turning lanes exist. Through movements are prohibited in these lanes. Multiple turning lanes allow for simultaneous turns from all turning lanes.
3	Turns permitted; a continuous exclusive left turning lane exists from intersection to intersection. Through movements are prohibited in this lane.
4	Turns permitted; a single exclusive left turning lane exists.
5	Turns permitted; no exclusive left turning lanes exist.
6	No left turns are permitted during the peak period.

Collection and Reporting

Reported as needed.

LRS

Inventory direction reporting required.

Calculation Method

Predominance

Guidance

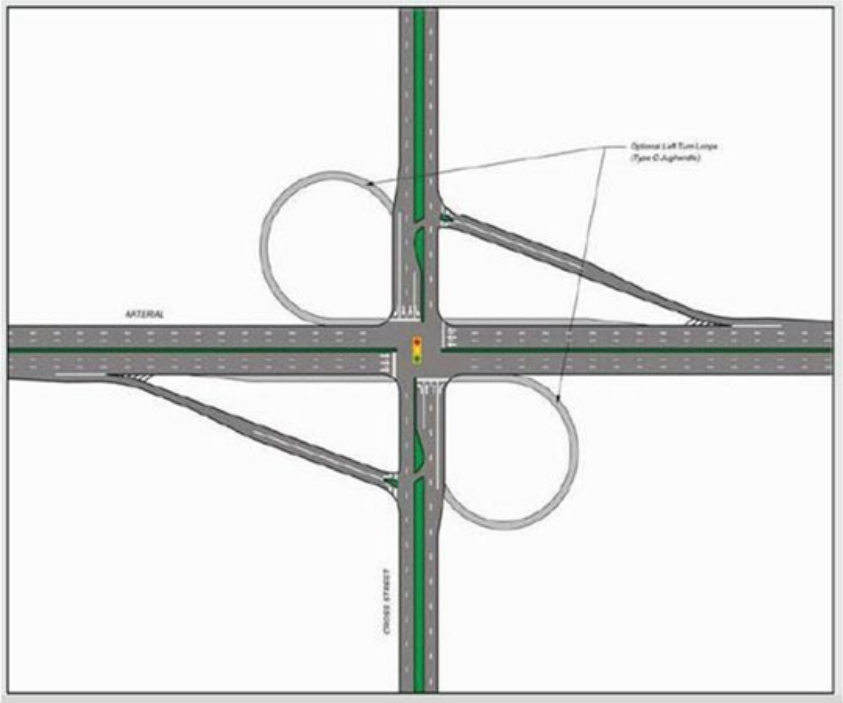
See *Guidance f*or **Data Item 12: Turn_Lanes_R**. In addition:

Jug handle configurations (as shown in Figure 47), or lanes on either side of the roadway, should be considered an intersection with protected (exclusive) left turn lanes. Although a jug handle may be viewed as a right turn lane, it is intended for left turn movements, therefore it should not be coded as a right turn lane; instead use code 6.

Permitted U-turn movements are not to be considered for the purpose of determining turn lanes.

For an intersection that has a single left turn lane and no right turn lane with turns permitted in the peak period (as shown in Figure 50: Exclusive Turn Lane (Code 4) Example), use a code 4 for this Data item, and a code 5 (turns permitted; no exclusive right turning lane exists) for Data Item 12 (Right Turn Lanes). Additionally, this intersection has four through-lanes (Data Item 7), and two peak-lanes (Data Item 10).

Figure 47: Jug Handle Configuration Example



Source: SRA Consulting Group, Nov. 2008

Figure 48: Multiple Turn Lanes (Code 2) Example

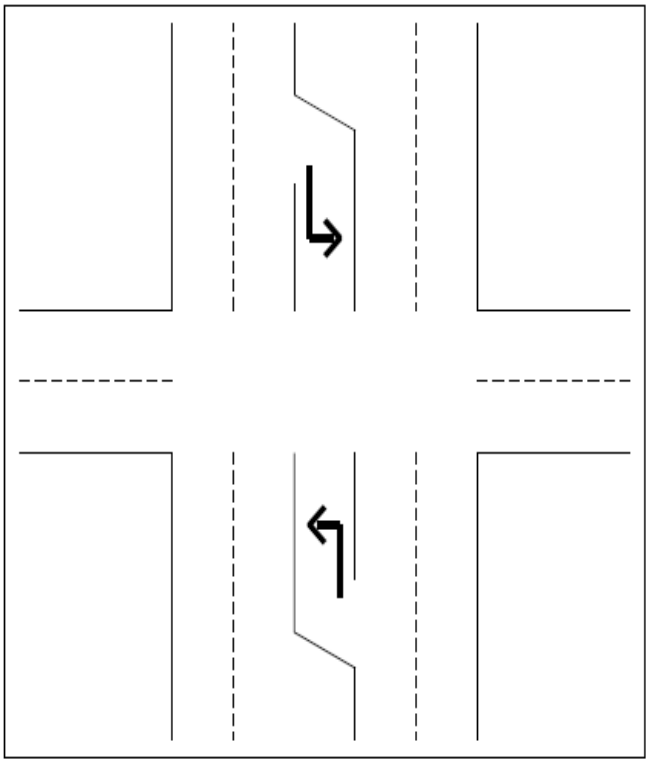
Turns permitted; multiple exclusive left turn lanes exist. Through movements are prohibited in these lanes. Multiple turn lanes allow for simultaneous turns from all turn lanes.

Source: FDOT RCI Field Handbook, Nov. 2008

Figure 49: Continuous Turn Lane (Code 3) Example

Source: Kentucky Transportation Cabinet

Figure 50: Exclusive Turn Lane (Code 4) Example



Source: FHWA, OHPI

Figure 51: No Exclusive Left Turn Lane (Code 5) Example

Source: FHWA, OHPI

Figure 52: No Left Turn Permitted (Code 6) Example

Source: FHWA, OHPI

SIGNAL_TYPE (Signal Type, Item 29)

Description

The predominant type of signal system on a Sample section.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	-

May optionally be reported for rural Samples.

Coding

Value Numeric: Enter the code that best describes the predominant type of signal system for the inventoried direction of travel.

Code	Description
1	Uncoordinated Fixed Time (may include pre-programmed changes for peak or other time periods).
2	Uncoordinated Traffic Actuated.
3	Coordinated Progressive (coordinated signals through several intersections).
4	Coordinated Real-time Adaptive.
5	No signal systems exist.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance.

Guidance
It is difficult to determine coordinated signals from field observations, therefore the best source of such data may be traffic engineering departments or traffic signal timing plans. However, if such information cannot be obtained, field inspection and/or observation may be necessary.

Code 4 – Coordinated Real-Time Traffic Adaptive is difficult to determine from field reviews and may require discussion with local traffic engineering personnel. It is good practice to always contact the agencies responsible for the signals in question to obtain information on the type of signal and green time when available.

<u>Examples of Types of Signals</u>

Figure 53: Uncoordinated Fixed Time (Code 1) Example

These signals are generally found in rural areas, and in some cases small urban areas; typically not in close proximity to other traffic signals.

Source: FDOT RCI Field Handbook, 2021

Figure 54: Uncoordinated Traffic Actuated (Code 2) Example

These signals are typically identified by the presence of in-pavement loops or other detectors (intrusive or non-intrusive) on the approach to the intersection in one or more lanes.

Source: FDOT RCI Field Handbook, 2021

Figure 55: Coordinated Progressive (Code 3) Example

These signals usually occur in high-traffic urban or urbanized areas, in close proximity to other signals, and are usually timed or coordinated with adjoining signals. This type of signal allows for a more constant free flow of traffic.

Source: FDOT RCI Field Handbook, 2021

PCT_GREEN_TIME *(Percent Green Time, Item 30)*

Description
The percent of green time allocated for through-traffic at intersections.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	-

May optionally be reported for rural Samples.

Coding
Value Numeric: Enter the percent green time, rounded to the nearest whole percent, reported as a number, in effect during the peak period (max peak period preferred) for through traffic at signalized intersections, for the inventoried direction of travel. For example, 37.8% should be reported as 38.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Weighted Average.

Guidance
Example Procedure for Calculating Percent Green Time
The timing of signals should occur during either the AM or PM peak period (i.e., 7-9 AM or 4-6 PM). Using a stopwatch, the entire signal cycle (green, amber, red) should be timed (in seconds), followed by the timing of the green cycle (in seconds). Then, divide the green cycle time by the entire signal time to find the percent green time. If the signal has a green arrow for turning movements, do not include the green arrow time in the timing of the green cycle. Use the average of at least three field-timing checks to determine a "typical" green time for traffic- actuated or demand responsive traffic signals.

Additional Guidance
Code this Data Item for all sections where right and left turn data (Data Items 12 and 13) are coded. For uncoordinated traffic actuated signals only, data can be collected when monitoring green time. Consider the surrounding environment and determine if the inventory direction of the signal would actually carry the peak flow for the intersection. Based on this approach, the value received may be an estimate depending upon the operation of the traffic signal during the peak hour. Furthermore, if the traffic signal is fully actuated, or the approach of interest is actuated, estimate the percent of green time

based on the maximum green time available for that phase of operation versus the maximum cycle length. This would provide the "worst case" scenario since the volume on the actuated approach typically varies cycle by cycle.

Where peak capacity for a section is governed by a particular intersection that is on the section, this Data Item shall be coded based on the weighted average percent green time at that location. If multiple intersections exist, code this Data Item based on the predominate intersection.

For traffic actuated traffic signals, use the results of a field check of several (three complete cycles) peak period light cycles to determine a "typical" green time. Ignore separate green-arrow time for turning movements.

If this data is not available for the signalized intersections associated with a given Sample section, percent green time data from other signalized intersections located on the same route, or on a similar route with similar traffic characteristics in the immediate vicinity can be used for reporting purposes.

NUMBER_SIGNALS *(Number of Signalized Intersections, Item 31)*

Description

A count of at-grade intersections where traffic signals are present.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding

Value Numeric: Code the number of at-grade intersections where traffic signals are present, controlling traffic in the inventory direction.

Collection and Reporting

Reported as needed.

LRS

Inventory direction reporting required.

Calculation Method

No Calculation Permitted. Reported Values must be consistent with the limits of the sample.

Guidance

Only signals which cycle through a complete sequence of signalization (i.e., red, yellow, and green) for all or a portion of the day shall be counted as a signal.

Access points to large traffic generators (e.g., shopping centers, malls, large work sites, office parks, apartment complexes, etc.) shall be counted as intersections if the access point is controlled by a traffic signal.

Special treatment is required when a Sample begins and/or ends with a traffic control device (i.e., Data Items 31, 32, and 33). This is accomplished by doing the following as illustrated in Figure 56:

- Choose a statewide direction for inventory purposes (e.g., South to North, West to East, etc.).
- Choose a statewide rule to either always count the beginning at-grade intersection only or the ending at-grade intersection only, but never both.

For divided roadways, continuous cross streets are to be counted as a single intersection. If the cross street is not continuous and is separated by at least 50 feet, then it shall be counted as two intersections.

Roundabouts (Figure 40) shall be coded under Data Item 33 (At-Grade/Other) intersections.

The sum of Data Items 31, 32, and 33 shall be equal to the total number of intersections on the section.

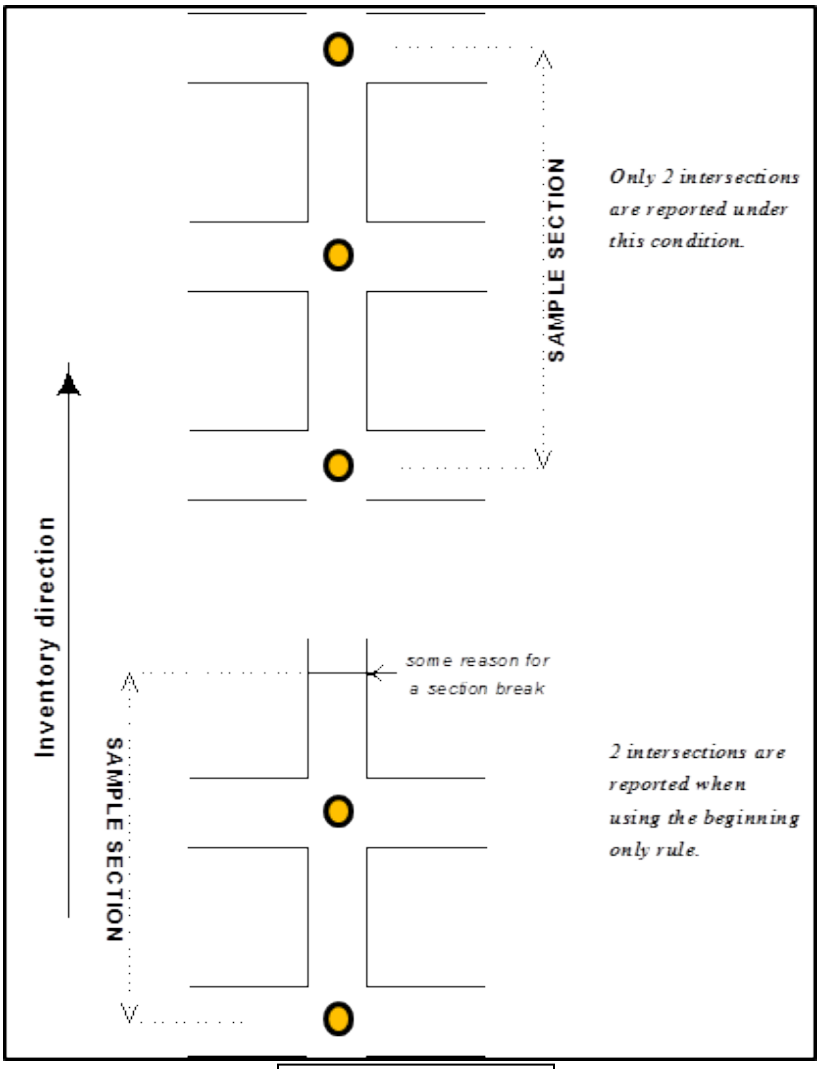
At-grade crossings where pedestrian-activated signals are present shall not be included in the count for this data item, unless a cross-street is present.

<u>Example of the Beginning or Ending Intersection Rule</u>

In the upper portion of Figure 56, 2 signalized intersections would be coded for this data item, when using either the beginning only or ending only rule.

In the lower portion of Figure 56, when using the beginning only rule, 2 signalized intersections would be coded for this data item; when using the ending only rule, 1 signalized intersection would be coded for this data item.

Figure 56: Intersection Count Example



Source: FHWA, OHPI

STOP_SIGNS *(Number of Stop Sign-Controlled Intersections, Item 32)*

Description

A count of at-grade intersections where stop signs are present.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: Code the number of at-grade intersections where stop signs are present, controlling traffic in the inventory direction.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
No Calculation Permitted. Reported Values must be consistent with the limits of the sample.

Guidance
A continuously operating (i.e. all day), flashing red signal shall be counted as a stop sign.

Stop signs on intersecting roads shall not be included in the total count.

Access points to large traffic generators (e.g., shopping centers, malls, large work sites, office parks, apartment complexes, etc.) shall be counted as intersections if the access point is controlled by a stop sign.

Special treatment is required when a Sample begins and/or ends with a traffic control device (i.e., Data Items 31, 32, and 33). This is accomplished by doing the following as illustrated in Figure 58:

- Choose a statewide direction for inventory purposes (e.g., South to North, West to East, etc.).
- Choose a statewide rule to either always count the beginning at-grade intersection only or the ending at-grade intersection only, but never both.

For divided roadways, continuous cross streets are to be counted as a single intersection. If the cross street is not continuous and is separated by at least 50 feet, then it shall be counted as two intersections.

Roundabouts (Figure 40) shall be coded under Data Item 33 (At-Grade/Other) intersections.

The sum of Data Items 31, 32, and 33 shall be equal to the total number of intersections on the section.

At-grade crossings where pedestrian-activated signals are present shall not be included in the count for this data item, unless a cross-street is present.

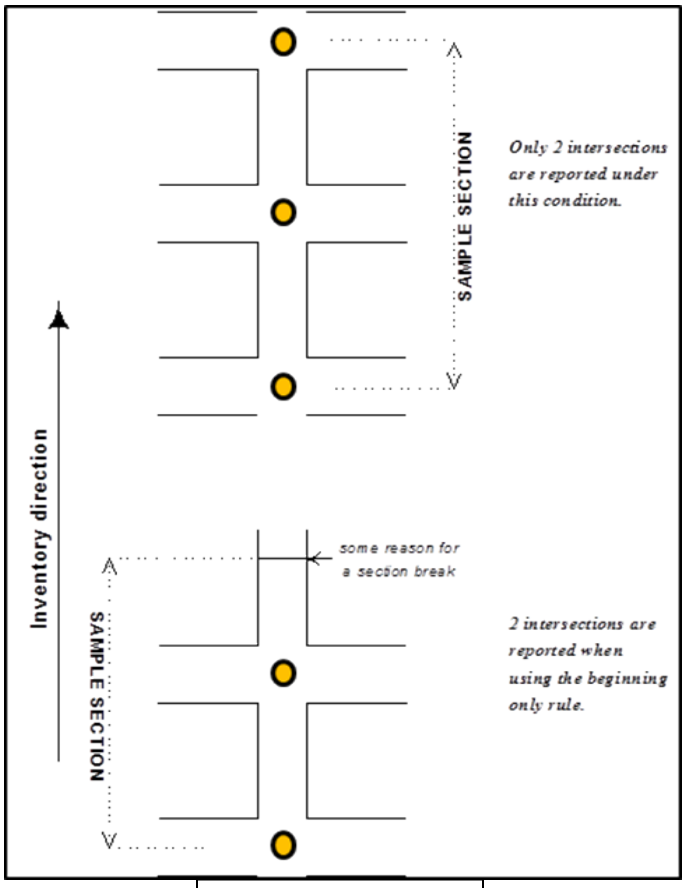
Figure 57: Stop Sign-Controlled Intersection

Source: MnDOT. Dec. 2012

Example of the Beginning or Ending Intersection Rule

In the upper portion of Figure 58, 2 stop sign-controlled intersections would be coded for this data item, when using either the beginning only or ending only rule. In the lower portion of Figure 58, when using the beginning only rule, 2 stop sign-controlled intersections would be coded for this data item; when using the ending only rule, 1 stop sign-controlled intersection would be coded for this data item.

Figure 58: Intersection Count Example



Source: FHWA, OHPI

AT_GRADE_OTHER *(Number of Intersections, Type-Other, Item 33)*

Description

Code the number of at-grade intersections where full sequence traffic signal or stop sign traffic control devices are not present, in the inventory direction.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: Code the number of at-grade intersections where full sequence traffic signal or stop sign traffic control devices are not present, in the inventory direction.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
No Calculation Permitted. Reported Values must be consistent with the limits of the sample.

Guidance
Intersections with either no traffic control devices, or specialized traffic control devices existing in the inventory direction, shall be included in the count for this data item.

Continuously operating (i.e. all day) flashing yellow signals and roundabouts (Figure 40) shall be included in the count for this data item (i.e. they are considered to be Type-Other).

Access points to large traffic generators (e.g., shopping centers, malls, large work sites, office parks, apartment complexes, schools, etc.) shall be included in the evaluation for this Data Item.

Special treatment is required when a Sample begins and/or ends with a traffic control device (i.e., Data Items 31, 32, and 33). This is accomplished by doing the following as illustrated in Figure 60:

- Choose a statewide direction for inventory purposes (e.g., South to North, West to East, etc.).
- Choose a statewide rule to either always count the beginning curb only or the ending curb only, but never both.

For divided roadways, continuous cross streets are to be counted as a single intersection. If the cross street is not continuous and is separated by at least 50 feet, then it shall be counted as two intersections.

The sum of Data Items 31, 32, and 33 shall be equal to the total number of intersections on the section.

At-grade crossings where pedestrian-activated signals are present shall not be included in the count for this data item, unless a cross-street is present.

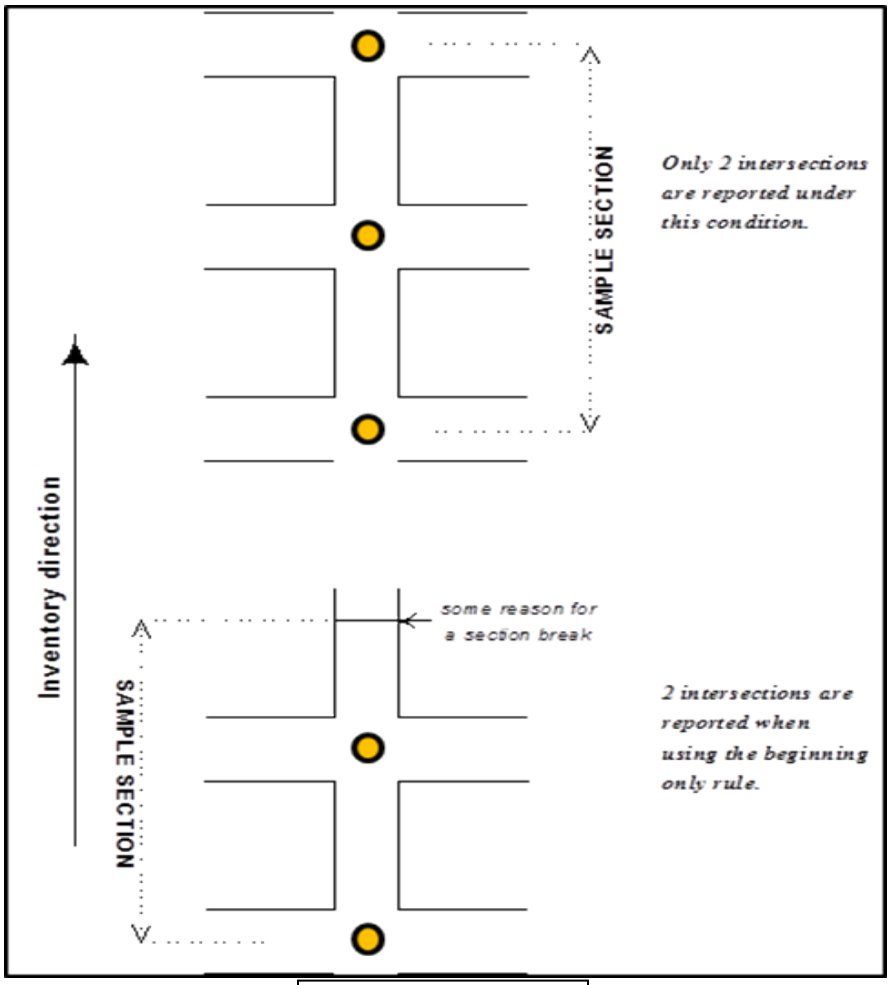
Figure 59: At-Grade Other Example

Source: Puckett Pages

Example of the Beginning or Ending Intersection Rule

In the upper portion of Figure 60, 2 at-grade other intersections would be coded for this data item, when using either the beginning only or ending only rule. In the lower portion of Figure 60, when using the beginning only rule, 2 at-grade other intersections would be coded for this data item; when using the ending only rule, 1 at- grade other intersection would be coded for this data item.

Figure 60: Intersection Count Example



Source: FHWA, OHPI

Traffic Data Items

Regarding Traffic Requirements

States should collect and report traffic and vehicle classification data in accordance with the *Traffic Monitoring Guide* (*TMG*) and the *AASHTO Traffic Data Guidelines*. Traffic data on the NHS and all Principal Arterials should be collected through field counting or other verifiable approaches, at a minimum, on a 3-year cycle. Traffic data for all non-NHS lower functional system Federal-aid roadways should be collected through field counting or other verifiable approaches, at a minimum, on a 6-year cycle. Traffic data should be based on 48-hour continuous monitoring or approved alternative methods. A sufficient number of continuous counts should be conducted for estimating and factoring. All procedures should be applied consistently Statewide.

AADT *(Annual Average Daily Traffic, Item 21)*

Description
Annual Average Daily Traffic

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1-6	1-5	Yes	-	-

Coding
Value Numeric: Enter a value that represents the AADT for the current data year.

Value Text: Enter the code that best represents the source of the data.

Code	Source (who conducted/ derived the count)	Type (Direct Input or Mechanism)	Method
A	State or local government agency	Actual count	Consistent with short term count factoring procedures outlined in the TMG
B	State or local government agency	Travel demand model output, statistical trend analysis, cellular data modeling, or similar	Alternative methods not identified in the TMG
C	Private business or non-governmental agency	Actual count	Consistent with short term count factoring procedures outlined in the TMG
D	Private business or non-governmental agency	Travel demand model output, statistical trend analysis, cellular data modeling, or similar	Alternative methods not identified in the TMG
E	Data is developed or acquired using a method not identified in A, B, C, or D		

Value Date: Enter the most recent year the data was collected in the field in YYYY format.

Collection and Reporting
Must be updated and reported annually and represent reporting year condition.

LRS
Inventory direction reporting required.

Calculation Method
Not Applicable.

Guidance
General
For two-way facilities, provide the bidirectional AADT; for one-way roadways and ramps, provide the directional AADT.

All AADTs shall reflect application of temporal and axle correction factors, as necessary; no other adjustment factors shall be used. Change rate factors shall be applied if the AADT is not derived from current year counts.

AADTs for the NHS, Interstate, and Principal Arterial (OFE, OPA) roadway sections shall be based on traffic counts taken on a minimum three-year cycle. AADTs for the non-Principal Arterial System (i.e., Minor Arterials, Major Collectors, and Urban Minor Collectors) can be based on a minimum six-year counting cycle.

Data for the years which are not based on actual traffic counts or other field verifiable methods shall be estimated to reflect the actual travel conditions.

AADT is an annual average daily value that represents all days of the data/inventory year.

Regarding Value Text codes:

- Contractors collecting or generating counts on behalf of a State or local government should be coded as a C or D, as appropriate. 'Grown' or 'factored' counts are considered actual counts and should be coded as such.

Regarding Value Date codes:

- Enter the year of the last actual physical in field count; and not the last estimate, factored count, or grown count year.
- If more than one count was used (e.g., extrapolation from the two adjacent counted sections), enter the year of the most recently counted section.
- Always use the year the actual count was taken or obtained as the basis for reporting the date.

Ramps
To the extent possible, the same procedures used to develop AADTs on non-ramp sections should also be used to develop ramp AADT data. At a minimum, 48-hour ramp traffic counts or other approved alternative approaches shall be taken on a six-year cycle, so at least one-sixth of the ramps should be counted every year.

Ramp AADT data may be available from freeway monitoring programs that continuously monitor travel on ramps and mainline facilities. Ramp balancing programs implemented by the States for ramp locations and on high volume roadways could also be used to gather traffic data on ramps. States are encouraged to use the conservation of flows to estimate entrance or exit travel patterns.

AADT_SINGLE_UNIT (Single-Unit Truck and Bus AADT, Item 22)

Description

Annual Average Daily Traffic for single-unit trucks and buses (FHWA classes 4-7).

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1	1	-	2-6	2-5

Coding

Value Numeric: Enter the volume for all single-unit truck and bus activity over all days of the week and seasons of the year in terms of the annual average daily traffic.

Value Text: Enter the code that best represents the source of the data.

Code	Source (who conducted/ derived the count)	Type (Direct Input or Mechanism)	Method
A	State or local government agency	Actual count	Consistent with short term count factoring procedures outlined in the TMG
B	State or local government agency	Travel demand model output, statistical trend analysis, cellular data modeling, or similar	Alternative methods not identified in the TMG
C	Private business or non-governmental agency	Actual count	Consistent with short term count factoring procedures outlined in the TMG
D	Private business or non-governmental agency	Travel demand model output, statistical trend analysis, cellular data modeling, or similar	Alternative methods not identified in the TMG

Code	Source (who conducted/ derived the count)	Type (Direct Input or Mechanism)	Method
E	Data is developed or acquired using a method not identified in A, B, C, or D		

Collection and Reporting
Must be updated and reported annually and represent reporting year condition.

LRS
Inventory direction reporting required.

Calculation Method
Weighted Averaging.

Guidance
For two-way facilities, provide the bidirectional Single-unit Truck and Bus AADT; for one-way roadways, provide the directional Single-unit Truck and Bus AADT.

This value shall be representative of all single-unit truck and bus activity based on vehicle classification count data from both the State's and other agency's traffic monitoring programs over all days of the week and all seasons of the year. Actual vehicle classification counts shall be adjusted to represent average conditions as recommended in the *TMG*. Single-unit trucks and buses are defined as vehicle classes 4 through 7 (buses through four-or-more axle, single-unit trucks).

Section specific measured values are requested based on traffic counts or other field verifiable methods taken on a minimum three-year cycle for the NHS and all Principal Arterials, and a six-year cycle for the non-NHS and lower functional class roadways. If these data are not available, values derived from classification station data on the same route, or on a similar route with similar traffic characteristics in the same area may be used.

Data for the years which are not based on actual traffic counts or other field verifiable methods shall be estimated to reflect the actual travel conditions.

Regarding Value Text codes:

- Contractors collecting or generating counts on behalf of a State or local government should be coded as a C or D, as appropriate. 'Grown' or 'factored' counts are considered actual counts and should be coded as such.

PCT_DH_SINGLE_UNIT (Percent Design Hour Single-Unit Trucks and Buses, Item 23)

Description
Design Hour single-unit truck and bus volume as a percentage of the Design Hour volume.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: Enter the Design Hour single-unit truck and bus volume as a percentage of the applicable roadway section's Design Hour volume rounded to the nearest hundredths of a percent (0.01%). This percent shall not be rounded to the nearest whole percent or to zero percent if minimal vehicles exist. The Design Hour is considered to be the 30th largest hourly volume for a given calendar year.

Collection and Reporting
Must be updated and reported annually.

LRS
Inventory direction reporting required.

Calculation Method
Weighted Averaging.

Guidance
Percent Design Hour Single-Unit Trucks and Buses is the design hour number of single-unit trucks and buses for a given calendar year as a percentage of the design hour volume. Section specific values shall be provided. Statewide or functional system-wide values shall not be used. The design-hour is also commonly known as the 30th highest hourly volume hour in a calendar year.

The best source of this data is from continuous class traffic monitoring sites. If the sample section has a permanent CVC site, use the Percent Design Hour Single-Unit Trucks and Buses from the actual permanent site.

The following steps are used to calculate this data item:

1. Identify the 30th highest hour of total volume at the site.
2. For the 30th highest hour, identify the volumes of vehicles by FHWA vehicle types. For this data item, sum the volumes of Classes 4, 5, 6, and 7.

3. Calculate the data item as the sum of the volumes for classes 4-7 divided by the total design hour volume.

If continuous class data is not available, use values derived from continuous class station data on the same route or on a similar route with similar truck traffic characteristics in the same area. Urban-rural and functional classification characteristics would be appropriate variables to use. Other sources of this data may include the use of project level information for the section, turning movement and classification class data, regression analysis of computed Percent Design Hour Single-Unit Trucks and Buses at continuous vehicle class stations (CVC), continuous class site data grouped by urbanized areas to estimate urbanized area Percent Design Hour, and continuous class site data grouped by number of lanes for high truck volume routes.

The hour used to calculate K-factor should also be used to calculate Percent Design Hour.

AADT_COMBINATION *(Combination Truck AADT, Item 24)*

Description

Annual Average Daily Traffic for Combination Trucks.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1	1	-	2-6	2-5

Coding

Value Numeric: Enter the volume for combination-unit truck activity over all days of the week and seasons of the year in terms of the annual average daily traffic.

Value Text: Enter the code that best represents the source of the data.

Code	Source (who conducted/ derived the count)	Type (Direct Input or Mechanism)	Method
A	State or local government agency	Actual count	Consistent with short term count factoring procedures outlined in the TMG

Code	Source (who conducted/ derived the count)	Type (Direct Input or Mechanism)	Method
B	State or local government agency	Travel demand model output, statistical trend analysis, cellular data modeling, or similar	Alternative methods not identified in the TMG
C	Private business or non-governmental agency	Actual count	Consistent with short term count factoring procedures outlined in the TMG
D	Private business or non-governmental agency	Travel demand model output, statistical trend analysis, cellular data modeling, or similar	Alternative methods not identified in the TMG
E	Data is developed or acquired using a method not identified in A, B, C, or D		

Collection and Reporting
Must be updated and reported annually and represent reporting year condition.

LRS
Inventory direction reporting required.

Calculation Method
Weighted Averaging.

Guidance
For two-way facilities, provide the bidirectional Combination Truck AADT; for one-way roadways, provide the directional Combination Truck AADT.

This value shall be representative of all combination truck activity based on vehicle classification data from traffic monitoring programs over all days of the week and all seasons of the year. Short-term vehicle classification counts shall be adjusted to represent average conditions as recommended in the *TMG.* Combination trucks are defined as vehicle classes 8 through 13 (four-or-less axle, single-trailer trucks through seven-or-more axle, multi- trailer trucks).

Historical AADT values shall be adjusted annually (during non-collection years) to represent current year data.

Sample-section-specific measured values shall be based on traffic counts taken on a three-year cycle, at a minimum with a duration minimum of 48 hours. If these data are not available, use values derived from classification station data on the same route or on a similar route with similar traffic characteristics in the same area.

Specific guidance for the frequency and size of vehicle classification data collection programs, factor development, age of data, and other applications is contained in the *TMG.*

Regarding Value Text codes:

- Contractors collecting or generating counts on behalf of a State or local government should be coded as a C or D, as appropriate. 'Grown' or 'factored' counts are considered actual counts and should be coded as such.

PCT_DH_COMBINATION *(Percent Design Hour Combination Trucks, Item 25)*

Description
Design Hour combination truck volume as a percentage of the Design Hour volume.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: Enter the Design Hour combination truck volume as a percentage of the applicable roadway section's Design Hour volume rounded to the nearest hundredths of a percent (0.01%). This percent shall not be rounded to the nearest whole percent or to zero percent if minimal vehicles exist. The Design Hour is considered to be the 30th largest hourly volume for a given calendar year.

Collection and Reporting
Must be updated and reported annually.

LRS
Inventory direction reporting required.

Calculation Method
Weighted Averaging.

Guidance
Percent Design Hour Combination Trucks is the design hour number of combination trucks for a given calendar year as a percentage of the design hour volume. Section specific values shall be provided. Statewide or functional system-wide values shall not be used. The design-hour is also commonly known as the 30th highest hourly volume hour in a calendar year.

The best source of this data is from continuous class traffic monitoring sites. If the sample section has a permanent CVC site, use the Percent Design Hour Combination Trucks from the actual permanent site.

The following steps are used to calculate this data item:

1. Identify the 30th highest hour of total volume at the site.
2. For the 30th highest hour, identify the volumes of vehicles by FHWA vehicle types. For this data item, sum the volumes of Classes 8, 9, 10, 11, 12, and 13.
3. Calculate the data item as the sum of the volumes for classes 8-13 divided by the total design hour volume.

If continuous class data is not available, use values derived from continuous class station data on the same route or on a similar route with similar truck traffic characteristics in the same area. Urban-rural and functional classification characteristics would be appropriate variables to use. Other sources of this data may include the use of project level information for the section, turning movement and classification class data, regression analysis of computed Percent Design Hour Combination Trucks at continuous vehicle class stations (CVC), continuous class site data grouped by urbanized areas to estimate urbanized area Percent Design Hour, and continuous class site data grouped by number of lanes for high truck volume routes.

The hour used to calculate K-factor should also be used to calculate Percent Design Hour.

K_FACTOR *(K-factor, Item 26)*

Description
The design hour volume (often the 30th largest hourly volume for a given calendar year) as a percentage of AADT.

Extent

All NHS	Full Extent		Ramps	Sample Panel	
	Functional Classes			Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: enter the K-factor to the nearest percent.

Collection and Reporting
Must be updated and reported annually.

LRS
Inventory direction reporting required.

Calculation Method
Weighted Averaging.

Guidance
The K-factor is the design hour volume, commonly known as the 30th largest hourly volume, for a given calendar year as a percentage of the annual average daily traffic. Section specific values shall be provided. Statewide or functional system-wide values shall not be used.

The best source of this data is from continuous traffic monitoring sites. If continuous data is not available, use values derived from continuous count station data on the same route or on a similar route with similar traffic characteristics in the same area.

When utilizing traffic count data gathered from continuous traffic monitoring sites, the 30th highest hourly volume for a given year (typically used) is to be used for the purposes of calculating K-factor.

Other sources of this data may include the use of project level information for the section, turning movement and classification count data, regression analysis of computed K-factors at continuous count stations (CCSs), continuous site data grouped by urbanized areas to estimate urbanized area K-factors, and continuous site data grouped by number of lanes for high volume routes.

The hour used to calculate K-factor should also be used to calculate D-factor.

Code this data item in accordance with the limits for which Data Item #21 (AADT) is reported.

DIR_FACTOR *(Directional Factor, Item 27)*

Description

The percent of design hour volume (often the 30th largest hourly volume for a given calendar year) flowing in the higher volume direction.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding

Value Numeric: Enter the percentage of the design hour volume flowing in the peak direction. Code '100' for one-way facilities.

Collection and Reporting

Must be updated and reported annually.

LRS

Inventory direction reporting required.

Calculation Method

Weighted Averaging.

Guidance

Section-specific values based on an actual count shall be provided. If this information is unavailable, use values derived from continuous count station data on the same route or on a similar route with similar traffic characteristics in the same area. Statewide or functional system- wide values shall not be used.

For two-way facilities, the directional factor normally ranges from 50 to 70 percent.

When utilizing traffic count data gathered from continuous traffic monitoring sites, the 30th highest hourly volume for a given year (typically used) is to be used for the purposes of calculating D-factor.

The hour used to calculate D-factor should also be used to calculate K-factor.

Code this data item in accordance with the limits for which Data Item #21 (AADT) is reported.

FUTURE_AADT *(Future AADT, Item 28)*

Description
Forecasted AADT

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: Enter a value that represents the forecasted AADT.

Value Date: The year for which the Future AADT has been forecasted in YYYY format.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Weighted Averaging.

Guidance
For two-way facilities, provide the bidirectional Future AADT; for one-way roadways, provide the directional Future AADT.

This should be a 20-year forecast AADT, which may cover a period of 18- to 25-year periods from the data year of the submittal, and must be updated if less than 18 years.

Future AADT should come from a technically supportable State procedure, Metropolitan Planning Organizations (MPOs) or other local sources. HPMS forecasts for urbanized areas should be consistent with those developed by the MPO at the functional system and urbanized area level.

This data may be available from travel demand models, State and local planning activities,

socioeconomic forecasts, trends in motor vehicle and motor fuel data, projections of existing travel trends, and other types of statistical analyses.

Code this data item in accordance with the limits for which Data Item #21 (AADT) is reported.

Control Data Items

ACCESS_CONTROL *(Access Control, Item 5)*

Description
The degree of access control for a given section of road.

Extent

All NHS	Full Extent		Ramps	Sample Panel	
	Functional Classes			Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1-3	1-3	-	4-6	4-5

Coding
Value Numeric: Use the following codes:

Code	Description	
1	Full Access Control	Preference given to through traffic movements by providing interchanges with selected public roads, and by prohibiting crossing at-grade and direct driveway connections (i.e., limited access to the facility).
2	Partial Access Control	Preference given to through traffic movement. In addition to interchanges, there may be some crossings at-grade with public roads, but, direct private driveway connections have been minimized through the use of frontage roads or other local access restrictions. Control of curb cuts is not access control.
3	No Access Control	No degree of access control exists (i.e., full access to the facility is permitted).

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance

Figure 61: Full Access Control (Code 1) Examples
All access via grade-separated interchanges

Sources:
Left: https://theconstructor.org/transportation/grade-separation-interchanges/29200/
Right: TxDOT, Transportation Planning and Programming Division

Figure 62: Partial Access Control (Code 2) Examples
Access via grade-separated interchanges and direct access roadways

Sources:
Left: https://upload.wikimedia.org/wikipedia/commons/a/a9/Ohio_13_and_Possum_Run_Road.JPG
Right: https://en.wikipedia.org/wiki/Limited-access_road

Figure 63: No Access Control (Code 3) Examples

Source: FDOT RCI Field Handbook, Nov. 2008

SPEED_LIMIT ***(Speed Limit, Item 14)***

Description
The posted speed limit.

Extent

All NHS	Full Extent		Ramps	Sample Panel	
	Functional Classes			Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1	1	-	2-6	2-5

Coding
Value Numeric: Enter the daytime speed limit for automobiles posted or legally mandated on the greater part of the section. If there is no legally mandated maximum daytime speed limit for automobiles, code 999.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance
If the speed limit changes within the limits of a section, the State shall determine and report the predominant daytime speed limit.

For sections where minimum and maximum posted speed limits (PSLs) are present, this data item shall be coded in accordance with the maximum PSLs.

For sections where dynamically or variably controlled speed limits are present, code the PSL. If the speed limit for these sections during the peak period is lower than the PSL, code the lower value (i.e. peak period speed limit).

Pavement Data Items

IRI *(International Roughness Index, Item 47)*

Description
IRI is the road roughness index most commonly used worldwide for evaluating and managing road systems. Road roughness is the primary indicator of the utility of a highway network to road users. IRI is defined as a statistic used to estimate the amount of roughness in a measured longitudinal profile.

Extent

All NHS	Full Extent		Ramps	Sample Panel	
	Functional Classes			Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1-3	1-3	-	4-6	4-5

Reporting for Samples on urban minor arterials, all major collectors, and urban minor collectors is optional if PSR is provided. Either IRI or PSR must be reported for all NHS and Sample sections.

Coding
Value Numeric: Code IRI to the nearest inch per mile.

Value Text: This field should not be populated if the Value Numeric field has been populated with a newly measured value (per the Collection and Reporting requirements) for a NHS section. If the Value Numeric field has not been populated with a newly measured value, then one of the following codes shall be provided, only when applicable, to indicate why a newly measured value could not be collected:

Code	Description
A	Construction - Roadway was under construction (i.e., not open to traffic due to capital improvement activities)
B	Closure - Roadway was closed to traffic (i.e., not open to traffic, and not under construction, impassable due to earthquake damage, etc.)

Code	Description
C	Disaster - Roadway was located in an area declared as a disaster zone (e.g., not open to traffic due to being flooded)
D	Deterioration - Roadway was too deteriorated to measure
E	New NHS Designation – Roadway added to NHS post-data collection

Value Date: Report the date in MM/YYYY format for when the data was collected.

Collection and Reporting

IRI on the Interstate must be collected annually and must be reported to HPMS by April 15th each year for the data collected during the previous calendar year. IRI on the non-Interstate NHS must be collected biennially and must be reported to HPMS by June 15th each year for the data collected during the previous calendar year. See 23 CFR 490 for additional details on the National Performance Management Measures requirements. IRI on Samples not on the NHS must also be collected and reported biennially.

LRS

Inventory direction for all roads. Non-Inventory direction for divided facilities is optional, except where pavement data items (IRI, PSR, Surface Type, Rutting, Faulting, or Cracking Percent) have been reported for the non-Inventory direction.

Calculation Method

No Calculation Permitted. Values must be reported in tenth mile sections, consistent with the Guidance below.

Guidance

Data collection for IRI shall follow the processes identified in their Data Quality Management Plan approved by the FHWA Division Office as required under 23 CFR 490.319(c).

The following standards shall be followed for reported IRI values:

- The system to collect IRI data shall be in accordance with American Association of State Highway Transportation Officials (AASHTO) Standard M328-14, Standard Specification for Transportation Materials and Methods of Sampling and Testing, Standard Equipment Specification for Inertial Profiler and AASHTO Standard R56-14, Standard Specification for Transportation Materials and Methods of Sampling and Testing, Standard Practice for Certification of Inertial Profiling Systems.
- The method to collect data shall be in accordance with the network-level data collection procedures in AASHTO Standard R57-14, Standard Specification for Transportation Materials and Methods of Sampling and Testing, Standard Practice for Operating Inertial Profiling Systems.
- The reported IRI values shall be computed from pavement profile data in accordance with AASHTO Standard R43-13, Standard Specification for Transportation Materials and Methods of Sampling and Testing, Standard Practice for Quantifying Roughness of Pavement, 2021, 41st/2021 Edition, AASHTO, 978-1-56051-771-9. This method requires the calculation of IRI for each wheelpath in a section, then averaging the two IRI values to determine the Mean Roughness Index (MRI) for the section which is reported.

- For the sections on the Interstate System, measured IRI shall be:
    - collected for the full extent of the mainline highway;
    - in the rightmost through lane or one consistent lane for all data if the rightmost through lane carries traffic that is not representative of the remainder of the lanes or is not accessible due to closure, excessive congestion, or other events impacting access;
    - continuously collected in a manner that will allow for reporting in nominally uniform section lengths of 0.1 mile (528 feet); shorter sections are permitted only at the beginning of a route, end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable (e.g., locations where a change in Surface Type occurs); the maximum length of a section shall not exceed 0.11 mile in length; and
    - on an annual frequency (note: data collection shall be performed during a given calendar year, i.e., data collection activities conducted during a State's fiscal year, performance year, etc. must conclude by December 31st of that year for reporting in the following year).
- For the sections on the non-Interstate System NHS, measured IRI shall be:
    - collected for the full extent of the mainline highway;
    - in the rightmost through lane or one consistent lane for all data if the rightmost through lane carries traffic that is not representative of the remainder of the lanes or is not accessible due to closure, excessive congestion, or other events impacting access;
    - continuously collected in a manner that will allow for reporting in nominally uniform section lengths of 0.1 mile (528 feet); shorter sections are permitted only at the beginning of a route, end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable (e.g., locations where a change in Surface Type occurs); the maximum length of a section shall not exceed 0.11 mile in length; and
    - on a biennial frequency (note: data collection shall be performed during a given 2- year duration and must conclude by December 31st of that 2-year duration for reporting purposes).
- Shall be reported for all sections with Surface Type (Item 49) codes '2', '3', '4', '5', '6', '7', '8', '9', and '10'.
- Shall not be estimated from PSR (Item 48).
- Estimating conditions from data Samples of the full extent of the mainline will not be permitted.
- For all other sections (including samples), measured IRI values shall be:
    - In the rightmost through lane or one consistent lane for all data if the rightmost through lane carries traffic that is not representative of the remainder of the lanes or is not accessible due to closure, excessive congestion, or other events impacting access;
    - continuously collected in a manner that will allow for reporting in nominally uniform section lengths of 0.1 mile (528 feet); shorter sections are permitted only at the beginning of a route, end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable (e.g., locations where a change in Surface Type occurs); the maximum length of a section shall not exceed 0.11 mile in length; and
    - on a biennial frequency (note: data collection shall be performed during a given 2- year duration and must conclude by December 31st of that 2-year duration for reporting purposes).

Structures and railroad grade crossings are to be included in the measurement of surface roughness.

If a measured IRI value is reported for a non-Principal Arterial System (PAS) Sample, a PSR value for that

section is not required, as a paved Sample shall have either PSR or IRI reported.

For LRS purposes, this Data Item can be reported independently for both directions of travel associated with divided highway sections, for which dual carriageway GIS network representation is required. However, if this data item is being reported for both the inventory and non-inventory directional approaches associated with all divided Interstate roadway sections, then the following data items shall be reported in the same manner for these roadway sections: Data Item 2 (Urban ID), Data Item 4 (Structure Type), Data Item 17 (Route Number), Data Item 48 (PSR), Data Item 49 (Surface Type), Data Item 50 (Rutting), Data Item 51 (Faulting), Data Item 52 (Cracking Percent), and Data Item 70 (Directional Through Lanes).

Value Text: When a measured value has not been populated, and one of the text codes do not apply, the State should provide an explanation for this missing data in their HPMS Submittal Comments. This might include circumstances such as equipment malfunctions or staffing constraints.

PSR *(Present Serviceability Rating, Item 48)*

Description

Present Serviceability Rating (PSR) for pavement condition.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1	1	-	4-6	5

For highway on the NHS, the PSR may be used as an alternative to IRI wherever the speed limit is below 40 mph. For Samples on urban minor arterials, all major collectors, and urban minor collectors, PSR may be used as an alternative to IRI.

Coding

Value Numeric: Code a PSR or equivalent to the nearest tenth.

Value Text: No entry required for non-NHS sections. **Report Code A if the posted speed limit is less than 40 mph.**

Value Date: Report using the MM/YYYY format for when the data was collected. This field should not be populated when the Value Numeric field has not been populated.

Collection and Reporting

Where the State is collecting PSR in lieu of IRI, the State must abide by the pavement collection cycle expected for that road section. PSR on the Interstate must be collected annually and must be reported to HPMS by April 15th each year for the data collected during the previous calendar year. PSR on the

non-Interstate NHS must be collected biennially and must be reported to HPMS by June 15th each year for the data collected during the previous calendar year. See 23 CFR 490 for additional details on the National Performance Management Measures requirements. PSR on Samples not on the NHS must also be collected and reported biennially.

LRS

Inventory direction for all roads. Non-Inventory direction for divided facilities is optional except where pavement data items (IRI, PSR, Surface Type, Rutting, Faulting, or Cracking Percent) have been reported for the non-Inventory direction.

Calculation Method

No Calculation Permitted. Values must be reported in tenth mile sections, consistent with the Guidance below.

Guidance

Data collection for PSR shall follow the processes identified in their Data Quality Management Plan approved by the FHWA Division Office as required under 23 CFR 490.319(c).

For the sections on the NHS where posted speed limit is less than 40 mph, PSR may be reported in lieu of IRI.

If reported, measured PSR values shall be:

- in the rightmost through lane or one consistent lane for all data if the rightmost through lane carries traffic that is not representative of the remainder of the lanes or is not accessible due to closure, excessive congestion, or other events impacting access;
- continuously collected in a manner that will allow for reporting in nominally uniform section lengths of 0.1 mile (528 feet); shorter sections are permitted only at the beginning of a route, end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable; the maximum length of a section shall not exceed 0.11 mile in length;
- on an annual frequency for Interstate pavements (note: data collection shall be performed during a given calendar year, i.e., data collection activities conducted during a State's fiscal year, performance year, etc. must conclude by December 31st of that year for reporting in the following year).
- on a biennial frequency for all other sections (including samples) (note: data collection shall be performed during a given 2- year duration and must conclude by December 31st of that 2-year duration for reporting purposes).

If sufficiency ratings of pavement condition are available, they may be used after a correlation between the sufficiency rating scale and the PSR scale or other rating factors has been developed in accordance with Table 8 and approved by the FHWA Division Office. If there are no current PSR, PSI, or sufficiency ratings that can be adapted, the section can be rated using values in the following Table 8. Estimates to the nearest tenth within the applicable range shall be made (e.g., 2.3 as opposed to 2.323).

Table 8: Present Serviceability Rating

PSR	Description
4.0 – 5.0	Only new (or nearly new) superior pavements are likely to be smooth enough and distress free (sufficiently free of cracks and patches) to qualify for this category. Most pavements constructed or resurfaced during the data year would normally be rated in this category.
3.1 – 3.9	Pavements in this category, although not quite as smooth as those described above, give a first-class ride and exhibit few, if any, visible signs of surface deterioration. Flexible pavements may be beginning to show evidence of rutting and fine random cracks. Rigid pavements may be beginning to show evidence of slight surface deterioration, such as minor cracks and spalling.
2.1 – 3.0	The riding qualities of pavements in this category are noticeably inferior to those of new pavements, and may be barely tolerable for high-speed traffic. Surface defects of flexible pavements may include rutting, map cracking, and extensive patching. Rigid pavements in this group may have a few joint failures, faulting and/or cracking, and some pumping.
1.1 – 2.0	Pavements in this category have deteriorated to such an Extent that they affect the speed of free-flow traffic. Flexible pavement may have large potholes and deep cracks. Distress includes raveling, cracking, rutting and occurs over 50 percent of the surface. Rigid pavement distress includes joint spalling, patching, cracking, scaling, and may include pumping and faulting.
0.1 – 1.0	Pavements in this category are in an extremely deteriorated condition. The facility is passable only at reduced speeds, and with considerable ride discomfort. Large potholes and deep cracks exist. Distress occurs over 75 percent or more of the surface.

For LRS purposes, this Data Item can be reported independently for both directions of travel associated with divided highway, for which dual carriageway GIS network representation is required. However, if this data item is being reported for both the inventory and non-inventory directional approaches associated with all divided Interstate roadways, then the following data items shall be reported in the same manner for these roadways: Data Item 2 (Urban ID), Data Item 4 (Structure Type), Data Item 17 (Route Number), Data Item 48 (PSR), Data Item 49 (Surface Type), Data Item 50 (Rutting), Data Item 51 (Faulting), Data Item 52 (Cracking Percent), and Data Item 70 (Directional Through Lanes).

Additional guidance on Present Serviceability Ratings can be found here.

SURFACE_TYPE ***(Surface Type, Item 49)***

Description

Surface type on a given roadway section.

Extent

All NHS	Full Extent			Sample Panel	
	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1	1	-	2-6	2-5

Coding

Value Numeric: Enter the following code which best represents the type of surface:

Code	Description	Pavement Group
1	Unpaved	N/A
2	Bituminous.	Asphalt Pavement
3	JPCP - Jointed Plain Concrete Pavement (includes whitetopping).	Jointed Concrete Pavement
4	JRCP - Jointed Reinforced Concrete Pavement (includes whitetopping).	Jointed Concrete Pavement
5	CRCP - Continuously Reinforced Concrete Pavement.	CRCP
6	Asphalt-Concrete (AC) Overlay over Existing AC pavement.	Asphalt Pavement
7	AC Overlay over Existing Jointed Concrete Pavement	Asphalt Pavement
8	AC (Bituminous Overlay over Existing CRCP)	Asphalt Pavement
9	Unbonded Jointed Concrete Overlay on Portland Cement Concrete (PCC) Pavement	Jointed Concrete Pavement
10	Bonded PCC Overlay on PCC Pavement	Jointed Concrete Pavement
11	Other (e.g. plank, brick, cobblestone, etc.)	N/A

Value Date: Report the date in MM/YYYY format for when the data was collected.

Collection and Reporting

Surface Type on the Interstate must be collected annually and must be reported to HPMS by April 15th each year for the data collected during the previous calendar year. Surface Type on the non-Interstate NHS must be collected biennially and must be reported to HPMS by June 15th each year for the data collected during the previous calendar year. See 23 CFR 490 for additional details on the National Performance Management Measures requirements. All other sections or Samples are to be reported as needed.

LRS

Inventory direction for all roads. Non-Inventory direction for divided facilities is optional except where pavement data items (IRI, PSR, Surface Type, Rutting, Faulting, or Cracking Percent) have been reported for the non-Inventory direction.

Calculation Method

No Calculation Permitted. Reported values must reflect homogenous sections. Multiple values/records may be reported within the sample limits.

Guidance

In accordance with 23 CFR 490.309(c), this data shall be collected and reported on an annual cycle for the Interstate roadways and on a 2-year maximum cycle for all other required sections.

Surface Type is a full extent item for the NHS and should be determined from visual inspection and construction records to the extent possible. Sample data needs construction record verification.

Code 1, Unpaved, on the NHS should be verified since they are very rare. Roadway sections where subgrade/subbase of a pavement is exposed and roadway sections that are currently being rehabilitated/reconstructed shall not be coded as 'Unpaved'.

Asphalt pavement is pavement constructed with asphalt materials (codes 2, 6, 7, and 8). Continuously Reinforced Concrete Pavements (CRCP) means pavements constructed of reinforced Portland cement concrete with no joints (code 5). Jointed Concrete Pavements means pavements constructed of Portland cement concrete (PCC) with joints. It may be constructed of either reinforced or unreinforced (plain) concrete (codes 3, 4, 9, and 10). For codes 7 through 9, if the existing PCC pavement is fractured (rubblized or crack-and-seated) prior to overlaying, treat the broken PCC as a base and select the surface type that best describes the new surface. For example, AC (Bituminous) surface placed over rubblized PCC is code 2 with fractured PCC as the base type. For whitetopping do not treat the underlying HMA as a base type, rather follow the coding described for Item 58.

Whitetopping should be classified as code 3 or 4 depending on whether reinforcement is present or not. For HERS pavement modelling purposes, whitetopping will be analyzed as a PCC pavement. For whitetopping do not treat the underlying HMA as a base type, rather follow the coding described for Item 58. Modern whitetopping overlays are commonly classified by thickness and by bond with the HMA. Three distinct categories are found in the literature:

- Conventional whitetopping—a concrete overlay of 200 mm (8 in.) or more, designed and constructed without consideration of a bond between the concrete and underlying HMA.
- Thin whitetopping (TWT)—an overlay of greater than 100 mm (4 in.) and less than 200 mm (8 in.) in thickness. In most but not all cases, this overlay is designed and constructed with an intentional bond to the HMA.
- Ultra-thin whitetopping (UTW)—with a thickness equal to or less than 100 mm (4 in.), this overlay requires a bond to the underlying HMA to perform well.

For code 6, the coding for this data item shall not be based on materials utilized for preservation treatments (e.g., thin overlays, micro-surfacing, chip seals, slurry seal, etc.) if they are less than 0.5 inch in compacted thickness. If milling/filling operations are used, revise the thickness of the layer that was milled. For example, a 7-inch bituminous pavement (code 2) is milled 2 inches and a 2-inch bituminous overlay is applied. This section is then coded as a code 6 with 7-inch Thickness_Flexible (Item 58) and a 2-inch Last_Overlay_Thickness (Item 56).

Code 11 (Other) should be verified for the NHS since this surface type on the NHS would be rare.

For LRS purposes, this Data Item can be reported independently for both directions of travel associated with divided highways, for which dual carriageway GIS network representation is required. However, if this data item is being reported for both the inventory and non-inventory directional approaches associated with all divided Interstate roadways, then the following data items shall be reported in the same manner for these roadways: Data Item 2 (Urban ID), Data Item 4 (Structure Type), Data Item 17 (Route Number), Data Item 48 (PSR), Data Item 49 (Surface Type), Data Item 50 (Rutting), Data Item 51 (Faulting), Data Item 52 (Cracking Percent), and Data Item 70 (Directional Through Lanes).

Table 9 illustrates the expected pavement data items to be coded consistent with the surface type.

Table 9: Data Item Requirements by Surface Type

Code	IRI	PSR	Rutting	Faulting	Cracking Percent	Thickness Rigid	Thickness Flexible
1 - Unpaved							
2 - Bituminous	in/mi	0.1-5.0	0.01”		Fatigue % area		0.5”
3 - JPCP	in/mi	0.1-5.0		0.01”	% cracked slabs	0.5”	0.5” include for white-topping only
4 - JRCP	in/mi	0.1-5.0		0.01”	% cracked slabs	0.5”	0.5” include for white-topping only
5 - CRCP	in/mi	0.1-5.0			Punchout/ long./patch % area	0.5”	
6 – Composite (AC / AC)	in/mi	0.1-5.0	0.01”		Fatigue % area		0.5”
7 – Composite (AC / JCP)	in/mi	0.1-5.0	0.01”		Fatigue % area	0.5”	0.5”
8 – Composite (Bituminous / CRCP)	in/mi	0.1-5.0	0.01”		Fatigue % area	0.5”	0.5”
9 – Composite (Unbonded JC / PCC)	in/mi	0.1-5.0		0.01”	% cracked slabs	0.5”	
10 – Composite (Bonded JC / PCC)	in/mi	0.1-5.0		0.01”	% cracked slabs	0.5”	
11 – Other (e.g., brick)	in/mi	0.1-5.0					

RUTTING *(Rutting, Item 50)*

Description

Average depth of rutting. A rut is defined as longitudinal surface depressions in the asphalt pavement derived from measurements of a profile transverse to the path of travel on a highway lane. It may have associated transverse displacement. Asphalt pavement (Item 49 codes 2, 6, 7, and 8) is defined as pavements where the top-most surface is constructed with asphalt materials.

Extent

All NHS	Full Extent			Sample Panel	
	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1	1	-	2-6	2-5

Coding

Value Numeric: Code the average rutting for the roadway to the nearest 0.01 inch. Reporting shall be consistent with IRI inventory direction, lane, and section. Zero (0) values shall only be reported for roadways where ruts are not present.

Value Text: This field should not be populated if the Value Numeric field has been populated with a newly measured value for a NHS section. If the Value Numeric field has not been populated with a newly measured value, then one of the following codes shall be provided, only when applicable, to indicate why a newly measured value could not be collected:

Code	Description
A	Construction - Roadway was under construction (i.e., not open to traffic due to capital improvement activities)
B	Closure - Roadway was closed to traffic (i.e., not open to traffic, and not under construction, impassable due to earthquake damage, etc.)
C	Disaster - Roadway was located in an area declared as a disaster zone (e.g., not open to traffic due to being flooded)
D	Deterioration - Roadway was too deteriorated to measure
E	New NHS Designation - Roadway added to NHS post-data collection

Value Date: Report the date in MM/YYYY format for when the data was collected. This field should not be populated when the Value Numeric field has not been populated.

Collection and Reporting

Rutting on the Interstate must be collected annually and must be reported to HPMS by April 15th each year for the data collected during the previous calendar year. Rutting on the non-Interstate NHS must be collected biennially and must be reported to HPMS by June 15th each year for the data collected

during the previous calendar year. See 23 CFR 490 for additional details on the National Performance Management Measures requirements. Rutting on Samples not on the NHS must also be collected and reported biennially.

LRS

Inventory direction for all roads. Non-Inventory direction for divided facilities is optional except where pavement data items (IRI, PSR, Surface Type, Rutting, Faulting, or Cracking Percent) have been reported for the non-Inventory direction.

Calculation Method

No Calculation Permitted. Values must be reported in tenth mile sections, consistent with the Guidance below.

Guidance

The practices in the following Standard Specifications shall be followed for reporting Rutting values, as required in 23 CFR 490.309 and 490.311:

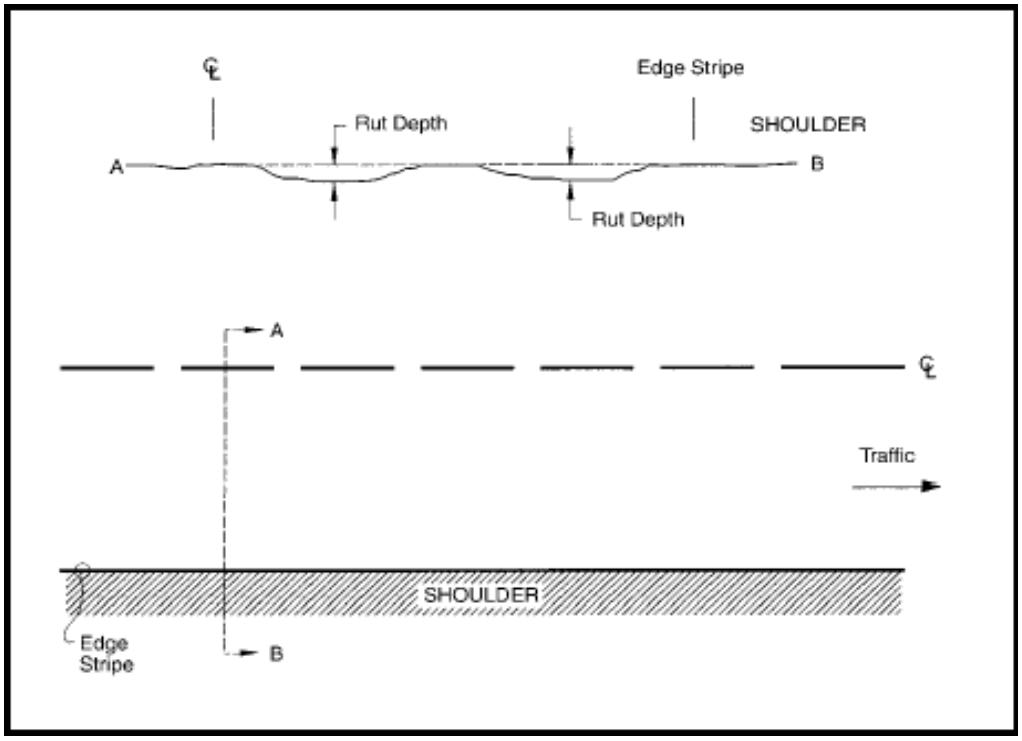
- Data collection conforming to AASHTO Standard R 88-18, Practice for Collection the Transverse Pavement Profile, and AASHTO Standard R 87-18, Practice for Determining Pavement Deformation Parameters and Cross Slope from Collected Transverse Profiles, with the following modifications:
    - The maximum longitudinal spacing between transverse profiles (report interval) shall not be more than 12 inches.
    - Transverse profiles shall be measured in the inventory direction of the highway.
    - The summary interval (or section) shall be the length of the section, nominally 0.1 mile and aligned with other surface measurements.
    - Calculation of rut depth shall follow the method described in section 6.7 of AASHTO Standard R 87-18 and averaged over each wheelpath. The average of the two wheelpaths in the summary interval is to be reported.
- For the sections on the Interstate System, measured rutting values shall be:
    - collected for the full extent of the mainline highway;
    - in the rightmost through lane or one consistent lane for all data if the rightmost through lane carries traffic that is not representative of the remainder of the lanes or is not accessible due to closure, excessive congestion, or other events impacting access;
    - continuously collected in a manner that will allow for reporting in nominally uniform section lengths of 0.1 mile (528 feet); shorter sections are permitted only at the beginning of a route, end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable (e.g., locations where a change in Surface Type occurs); the maximum length of a section shall not exceed 0.11 mile in length;
    - reported for milepoint limits (i.e., sections) that are consistent with those reported for Data Item 47 (IRI); and
    - on an annual frequency (note: data collection shall be performed during a given calendar year, i.e., data collection activities conducted during a State's fiscal year, performance year, etc. must conclude by December 3^{1st} of that year for reporting in the following year).
- For the sections on the non-Interstate System NHS, measured rutting values shall be:

    - collected for the full extent of the mainline highway;
    - in the rightmost through lane or one consistent lane for all data if the rightmost through lane carries traffic that is not representative of the remainder of the lanes or is not accessible due to closure, excessive congestion, or other events impacting access;
    - continuously collected in a manner that will allow for reporting in nominally uniform section lengths of 0.1 mile (528 feet); shorter sections are permitted only at the beginning of a route, end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable (e.g., locations where a change in Surface Type occurs); the maximum length of a section shall not exceed 0.11 mile in length; and
    - on a biennial frequency (note: data collection shall be performed during a given 2- year duration and must conclude by December 31st of that 2-year duration for reporting purposes).
- For all other sections (including samples), measured rutting values shall be:
    - in the rightmost through lane or one consistent lane for all data if the rightmost through lane carries traffic that is not representative of the remainder of the lanes or is not accessible due to closure, excessive congestion, or other events impacting access;
    - continuously collected in a manner that will allow for reporting in nominally uniform section lengths of 0.1 mile (528 feet); shorter sections are permitted only at the beginning of a route, end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable (e.g., locations where a change in Surface Type occurs); the maximum length of a section shall not exceed 0.11 mile in length; and
    - on a biennial frequency (note: data collection shall be performed during a given 2- year duration and must conclude by December 31st of that 2-year duration for reporting purposes).
- Shall be reported for all asphalt pavement sections with Surface Type (Item 49) codes 2, 6, 7, and 8.
- Estimating conditions from data Samples of the full extent of the mainline of the NHS will not be permitted.

For LRS purposes, this Data Item can be reported independently for both directions of travel associated with divided highways, for which dual carriageway GIS network representation is required. However, if this data item is being reported for both the inventory and non-inventory directional approaches associated with all divided Interstate roadways, then the following data items shall be reported in the same manner for these roadways: Data Item 2 (Urban ID), Data Item 4 (Structure Type), Data Item 17 (Route Number), Data Item 48 (PSR), Data Item 49 (Surface Type), Data Item 50 (Rutting), Data Item 51 (Faulting), Data Item 52 (Cracking Percent), and Data Item 70 (Directional Through Lanes).

Default values or values obtained by other means or conversions that are not directly obtained from measured road profiles are not to be used.

Figure 64: Rutting



Source: LTPP Distress and Identification Manual, June 2003

Figure 65: Rutting Example

Source: TxDOT, Construction Division

Value Text: When a measured value has not been populated, and one of the text codes do not apply, the State should provide an explanation for this missing data in their HPMS Submittal Comments. This might include circumstances such as equipment malfunctions or staffing constraints.

FAULTING *(Faulting, Item 51)*

Description

Faulting is defined as a vertical misalignment of pavement joints in Portland Cement Concrete Pavements (Jointed Concrete Pavement). Jointed Concrete Pavements is defined as pavements where the top-most surface is constructed of Portland Cement Concrete with joints (Item 49 codes 3, 4, 9, and 10). It may be constructed of either reinforced or unreinforced (plain) concrete.

Extent

All NHS	Full Extent		Ramps	Sample Panel	
	Functional Classes			Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1	1	-	2-6	2-5

Coding

Value Numeric: Report the average/mean absolute faulting of all joints in a roadway to the nearest 0.01 inch. Reporting shall be consistent with IRI inventory direction, lane, and section. Zero (0) values shall only be reported for roadway sections where faults are not present.

Value Text: This field should not be populated if the Value Numeric field has been populated with a newly measured value for a NHS section. If the Value Numeric field has not been populated with a newly measured value, then one of the following codes shall be provided, only when applicable, to indicate why a newly measured value could not be collected:

Code	Description
A	Construction - Roadway was under construction (i.e., not open to traffic due to capital improvement activities)
B	Closure - Roadway was closed to traffic (i.e., not open to traffic, and not under construction, impassable due to earthquake damage, etc.)
C	Disaster - Roadway was located in an area declared as a disaster zone (e.g., not open to traffic due to being flooded)
D	Deterioration - Roadway was too deteriorated to measure
E	New NHS Designation - Roadway added to NHS post-data collection

Value Date: Report the date in MM/YYYY format for when the data was collected. This field should not be populated when the Value Numeric field has not been populated.

Collection and Reporting

Faulting on the Interstate must be collected annually and must be reported to HPMS by April 15th each year for the data collected during the previous calendar year. Faulting on the non-Interstate NHS must be collected biennially and must be reported to HPMS by June 15th each year for the data collected during the previous calendar year. 23 CFR 490 for additional details on the National Performance Management Measures requirements. Faulting on Samples not on the NHS must also be collected and reported biennially.

LRS

Inventory direction for all roads. Non-Inventory direction for divided facilities is optional except where pavement data items (IRI, PSR, Surface Type, Rutting, Faulting, or Cracking Percent) have been reported for the non-Inventory direction.

Calculation Method

No Calculation Permitted. Values must be reported in tenth mile sections, consistent with the Guidance below.

Guidance

The practices in the following Standard Specifications shall be followed for reporting Faulting values, as required in 23 CFR 490.309 and 490.311:

- Data collection method for faulting data shall be in accordance with AASHTO Standard R36- 21, Standard Specification for Transportation Materials and Methods of Sampling and Testing, Standard Practice for Evaluating Faulting of Concrete Pavements with the following parameters.
    - The length of each measured section shall be nominally 0.1-mile-long and aligned with other measurements of the pavement surface.
    - Use of Manual Fault Measurement is not recommended.
    - Calculation of faulting may use Method A or Method B for automated measurements based profile data collected for both wheel paths and Method C may be used for measurement of faulting using 3D technology for both wheel paths.
    - Faulting is to be reported as the average absolute faulting of both wheel paths for the measured section.
    - Care should be exercised to avoid measuring faulting at cracks.
- For the sections on the Interstate System, measured faulting values shall be:
    - collected for the full extent of the mainline highway;
    - in the rightmost through lane or one consistent lane for all data if the rightmost through lane carries traffic that is not representative of the remainder of the lanes or is not accessible due to closure, excessive congestion, or other events impacting access;
    - continuously collected in a manner that will allow for reporting in nominally uniform section lengths of 0.1 mile (528 feet); shorter sections are permitted only at the beginning of a route, end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable (e.g., locations where a change in Surface Type occurs); the maximum length of a section shall not exceed 0.11 mile in length;
    - reported for milepoint limits (i.e., sections) that are consistent with those reported for Data Item 47 (IRI); and
    - on an annual frequency (note: data collection shall be performed during a given

calendar year, i.e., data collection activities conducted during a State's fiscal year, performance year, etc. must conclude by December 31st of that year for reporting in the following year).

- For the sections on the non-Interstate System NHS, measured faulting values shall be:
  - collected for the full extent of the mainline highway;
  - in the rightmost through lane or one consistent lane for all data if the rightmost through lane carries traffic that is not representative of the remainder of the lanes or is not accessible due to closure, excessive congestion, or other events impacting access;
  - continuously collected in a manner that will allow for reporting in nominally uniform section lengths of 0.1 mile (528 feet); shorter sections are permitted only at the beginning of a route, end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable (e.g., locations where a change in Surface Type occurs); the maximum length of a section shall not exceed 0.11 mile in length;
  - reported for milepoint limits (i.e., sections) that are consistent with those reported for Data Item 47 (IRI); and
  - on a biennial frequency (note: data collection shall be performed during a given 2- year duration and must conclude by December 31st of that 2-year duration for reporting purposes).
- For all the non-NHS sections (i.e. where Sample reporting is required), measured faulting values shall be:
  - in the rightmost through lane or one consistent lane for all data if the rightmost through lane carries traffic that is not representative of the remainder of the lanes or is not accessible due to closure, excessive congestion, or other events impacting access;
  - continuously collected in a manner that will allow for reporting in nominally uniform section lengths of 0.1 mile (528 feet); shorter sections are permitted only at the beginning of a route, end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable (e.g., locations where a change in Surface Type occurs); the maximum length of a section shall not exceed 0.11 mile in length;
  - reported for milepoint limits (i.e., sections) that are consistent with those reported for Data Item 47 (IRI); and
  - on a biennial frequency (note: data collection shall be performed during a given 2- year duration and must conclude by December 31st of that 2-year duration for reporting purposes).
- Shall be reported for all Jointed Concrete Pavement sections with Surface Type (Item 49) codes 3, 4, 9, and 10.
- Estimating conditions from data Samples of the full extent of the mainline will not be permitted.

Faulting at cracks shall not be included in this measure, only at joints.

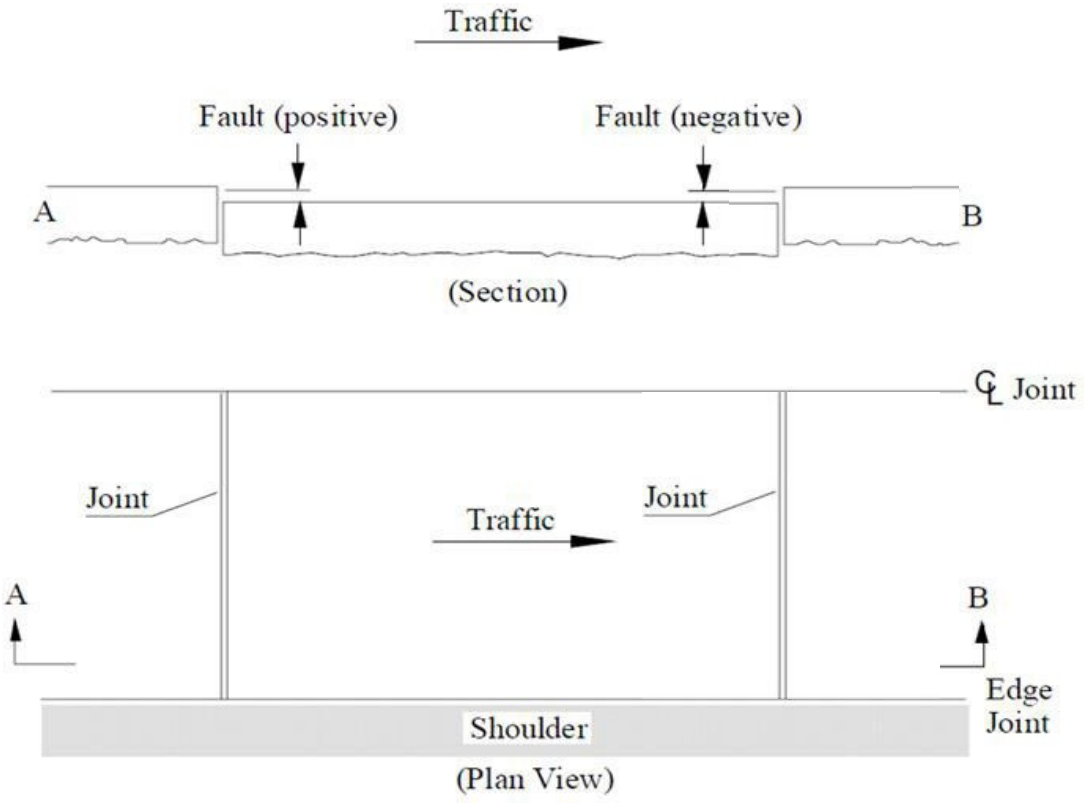
Every joint shall be measured in both wheel paths over a section and the average absolute faulting reported.

For LRS purposes, this Data Item can be reported independently for both directions of travel associated with divided highways, for which dual carriageway GIS network representation is required. However, if this data item is being reported for both the inventory and non-inventory directional approaches associated with all divided Interstate roadways, then the following data items shall be reported in the same manner for these roadways: Data Item 2 (Urban ID), Data Item 4 (Structure Type), Data Item 17 (Route Number), Data Item 48 (PSR), Data Item 49 (Surface Type), Data Item 50 (Rutting), Data Item 51

(Faulting), Data Item 52 (Cracking Percent), and Data Item 70 (Directional Through Lanes).

Default values or values obtained by other means or conversions that are not directly obtained from measured road profiles shall not to be used.

Figure 66: Faulting



Source: LTPP Distress and Identification Manual, June 2003

Figure 67: Faulting Example

Source: TxDOT, Construction Division

Value Text: When a measured value has not been populated, and one of the text codes do not apply, the State should provide an explanation for this missing data in their HPMS Submittal Comments. This might include circumstances such as equipment malfunctions or staffing constraints.

CRACKING_PERCENT *(Cracking Percent, Item 52)*

Description

Cracking is defined as a fissure or discontinuity of the pavement surface not necessarily extending through the entire thickness of the pavement. Cracking Percent is defined as the percentage of pavement surface exhibiting cracking as follows:

- For Asphalt pavement (Item 49 codes 2, 6, 7, and 8), Cracking Percent is the percentage of the total area exhibiting visible fatigue type cracking (both longitudinal and/or pattern) for all severity levels in the wheelpath in each section. See Figure 75 for an illustration.
- For Jointed Concrete Pavements (Item 49 codes 3, 4, 9, and 10), Cracking Percent is the percentage of slabs within the section that exhibit transverse cracking. Partial slabs shall contribute to the section that contains the majority of the slab length.
- For CRCP (Item 49 code 5), the Cracking Percent is the percentage of the area of the section exhibiting longitudinal cracking, punchouts, and/or patching. Transverse cracking shall not be considered in the Cracking_Percent for CRCP.

Extent

All NHS	Full Extent		Ramps	Sample Panel	
	Functional Classes			Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1	1	-	2-6	2-5

Coding

Value Numeric: Report the percent of total section area for asphalt pavement and CRCP and percent of slabs for Jointed Concrete Pavements to the nearest 1%. Zero (0) values shall only be reported either for roadway sections where cracks are not present, or roadway sections where recorded values are less than 0.5%.

Value Text: This field should not be populated if the Value Numeric field has been populated with a newly measured value for a NHS section. If the Value Numeric field has not been populated with a newly measured value, then one of the following codes shall be provided, only when applicable, to indicate why a newly measured value could not be collected:

Code	Description
A	Construction - Roadway was under construction (i.e., not open to traffic due to capital improvement activities)
B	Closure - Roadway was closed to traffic (i.e., not open to traffic, and not under construction, impassable due to earthquake damage, etc.)
C	Disaster - Roadway was located in an area declared as a disaster zone (e.g., not open to traffic due to being flooded)
D	Deterioration - Roadway was too deteriorated to measure
E	New NHS Designation - Roadway added to NHS post-data collection

Value Date: Report the date in MM/YYYY format for when the data was collected. This field should not be populated when the Value Numeric field has not been populated.

Collection and Reporting

Cracking Percent on the Interstate must be collected annually and must be reported to HPMS by April 15th each year for the data collected during the previous calendar year. Cracking Percent on the non-Interstate NHS must be collected biennially and must be reported to HPMS by June 15th each year for the data collected during the previous calendar year. 23 CFR 490 for additional details on the National Performance Management Measures requirements. Cracking Percent on Samples not on the NHS must also be collected and reported biennially.

LRS

Inventory direction for all roads. Non-Inventory direction for divided facilities is optional except where pavement data items (IRI, PSR, Surface Type, Rutting, Faulting, or Cracking Percent) have been reported for the non-Inventory direction.

Calculation Method

No Calculation Permitted. Values must be reported in tenth mile sections, consistent with the Guidance below.

Guidance

For Asphalt pavements (Item 49 codes 2, 6, 7, and 8), the practices in one of the following Standard Specifications shall be followed for reporting Cracking values, as required in 23 CFR 490.309 and 490.311:

- Cracking measurements may be done using manual or automated methods, however, automated methods are preferred for roadways where IRI is measured.
- Cracking will be measured and reported for both wheelpaths. Measuring and reporting cracking outside of the wheelpath areas is not required.
- Any and all severity levels (sealed and unsealed) will be reported.
- The section length for reporting is nominally 0.1 mile and shall be consistent with IRI inventory direction and lane.

- AASHTO Standard R 55-10, Quantifying Cracks in Asphalt Pavement Surfaces, AASHTO Standard R 85-18, Quantifying Cracks in Asphalt Pavement Surfaces from Collected Images Utilizing Automated Methods, and AASHTO Standard R 86-18, Collecting Images of Pavement Surfaces for Distress Detection may be used with the following modifications:
    - Collected images must be sufficient width and length to capture details of both wheelpaths in each section.
    - The lane for image collection must be in the same lanes as measured for IRI and Rutting.
    - Images covering the entire length of the section are to be used. Sampling of images is not to be used.
    - For purposes of reporting cracking data to HPMS, the wheelpath width is to be 39 inches (1.0 m) and located as described in the Standard.
- Regardless of the method of data collection, the percentage of cracking to be reported is the total area of the wheelpaths where cracks are detected divided by the total area of the 0.1 mile section. See example calculation.

For Jointed Concrete Pavements (Item 49 codes 3, 4, 9, and 10), the following practices shall be followed for reporting Cracking values for jointed Concrete Pavements, as required in 23 CFR 490.309 and 490.311:

- Cracks in the Concrete Slabs may be detected using manual observations, imaging, or other methods that identify at least 85% of all cracks present in the slabs.
- A crack is defined as a fissure or discontinuity of the pavement surface not necessarily extending through the entire thickness of the pavement.
- Reported cracking for jointed concrete pavements excludes longitudinal cracks, corner breaks, D-cracking, and Alkali Silica Reactivity (ASR) cracking that may occur on a slab.
- The percentage of cracking reported is calculated as the number of slabs containing one or more transverse cracks extending for at least one-half the lane width, divided by the total number of slabs in the section.

For Continuously Reinforced Concrete Pavements (Item 49 code 5', the following practices shall be followed for reporting Cracking values for CRCP, as required in 23 CFR 490.309 and 490.311:

- Cracks and related distresses in the CRCP pavement surface may be detected using manual observations, imaging, or other methods that identify at least 85% of all distress present in the surface.
- Cracking and distresses may occur anywhere on the pavement. Transverse cracks that are at or near right angles to the direction of travel in the lane should not be included in the calculation.
- Distresses to be included are longitudinal cracking (any severity), punchouts, and patched areas.
- Percentage of Cracking for CRCP pavements is determined as the area of pavements where cracking or distresses are detected divided by the total area of the section.
    - For longitudinal cracking, the cracked area is determined as the length of the crack multiplied by 1 foot width.
    - For punchouts, the area is determined by the two transverse cracks and the edge of the pavement or longitudinal joint (see the three types on Figure 81). For case 2 in Figure 81, the transverse cracks must be distressed for this to be considered a punchout.

For all pavement sections:

- For the sections on the Interstate System, measured Cracking Percent values shall be:

    - collected for the full extent of the mainline highway;
    - in the rightmost through lane or one consistent lane for all data if the rightmost through lane carries traffic that is not representative of the remainder of the lanes or is not accessible due to closure, excessive congestion, or other events impacting access;
    - continuously collected in a manner that will allow for reporting in nominally uniform section lengths of 0.1 mile (528 feet); shorter sections are permitted only at the beginning of a route, end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable (e.g., locations where a change in Surface Type occurs); the maximum length of a section shall not exceed 0.11 mile in length;
    - reported for milepoint limits (i.e., sections) that are consistent with those reported for Data Item 47 (IRI); and
    - on an annual frequency (note: data collection shall be performed during a given calendar year, i.e., data collection activities conducted during a State's fiscal year, performance year, etc. must conclude by December 31st of that year for reporting in the following year).
- For the sections on the non-Interstate System NHS, measured Cracking Percent values shall be:
    - collected for the full extent of the mainline highway;
    - in the rightmost through lane or one consistent lane for all data if the rightmost through lane carries traffic that is not representative of the remainder of the lanes or is not accessible due to closure, excessive congestion, or other events impacting access;
    - continuously collected in a manner that will allow for reporting in nominally uniform section lengths of 0.1 mile (528 feet); shorter sections are permitted only at the beginning of a route, end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable (e.g., locations where a change in Surface Type occurs); the maximum length of a section shall not exceed 0.11 mile in length;
    - reported for milepoint limits (i.e., sections) that are consistent with those reported for Data Item 47 (IRI); and
    - on a biennial frequency (note: data collection shall be performed during a given 2-year duration and must conclude by December 31st of that 2-year duration for reporting purposes).
- For the non-NHS sections (i.e. where Sample reporting is required), measured Cracking Percent values shall be:
    - in the rightmost through lane or one consistent lane for all data if the rightmost through lane carries traffic that is not representative of the remainder of the lanes or is not accessible due to closure, excessive congestion, or other events impacting access;
    - continuously collected in a manner that will allow for reporting in nominally uniform section lengths of 0.1 mile (528 feet); shorter sections are permitted only at the beginning of a route, end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable (e.g., locations where a change in Surface Type occurs); the maximum length of a section shall not exceed 0.11 mile in length;
    - reported for milepoint limits (i.e., sections) that are consistent with those reported for Data Item 47 (IRI); and
    - on a biennial frequency (note: data collection shall be performed during a given 2-year duration and must conclude by December 31st of that 2-year duration for reporting purposes).
- Shall be reported for all Asphalt pavements (Item 49 codes 2, 6, 7, and 8), Jointed Concrete Pavements (Item 49 codes 3, 4, 9, and 10), and CRCP (Item 49 code 5).
- Estimating conditions from data Samples of the full extent of the NHS mainline will not be

permitted.

Reporting shall be consistent with IRI inventory direction, lane and section.

For LRS purposes, this Data Item can be reported independently for both directions of travel associated with divided highways, for which dual carriageway GIS network representation is required. However, if this data item is being reported for both the inventory and non-inventory directional approaches associated with all divided Interstate roadways, then the following data items shall be reported in the same manner for these roadways: Data Item 2 (Urban ID), Data Item 4 (Structure Type), Data Item 17 (Route Number), Data Item 48 (PSR), Data Item 49 (Surface Type), Data Item 50 (Rutting), Data Item 51 (Faulting), Data Item 52 (Cracking Percent), and Data Item 70 (Directional Through Lanes).

Default values or values obtained by other means or conversions that are not directly obtained from measured road profiles are not to be used.

All severity levels of associated cracking should be considered and reported, both sealed and unsealed.

Examples of Procedures to Estimate Cracking Percent

For AC pavements, an estimate of the total area of fatigue cracking for the section shall be reported. As an example, if the section is a single lane, 12 foot in width, 0.1 mile in length; total area = 6336 sq. ft. The fatigue cracking occupies 200 feet in length in the outside wheelpath and 125 feet in length in the inside wheelpath. The wheelpath width is defined as a 39 inches width in each wheel path:

200 ft. + 125 ft. = 325 ft. total length of wheelpath with fatigue cracking
325 ft. * 39 inches / 12 inches per ft. = 1056.25 sq. ft.
1056.25 sq. ft. / 6336 sq. ft. = 16.67 percent area of fatigue cracking which can be reported as 17 percent

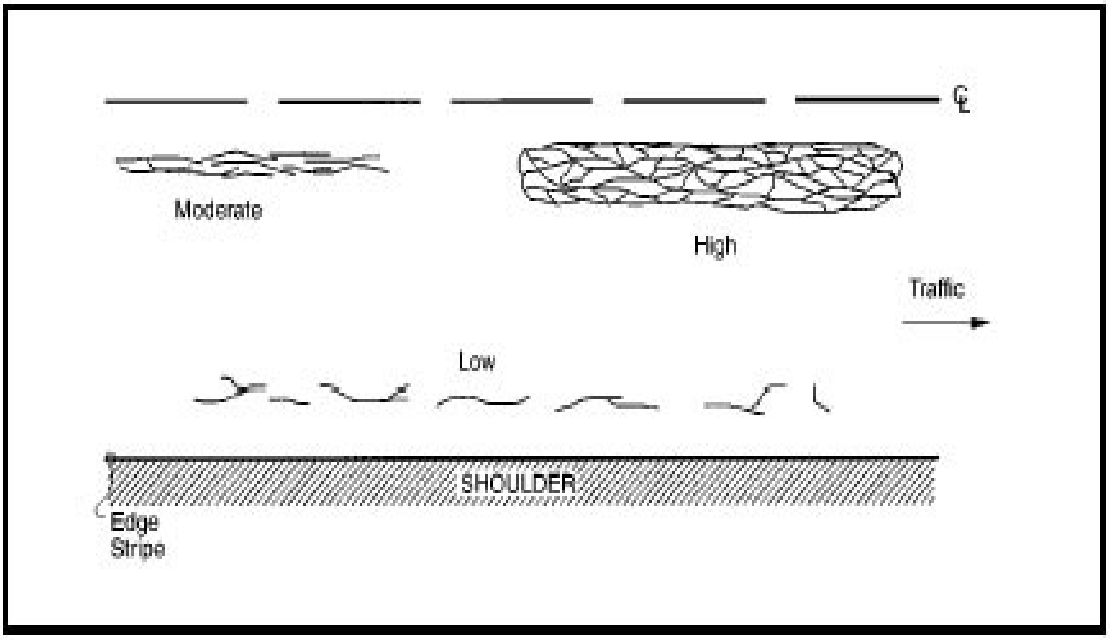
For Asphalt pavements, Cracking Percent should not generally exceed 54 percent for 12 foot lane width, 59 percent for 11 foot lanes, or 65 percent for 10 foot lanes.

For Jointed PCC pavements as an example, if a 0.1 mile section has 4 slabs of 33 having some transverse cracking, you would report 12% slab cracking.

For a CRCP example, if a 0.1 mile section, 12 foot lane; has a punchout that occupies 20 square feet, 10 lineal feet of longitudinal cracking, and three 6 square foot patch.

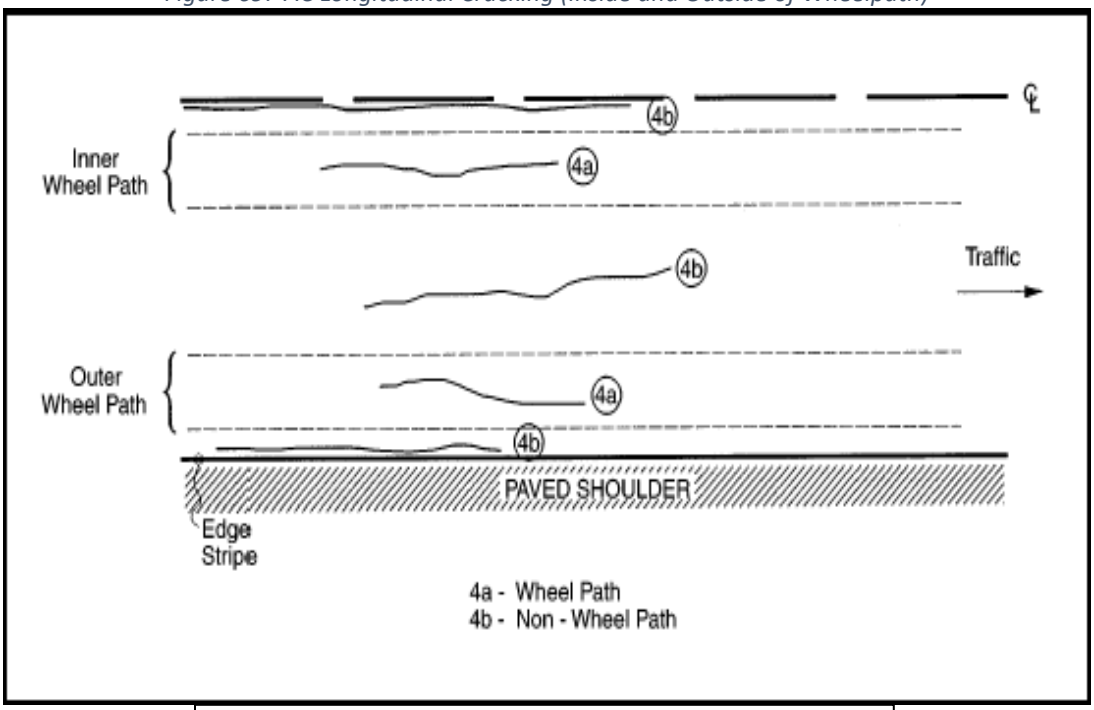
Distress = 20 sf + (10 ft. *1 ft.) + (3*6 sf) = 48 sf
48 sf / 6336 sf = 0.8 percent cracking, may be reported as 1 percent.

Figure 68: AC Fatigue Type Cracking



Source: LTPP Distress and Identification Manual, May 2014

Figure 69: AC Longitudinal Cracking (Inside and Outside of Wheelpath)



Source: LTPP Distress and Identification Manual, May 2014

Figure 70: AC Moderate Severity Longitudinal Cracking

Source: LTPP Distress and Identification Manual, May 2014

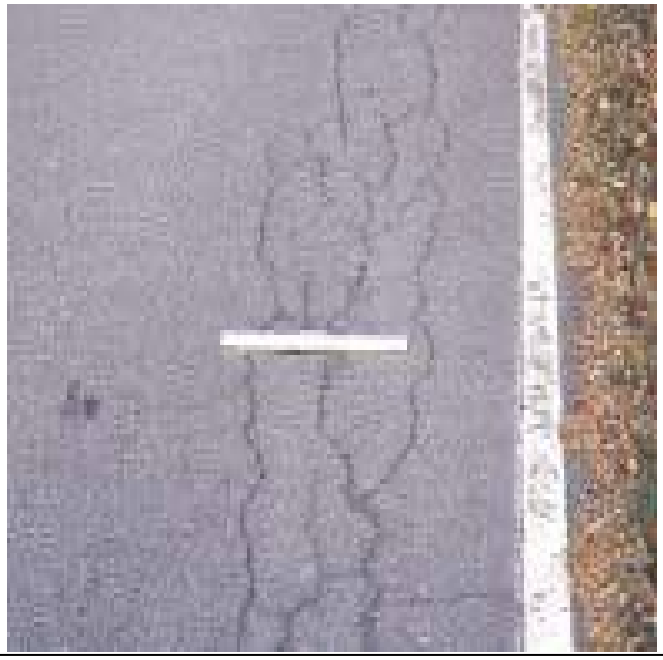
Figure 71: AC Chicken Wire/Alligator Fatigue Type Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 72: Low Severity Fatigue Type Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 73: AC Moderate Severity Fatigue Type Cracking

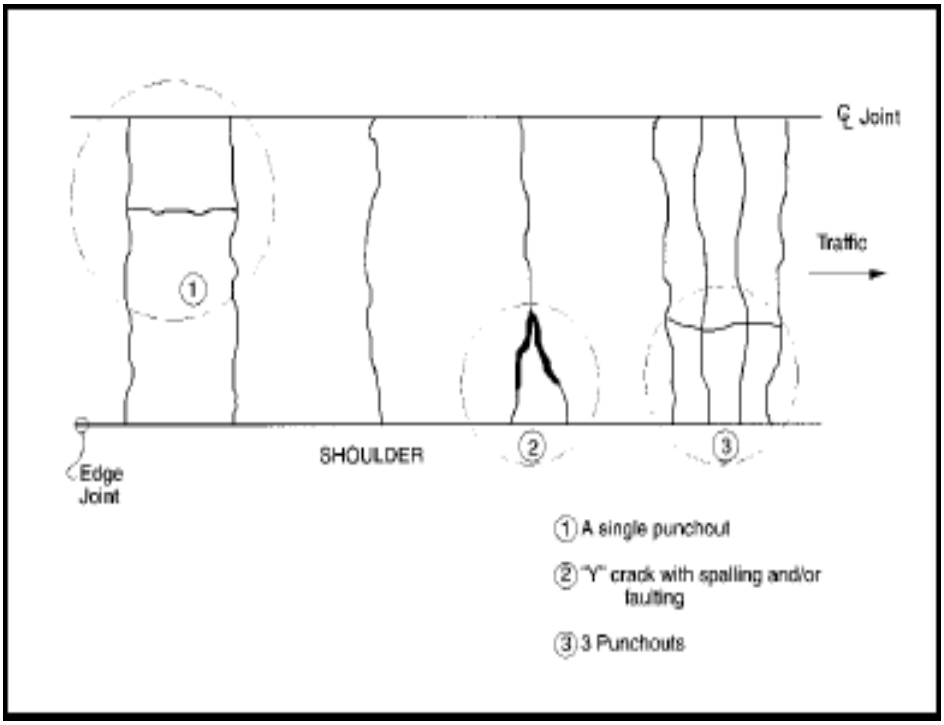


Source: LTPP Distress and Identification Manual, May 2014

Figure 74: AC High Severity Fatigue Type Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 75: CRCP Fatigue Type Cracking (Punchouts)

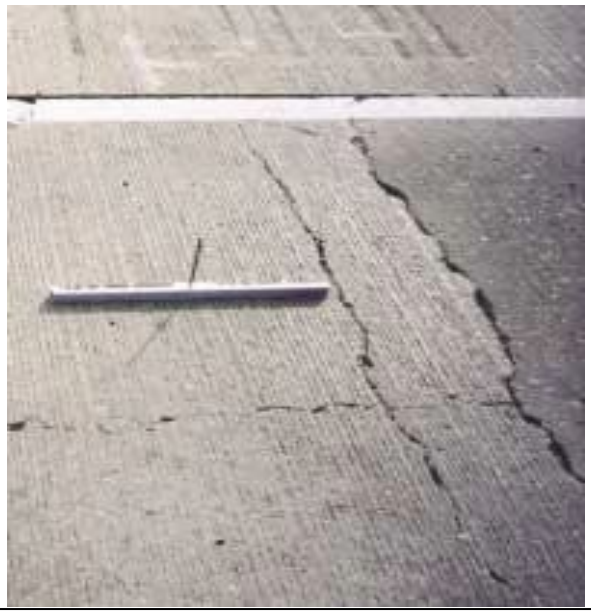


Source: LTPP Distress and Identification Manual, May 2014

Figure 76: Low Severity CRCP Punchout Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 77: Moderate Severity CRCP Punchout Cracking

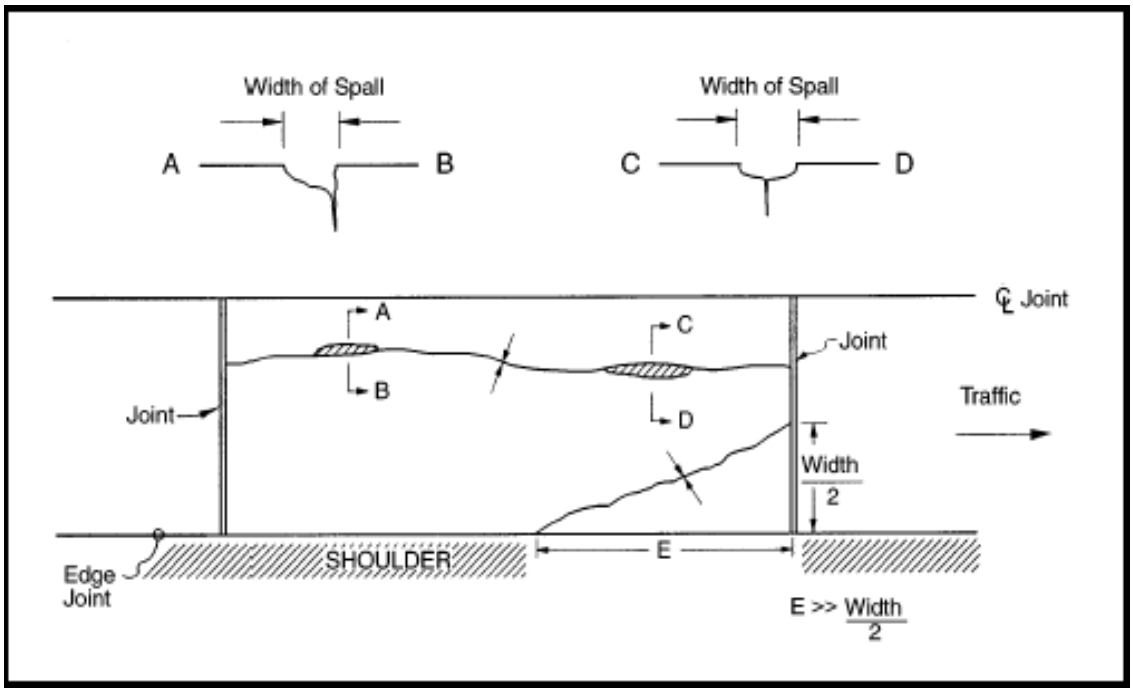


Source: LTPP Distress and Identification Manual, May 2014

Figure 78: High Severity CRCP Punchout Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 79: JCP Longitudinal Cracking



Source: LTPP Distress and Identification Manual, May 2014

Figure 80: JCP Low Severity Longitudinal Cracking

Source: LTPP Distress and Identification Manual, May 2014

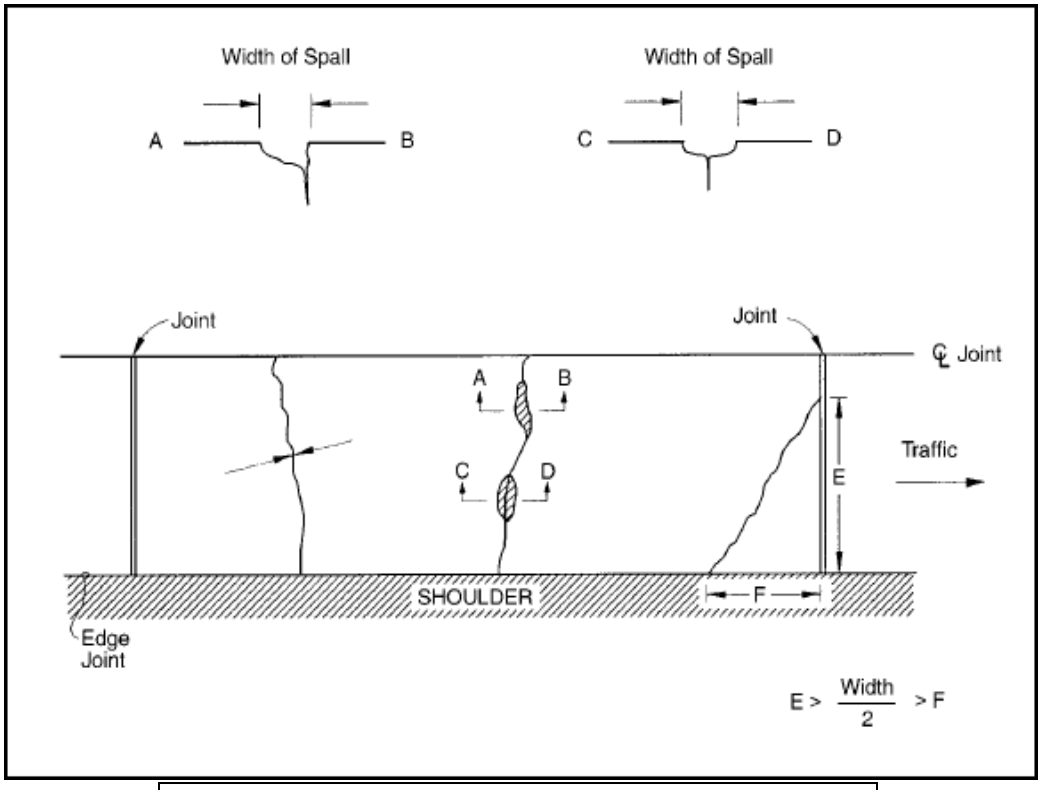
Figure 81: JCP Moderate Severity Longitudinal Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 82: JCP High Severity Longitudinal Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 83: JCP Transverse Cracking



Source: LTPP Distress and Identification Manual, May 2014

Figure 84: JCP Moderate Severity Transverse Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 85: JCP High Severity Transverse Cracking

Source: LTPP Distress and Identification Manual, May 2014

Value Text: When a measured value has not been populated, and one of the text codes do not apply, the State should provide an explanation for this missing data in their HPMS Submittal Comments. This might include circumstances such as equipment malfunctions or staffing constraints.

YEAR_LAST_IMPROVEMENT *(Year of Last Improvement, Item 54)*

Description
The year in which the roadway surface was last improved.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Date: Enter the year in YYYY format for when the last surface improvement was completed.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance
Reporting shall be consistent with IRI inventory direction and lane.

0.5 inch or more of compacted pavement material must be put in place for it to be considered a surface improvement.

Completion date is the actual date the construction ended or the date when the project was opened to traffic.

Retain the coded improvement year until another improvement affecting the surface is completed.

This data item shall be coded for resurfacing treatments of at least 0.5 inch that impact the wheelpath/traveled way.

For scenarios where only certain lanes have been resurfaced (e.g. 2 out of 3 lanes), this data item should be coded in cases where one of those lanes is the right-most outer lane (or lanes).

Figure 86: Resurfaced Roadway

Source: FDOT RCI Field Handbook, Nov. 2008

YEAR_LAST_CONSTRUCTION *(Year of Last Construction, Item 55)*

Description

The year in which the roadway was constructed or reconstructed.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding

Value Date: Enter the year in YYYY format for when the last reconstruction was completed.

Collection and Reporting

Reported as needed.

LRS

Inventory direction reporting required.

Calculation Method
Predominance

Guidance
Reporting shall be consistent with IRI inventory direction and lane.

Reconstruction is the replacement of the existing pavement structure with an equivalent or increased structure. Although recycled materials may be used in the new pavement structure, reconstruction usually requires the complete removal and replacement of at least the old pavement surface, and often also the base.

If a new pavement surface were placed without first removing the old pavement surface, the resulting pavement should be considered an overlay (surface improvement, not construction).

LAST_OVERLAY_THICKNESS ***(Last Overlay Thickness, Item 56)***

Description
Thickness of the most recent pavement overlay.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: code the actual measured value to the nearest 0.5 inch.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance
Reporting shall be consistent with IRI inventory direction and lane.

Values can also be obtained from construction plans. For HPMS purposes, an overlay must consist of at least 0.5 inch of compacted material.

In cases in which the surface has been milled off an AC surface type and overlaid, the newly overlaid thickness is to be coded for this data item. Note that if the overlaid layer is the same thickness that was milled, there will be no change to the value coded for Data Item 58 (Thickness_Flexible) and; if more/less material was overlaid than was milled, the Data Item 58 (Thickness_Flexible) should reflect the resulting total overall thickness.

THICKNESS_RIGID *(Thickness Rigid, Item 57)*

Description
Thickness of rigid pavement.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: Code the actual measured value to the nearest 0.5 inch.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance
The thickness shall reflect the last improvement on the roadway section. When an improvement is made, consider all new or redesigned base and pavement materials when determining the appropriate value.

Reporting shall be consistent with IRI inventory direction and lane. Values can also be obtained from construction plans. Definitions: Refer to the table of codes in Data Item 49 (Surface Type)

- Codes '3,' '4,' '5,' '9,' and '10' are rigidpavements.

- Codes ‘2’ and ‘6’ are flexible pavements.
- Codes ‘7’ and ‘8’ are composite pavements.

Report total thickness of all PCC pavement layer(s); if PCC has been overlaid on AC (“white topped”) (i.e., composite), report the PCC layer thickness on top; if AC has been overlaid on PCC (i.e., composite), report the PCC layer thickness under the AC on top.

For code ‘9’ (Unbonded Jointed Concrete Overlay on PCC Pavement), only the unbonded overlay should be considered and reported for this data item. For code ‘10’ (Bonded PCC Overlay on PCC Pavement), both bonded overlay and underlying rigid pavement surface layer should be considered and reported for this data item.

THICKNESS_FLEXIBLE ***(Thickness Flexible, Item 58)***

Description
Thickness of the flexible pavement.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: Code the actual measured value to the nearest 0.5 inch.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance
Reporting shall be consistent with IRI inventory direction and lane.

Values can also be obtained from construction plans. Definitions: Refer to the table of codes in Data Item 49 (Surface Type).

- Codes ‘3’,’4’, ‘5’, ‘9’, and ‘10’ are rigid pavements.
- Codes ‘2’ and ‘6’ are flexible pavements.

- Codes ‘7’ and ‘8’ are composite pavements.

Report total thickness of all AC (asphalt) pavement layer(s); if PCC has been overlaid on AC (“white topped”) (i.e., composite), report the AC layer thickness under it; if AC has been overlaid on PCC (i.e., composite), report the AC layer thickness on top.

BASE_TYPE *(Base Type, Item 59)*

Description

The base pavement type.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding

Value Numeric: Use the following codes:

Code	Description
1	No Base. Surface layer is placed directly on subgrade without a base
2	Aggregate. Non-stabilized granular, consisting of either crushed stone, gravel, recycled asphalt or concrete
3	Asphalt or Cement Stabilized. Aggregate base treated with either asphalt or Portland cement
5	Hot Mix AC (Bituminous). Either a new hot-mix asphalt (HMA) layer placed as the base layer or the HMA surface of an old flexible pavement
6	Lean Concrete. A Portland cement concrete mixture made with relatively low cement content (typically about 3 sacks/yd)
7	Stabilized Open-graded Permeable. Open-graded aggregate treated with either asphalt or Portland cement for stability
8	Fractured PCC. Rubblized or crack-and-seated PCC pavement

Collection and Reporting

Reported as needed.

LRS

Inventory direction reporting required.

Calculation Method
Predominance

Guidance
For rigid pavements the base is all layers between subgrade and bottom of concrete surface. For flexible pavements the base is all layers between subgrade and bottom of asphalt concrete layer. If you have several types of base, use the code that best describes the layer immediately below the surface layer.

Reporting shall be consistent with IRI inventory direction and lane.

BASE_THICKNESS ***(Base Thickness, Item 60)***

Description
The thickness of the base pavement.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: Code the actual measured value to the nearest inch.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance
For rigid pavements the base is all layers between subgrade and bottom of concrete surface.

For flexible pavements the base is all layers between subgrade and bottom of asphalt concrete layer. If there are several types of base, report the total thickness of all base layers.

Reporting shall be consistent with IRI inventory direction and lane.

Values can also be obtained from construction plans.

SOIL_TYPE *(Soil Type, Item 62)*

Description
Soil type as defined by AASHTO soil classes.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding
Value Numeric: Enter the applicable AASHTO soil class code:

Code	Description
1	Granular (35% or less passing the 0.075 mm sieve) (AASHTO Soil Class A0 through A-3)
2	Fine (Silt-Clay) Materials (>35% passing the 0.075 sieve) (AASHTO Soil Class A-4 through A-7)

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominance

Guidance
This data item will be populated by FHWA if the States do not provide this information.

Terrain Data Items

WIDENING_POTENTIAL *(Widening Potential, Item 42)*

Description
The number of through lanes that could be potentially added to the existing roadway, and any obstacles that would prevent the addition of through lanes.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-6	1-5

Coding

Value Numeric: Use the codes 1-4 as shown below to code for the total number of lanes for which it is feasible to widen the existing road (the entire facility, in both directions).

Code	Description
1	No lanes
2	1 to 2 lanes
3	3 to 4 lanes
4	5 or more lanes

Value Text: Code all conditions that apply in either direction on either side of the Sample. Leave blank for unreported data. Use the following codes:

Code	Description
X	No obstacles to widening.
A	Dense Development. Refers to the density and size of buildings to be acquired, the number of people that would need to be relocated, and the number of businesses that would need to be acquired. (Realizing dense development may be higher in urban areas; this should not be used as an obstacle for all urban areas and should be evaluated relative to the conditions in the area where the roadway is located).
B	Major transportation facilities. Includes major rail lines, canals, airports, major natural gas and oil pipe lines whose location relative to the roadway would limit expansion of the existing roadway.
C	Other public facilities. Includes hospitals, museums, libraries, major public office buildings, schools, and universities.
D	Terrain restrictions. Relates to geographic features that would make it very difficult to add lanes, requiring significant excavation, fill, or tunneling. This applies to both horizontal and vertical terrain restrictions.
E	Historic and archaeological sites. Includes such things as historic buildings, historic land, large monuments, cemeteries, and known archaeological sites.
F	Environmentally sensitive areas. Includes such areas as scenic landmarks, wetlands, bodies of water, areas inhabited or used by protected species. Scenic routes and byways are included in the category and are those national and State routes that have been identified and listed as official designations.
G	Parkland. Includes National, State, and local parks.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Predominant for Value Numeric.
Combination for Value Text.

Guidance
Code this item based on how feasible it is to widen the existing road based on the presence of obstacles and the proximity of the obstacle to the roadway. Consider medians, areas already within the existing right-of-way, and areas outside existing right-of-way to be available for widening.

Do not consider restrictions due to current right-of-way width, or projected traffic.

Narrowing lanes via restriping, resulting in an additional lane on a multilane facility does not constitute Widening Potential.

The cost of adding capacity to roadway sections or corridors with limited Widening Potential is assumed to be significantly more costly than other more routine capacity improvements.

Regarding Value Text: This item provides for the coding of obstacles which may prevent or limit the ability to widen the roadway surface within approximately 100 feet of the outer edge of the through lanes that are present in either direction of the roadway section. Enter any combination of the codes (e.g. if there are Historic and Dense development obstacles, code EA or AE for this Data Item). There is no requirement for the ordering of the codes; a code shall not be used more than once in a sequence of codes (e.g., AEA in invalid). However, code X cannot be used with other codes (e.g. XE would be invalid). If codes 1, 2, or 3 is entered into the Value Numeric field, then the Value Text shall be coded at least one value text code A through G.

Figure 87: No Widening Potential (Code 1)

Source: PennDOT

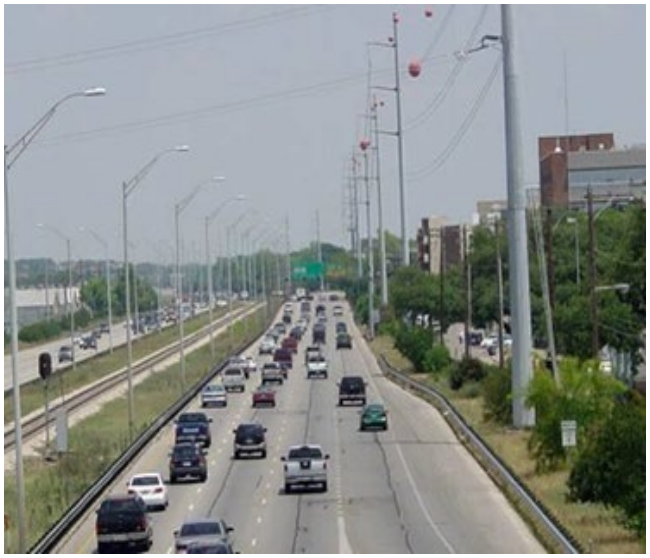
Figure 88: Widening Potential 5+ Lanes (Code 4)

Source: PennDOT

Figure 89: Cemetery (Code E) Obstacle Example

Source: PennDOT

Figure 90: Major Rail Line (Code B) Obstacle Example



Source: TxDOT, Transportation Planning and Programming Division

---

CURVES_A through CURVES_F *(Curve Classification, Item 43)*

Description

Curve classification data.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-3	1-4

Coding

Value Numeric: Enter the total length of the sections that apply to each individual curve class, using the degree of curvature ranges listed in the table below. Each Sample will need to be subdivided to report the extent of each applicable curve class.

Curve Classification	Degrees
A	Under 3.5 degrees (i.e., 0.061 radians)
B	3.5 - 5.4 degrees (i.e., 0.061 - 0.094 radians)
C	5.5 - 8.4 degrees (i.e., 0.096 - 0.147 radians)

Curve Classification	Degrees
D	8.5 - 13.9 degrees (i.e., 0.148 - 0.243 radians)
E	14.0 - 27.9 degrees (i.e., 0.244 - 0.487 radians)
F	28 degrees (i.e. 0.489 radians) or more.

Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
No Calculation Permitted. Values shall be reported for the defined limits of the TOPS section.

Guidance
This information may be available from construction plans, GIS databases, and contracts for other data collection activities such as International Roughness Index (IRI) or pavement data, and video log.

The primary goal is to populate curve data for each paved Sample on the applicable functional system. There are 6 classes of curvature (i.e., Curve Class A through Curve Class F). The beginning and ending points will remain constant for each of the data items; however, the values for these data items will reflect the length of that particular curve class. Furthermore, the sum of the values for each of the 6 curve class Data Items must be equal to the total length of the entire Sample.

Each curve and tangent section is coded as a separate curve; sections are summed by curve class to obtain the total length in each class. Report the sum of the class lengths for each of the six curve classes (in units of miles); the sum of all curve lengths must equal the Sample Panel section length.

Example

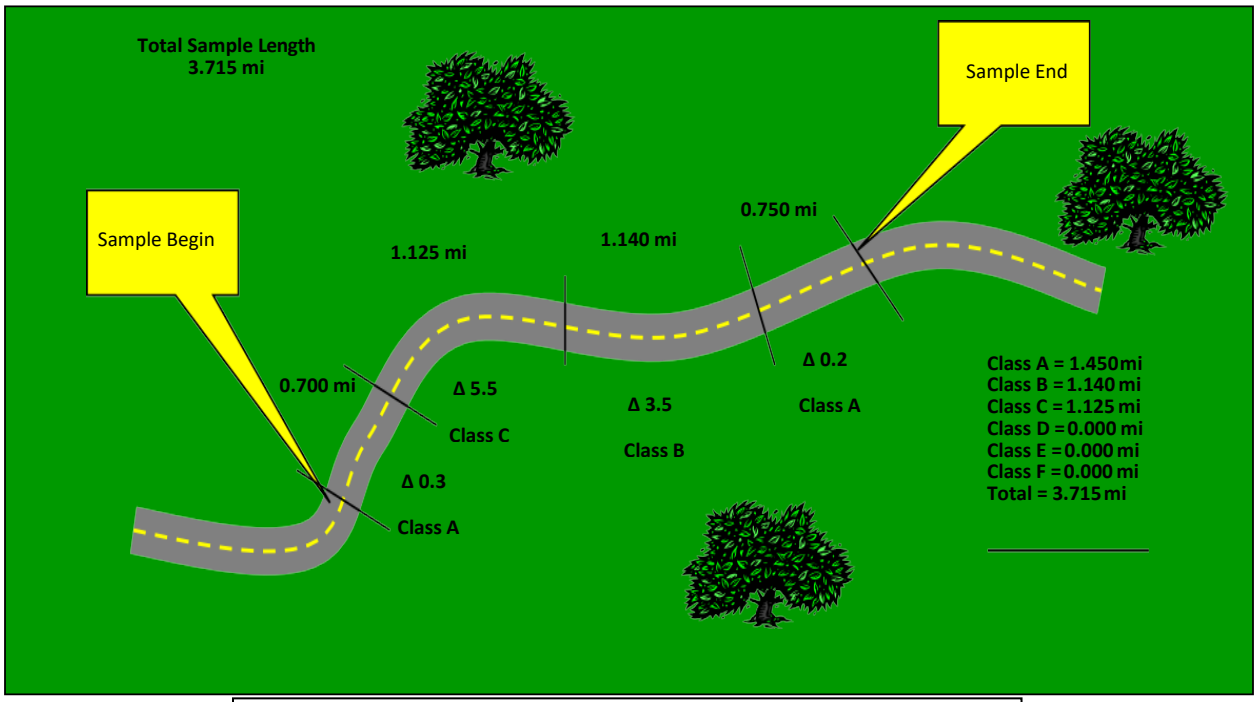
Milepoint	0.00	1.75	3.00	3.75	4.57	5.69
Curve Class	A	B	C	E	C	
Curve Length	1.75	1.25	0.75	0.82	1.12	

This example depicts a Sample Panel section for which the HPMS software would expect 4 records reported in the Road Events dataset as depicted below:

01/01/2022|45|SCXXX|0.0000|5.6900|CURVES_A|1.75|||
01/01/2022|45|SCXXX|0.0000|5.6900|CURVES_B|1.25|||
01/01/2022|45|SCXXX|0.0000| 5.6900|CURVES_C|1.87|||
01/01/2022|45|SCXXX|0.0000| 5.6900|CURVES_E|0.82|||

Since no data exists for curve classes D and F in this example, there would not be a record reported for either class. Moreover, the value for Curve Class C is calculated by adding the values for both Curve Class C parts together. The beginning and ending points are consistent throughout all records within the Sample. The sum of all of the Curve Class lengths must equal the total length of the Sample Panel section.

Figure 91: Curve Classification Example



Source: TxDOT, Transportation Planning and Programming Division

---

TERRAIN_TYPE *(Terrain Type, Item 44)*

Description

The type of terrain.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	-	1-5

Coding

Value Numeric: Enter the code that best describes the terrain:

Code	Description
1	Level. Any combination of grades and horizontal or vertical alignment that permits heavy vehicles to maintain the same speed as passenger cars; this generally includes short grades of no more than 2 percent.
2	Rolling. Any combination of grades and horizontal or vertical alignment that causes heavy vehicles to reduce their speeds substantially below those of passenger cars but that does not cause heavy vehicles to operate at crawl speeds for any significant length of time.
3	Mountainous. Any combination of grades and horizontal or vertical alignment that causes heavy vehicles to operate at extremely low speeds for significant distances or at frequent intervals.

Collection and Reporting

Reported as needed.

LRS

Inventory direction reporting required.

Calculation Method

Predominance

Guidance

When coding this data item, consider the terrain of roadway sections that extend beyond the Sample limits, rather than solely the grade characteristics associated with the Sample section. The extended roadway sections may be several miles long and contain a number of upgrades, downgrades, and level sections. For long Samples, such as rural freeway Samples extending between interchanges, the extended roadway section and the Sample may be the same.

Figure 92: Level Terrain

Source: PennDOT

Figure 93: Rolling Terrain

Source: PennDOT

Figure 94: Mountainous Terrain

Source: PennDOT

GRADES_A through GRADES_F *(Grade Classification, Item 45)*

Description

Grade classification data.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	1-3	1-4

Coding

Value Numeric: Enter the total length of the sections that apply to each individual grade class, using the percent grade ranges listed below. Each Sample will need to be subdivided to report the extent of each applicable grade class.

Grade Classification	Percent Grade
A	0.0 - 0.4 percent
B	0.5 - 2.4 percent
C	2.5 - 4.4 percent
D	4.5 - 6.4 percent
E	6.5 - 8.4 percent
F	8.5 percent or greater

Collection and Reporting
Reported as needed.

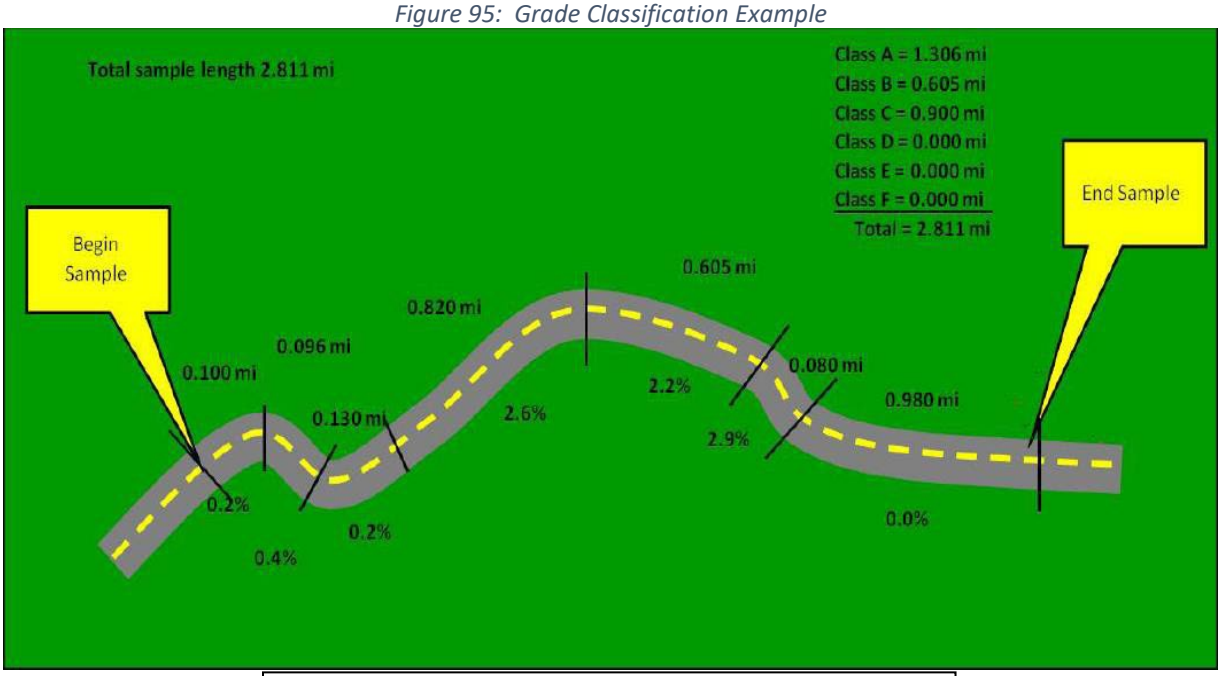
LRS
Inventory direction reporting required.

Calculation Method
No Calculation Permitted. Values shall be reported for the defined limits of the TOPS sections.

Guidance
This information may be available from construction plans, GIS databases, and contracts for other data collection activities.

Each grade and flat section is to be coded as a separate section; sections are typically measured between vertical points of intersection (VPI) and summed by grade class to obtain the total length in each class. The sum of all of the Grade Class lengths must equal the total length of the Sample Panel section.

Figure 95: Grade Classification Example



Source: TxDOT, Transportation Planning and Programming

PCT_PASS_SIGHT ***(Percent Passing Sight Distance, Item 46)***

Description
The percent of a Sample meeting the sight distance requirements for passing.

Extent

Full Extent				Sample Panel	
All NHS	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
-	-	-	-	-	1-5

This data item is only required to be reported on rural, paved, two-lane Sample Panel sections.

Coding
Value Numeric: Enter the percent of the section length that is striped for passing.

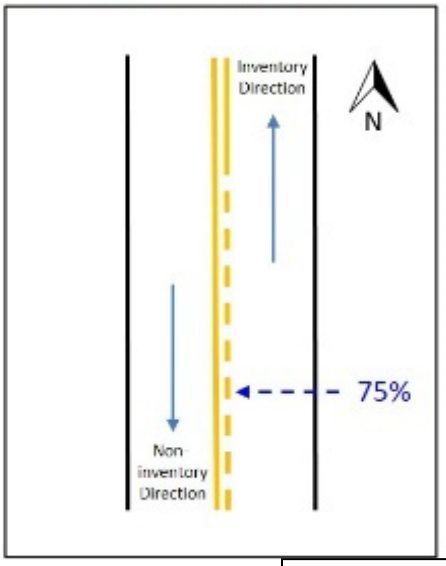
Collection and Reporting
Reported as needed.

LRS
Inventory direction reporting required.

Calculation Method
Minimum Value.

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

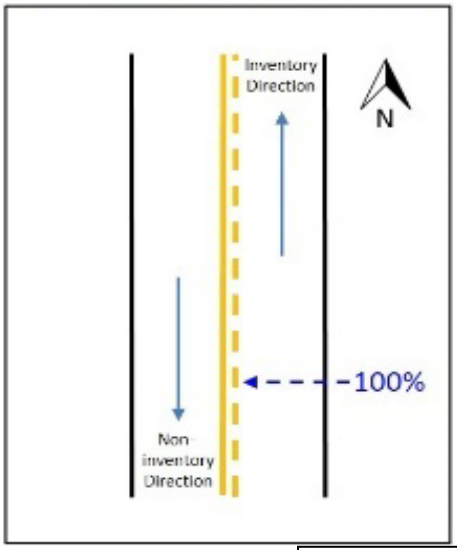
Figure 96: Passing Permitted (Northbound)



In this figure, passing is permitted in the northbound (inventory) direction for 75% of the sample's extent. Thus, Percent Passing Sight Distance for this sample shall be coded 75%.

Source: FHWA, Office of Policy

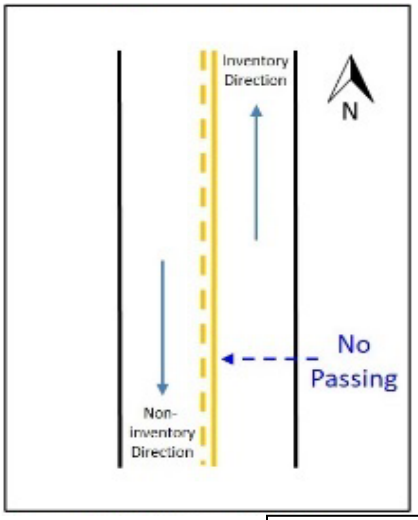
Figure 97: Passing Permitted (Northbound)



In this figure, passing is permitted in the northbound (inventory) direction for 100% of the sample's extent. Thus, Percent Passing Sight Distance for this sample shall be coded 100%.

Source: FHWA, Office of Policy

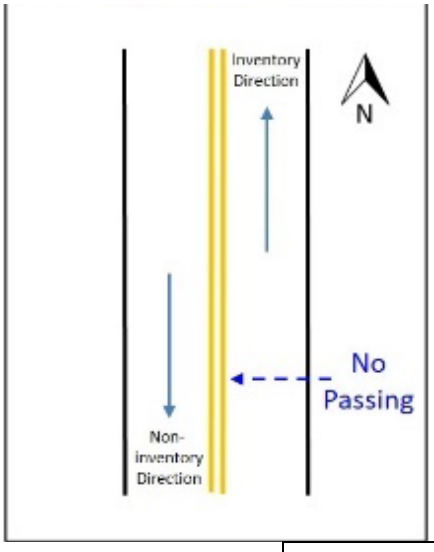
Figure 98: Passing Permitted (Southbound)



In this figure, passing is permitted in the southbound (non-inventory) direction of the sample's extent. Thus, Percent Passing Sight Distance for this sample shall be coded 0%.

Source: FHWA, Office of Policy

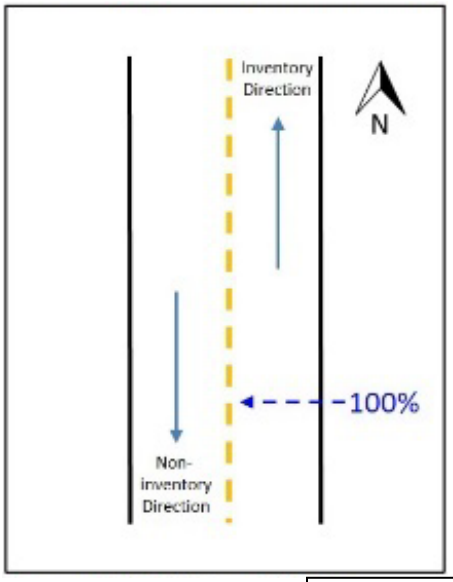
Figure 99: Passing Prohibited (Both Directions)



In this figure, passing is prohibited in both the southbound (non-inventory) and northbound (inventory) directions of the sample's extent. Thus, Percent Passing Sight Distance for this sample shall be coded 0%.

Source: FHWA, Office of Policy

Figure 100: Passing Permitted (Both Directions)



In this figure, passing is permitted in both the Southbound (non-inventory) and northbound (inventory) directions of the sample's extent. Thus, Percent Passing Sight Distance for this sample shall be coded 100%.

Source: FHWA, Office of Policy

Travel Time Code Data Item

TRAVEL_TIME_CODE (Travel Time Code, Item 71)

Description

Unique identifier for a given reporting segment used for PM3 reporting.

Extent

All NHS	Full Extent			Sample Panel	
	Functional Classes		Ramps	Functional Classes	
	Urban	Rural		Urban	Rural
Yes	1	1	-	-	-

Coding

Value Text: Enter the alpha-numeric the code used to identify the reporting segment location on a given route.

For reporting segments from the National Performance Management Research Data Set (NPMRDS), code the 9-digit Traffic Message Channel (TMC) Code.

If a reporting segment consists of contiguous multiple travel time segments in NPMRDS, code concatenated alpha-numeric TMC Codes for the travel time segments, separated by an underscore (_).

For reporting segments determined from equivalent data sets other than NPMRDS, code the State generated alphanumeric unique identifier.

Collection and Reporting
Must be updated and reported annually.

LRS
Inventory direction for all roads, non-Inventory direction for divided facilities.

Calculation Method
Not Applicable.

Guidance
N/A

Chapter 4: Summary Data

The summary datasets provide general information on the use, extent, condition, and performance of the lower functionally classified roadways that are not part of the Federal-aid system (i.e. rural minor collectors and local roads). This data includes travel, system length, and vehicle classification, sorted by functional system, and area type. Area types includes rural, small urban, and individual urbanized areas. **The summaries described below are to be updated annually** as three individual datasets, imported in a Pipe-delimited Character Separated Value (CSV) format.

Regarding Traffic Requirements
States should collect and report traffic and vehicle classification data in accordance with the *Traffic Monitoring Guide* (*TMG*) and the *AASHTO Traffic Data Guidelines*. Traffic data on the NHS and all Principal Arterials should be collected through field counting or other verifiable approaches, at a minimum, on a 3-year cycle. Traffic data for all non-NHS lower functional system Federal-aid roadways should be collected through field counting or other verifiable approaches, at a minimum, on a 6-year cycle. Traffic data should be based on 48-hour continuous monitoring or approved alternative methods. A sufficient number of continuous counts should be conducted for estimating and factoring. All procedures should be applied consistently Statewide.

Data for these years which are not based on actual counts or other field verifiable methods shall be estimated to reflect the actual travel conditions.

4.1 Vehicle Summaries

Vehicle summary data refers to percentages of vehicle miles traveled by vehicle group and roadway functional classification. The 13 vehicle types defined in *Traffic Monitoring Guide* is aggregated into six vehicle groups.

Table 10 provides detailed information on the data to be submitted.

Table 10: Vehicle Summaries Table

Field Name	Data Type (characters)	Description	Valid Values	
DataYear*	Date	Year the data represents	YYYY	
StateID*	Numeric (2)	State FIPS code	Up to two digits for the FIPS code**	
FSGroup*	Numeric (3)	Highway System Group	*Code*	*Description*
			100	Rural Interstate
			200	Rural Other Arterial (includes Other Freeways & Expressways, Other Principal Arterials, and Minor Arterials
			300	Rural Other (includes Major Collectors, Minor Collectors, and Locals)

Field Name	Data Type (characters)	Description	Valid Values	
			110	Urban Interstate
			210	Urban Other Arterial (includes Other Freeways & Expressways, Other Principal Arterials, and Minor Arterials
			310	Urban Other (includes Major Collectors, Minor Collectors, and Locals)
PCTMotorcycles	Decimal (5,2)	Percent of motorcycle VMT (Vehicle Class 1)	Code percentage as 0.00 to 100.00	
PCTCars	Decimal (5,2)	Percent of passenger car VMT (Vehicle Class 2)	Code percentage as 0.00 to 100.00	
PCTLightTrucks	Decimal (5,2)	Percent of light truck VMT (Vehicle Class 3)	Code percentage as 0.00 to 100.00	
PCTBuses	Decimal (5,2)	Percent of bus VMT (Vehicle Class 4)	Code percentage as 0.00 to 100.00	
PCTSingleUnitTrucks	Decimal (5,2)	Percent of single-unit truck VMT (Vehicle Classes 5-7)	Code percentage as 0.00 to 100.00	
PCTCombinationTrucks	Decimal (5,2)	Percent of combination unit truck VMT (Vehicle Classes 8-13)	Code percentage as 0.00 to 100.00	
Comments	VarChar (100)	Comment for State use	Variable text up to 100 characters; this field is optional	

*Primary Key **FIPS codes

4.2 Non-Federal-Aid Summaries

Contains information about travel on non-Federal-Aid roads (functionally classified as local or rural minor collector) for each adjusted urbanized area and rural areas. Table 11 provides detailed information on the data to be submitted.

Table 11: Non-Federal-Aid Summaries Table

Field Name	Data Type (characters)	Description	Valid Values
BeginDate*	Date	Date at which the data becomes active	MM/DD/YYYY
StateID*	Numeric (2)	State FIPS code	Up to two digits for the FIPS code**
FSystem*	Numeric (1)	Functional System	Report only for roads functionally classified as Local (7) and Minor Collector (rural only) (6)

Field Name	Data Type (characters)	Description	Valid Values
UrbanID*	Numeric (5)	Census urban code	Up to five digits for the Census urban code***; code 99999 for rural roadway sections and 99998 for small urban roadway sections
VMT	Numeric (8)	Daily vehicle miles traveled	Report total daily vehicle-miles of travel as a whole number (round to the nearest 1,000 if preferred)
Comments	VarChar (100)	Comment for State use	Variable text up to 100 characters; this field is optional

*Primary Key **FIPS codes ***Census urban codes

4.3 County Summaries

Contains system length data by county for all functionally classified rural minor collectors and local roads. NHS routes on these roads are also included for each county. Ownership and maintenance responsibilities are also included. Roadways identified as *Is Restricted* in the Road Events table should not be included in the system length in the County Summaries. Table 12 provides detailed information on the data to be submitted.

Table 12: County Summaries Table

Field Name	Data Type (characters)	Description	Valid Values
BeginDate*	Date	Date at which the data becomes active	MM/DD/YYYY
StateID*	Numeric (2)	State FIPS code	Up to two digits for the FIPS code**
CountyID*	Numeric (3)	County FIPS code	Up to three digits for the Census county code**
FSystem*	Numeric (1)	Functional System	Report only for roads functionally classified as Local (7) and Minor Collector (rural only) (6)
UrbanID*	Numeric (5)	Census urban code	Up to five digits for the Census urban code***; code 99999 for rural roadway sections and 99998 for small urban roadway sections
Ownership*	Numeric (2)	Ownership code	See Data Item 6 in Chapter 3.4
SystemLength	Decimal (9,4)	Rural minor collector and local roadways length within county	Total length to the nearest thousandth of a mile
Comments	VarChar (100)	Comment for State use	Variable text up to 100 characters; this field is optional

*Primary Key **FIPS codes ***Census urban codes

Chapter 5: Estimates

The estimates datasets provide best estimates of current State and local pavement conditions and construction practices where measured data are not available. These data are used for national-level analysis in various FHWA models. **The estimates are to be updated as needed** as an individual dataset, imported in a Pipe-delimited Character Separated Value (CSV) format. Table 13 provides detailed information on the format for statewide estimates data to be submitted for all Federal-aid highways. Table 14 provides information on the types and valid values of estimates data.

Table 13: Road Estimates Table

Field Name	Data Type (characters)	Description	Valid Values
BeginDate*	Date	Date at which the data becomes active	MM/DD/YYYY
StateID*	Numeric (2)	State FIPS code	Up to two digits for the FIPS code**
EstimateType*	Text	Estimates Type	Must be text as described in Table 14, code the predominate type when multiple types apply
FSystem*	Numeric (1)	Functional System	See Data Item 1 in Chapter 3
IsUrban*	Text	Rural or Urban	Code *N* for Rural, or *Y* for Urban (population of at least 5,000), as determined by the Census
IsStateOwned*	Text	On State / Off State System	Code *N* for Off-State System, or *Y* for On-State System, as determined by the State
ValueNumeric	Decimal (10,3)	Numeric Value	Must be numeric as described in Table 14
Comments	VarChar (100)	Comment for State use	Variable text up to 100 characters; this field is optional

**Primary Key* ***FIPS codes*

Table 14: Estimate Types and Valid Values

Type	Descriptions	Value Numeric	
Last_Overlay_Thickness	Typical design or construction last overlay	Last overlay thickness to the nearest 0.5 inch	
Thickness_Rigid	Typical design or construction thickness of rigid pavement	Rigid pavement thickness to the nearest 0.5 inch	
Thickness_Flexible	Typical design or construction thickness of all AC (asphalt concrete) pavement layers	Flexible pavement thickness to the nearest 0.5 inch	
Base_Type	Base Type	Code	Description
		1	No base
		2	Aggregate
		3	Asphalt or cement stabilized

Type	Descriptions	Value Numeric	
		5	Hot mix AC (Bituminous)
		6	Lean concrete
		7	Stabilized open-grade permeable
		8	Fractured PCC
Base_Thickness	Typical design or construction thickness	Base thickness to the nearest whole inch	
Binder_Type	Binder Type	See Table 15 and Table 16	
Dowel_Bar	Presence of Dowel Bars	Code	Description
		1	No - Dowel Bars not typically used
		2	Yes - Dowel Bars are typically used
Joint_Spacing	Typical joint spacing	Joint spacing to the nearest whole foot	
Paved_Length	Decimal (9,3)	Report total miles of paved roads; only report for Local roads and Rural Minor Collectors	
Unpaved_Length	Decimal (9,3)	Report total miles of unpaved roads; only report for Local roads and Rural Minor Collectors	

Table 15: Codes for Viscosity Graded Binders

Code	Description
1	Less than AC-2.5
2	AC-2.5 to AC-4
3	AC-5 to AC-9
4	AC-10 to AC-19
5	AC-20 to AC-29
6	AC-30 to AC-39
7	AC-40 to AC-49
8	AC-50 or more

Table 16: Codes for Super Pave Binders

High Temperature Grade	Low Temperature Grade								
	Less than –4	–4 to –9	–10 to –15	–16 to –21	–22 to –27	–28 to –33	–34 to –39	–40 to –45	–46 or more
Less than 40	10	20	30	40	50	60	70	80	90
40 to 45	11	21	31	41	51	61	71	81	91
46 to 51	12	22	32	42	52	62	72	82	92
52 to 57	13	23	33	43	53	63	73	83	93
58 to 63	14	24	34	44	54	64	74	84	94
63 to 69	15	25	35	45	55	65	75	85	95
70 to 75	16	26	36	46	56	66	76	86	96
76 to 81	17	27	37	47	57	67	77	87	97
82 to 87	18	28	38	48	58	68	78	88	98
88 or more	19	29	39	49	59	69	79	89	99

Chapter 6: Road Event Collection Methods

The road event collection methods (collection methods) dataset provides additional information for understanding the variability in certain traffic and pavement-related data items reported to HPMS. It describes data collection procedures and post-processing that may affect the consistency or quality of the data, is used to ensure conformity with the National Performance Management Measures requirements detailed in 23 CFR Part 490, and for other data quality needs. The collection methods apply to an entire data item or group of data items, and not any single data item entry. The data may be published in the *Highway Statistics* publication, or provided to data users upon request. However, the collection methods will not be used by FHWA to alter a State's submitted data. **The collection methods are to be updated as needed** for all items they have reported to HPMS, imported in a Pipe-delimited Character Separated Value (CSV) format. All collection methods will be extracted on **June 15th**, except for Pavement Reporting Method for Interstates, which will be extracted on **April 15th**. The collection methods must have been imported into HPMS by those dates. Table 17 provides detailed information on format for the collection methods to be submitted for all Federal-aid highways. Table 18 provides information on the types and valid values of collection methods.

Table 17: Road Event Collection Methods Table

Field Name	Data Type (characters)	Description	Valid Values
BeginDate*	Date	Date at which the data becomes active	MM/DD/YYYY
StateID*	Numeric (2)	State FIPS code	Up to two digits for the FIPS code**
MetadataType*	Text	Road Event Collection Method Type	Must be text as described in Table 18, multiple metadata types are permitted per data item, code the predominate value when multiple values apply
FSystem*	Numeric (1)	Functional System	See Data Item 1 in Chapter 3
IsUrban*	Text	Rural or Urban	Code *N* for Rural, or *Y* for Urban (population of at least 5,000), as determined by the Census
IsStateOwned*	Text	On State / Off State System	Code *N* for Off-State System, or *Y* for On-State System, as determined by the State
ValueNumeric	Numeric (6,1)	Numeric Value	Must be numeric as described in Figure 17
Comments	VarChar (100)	Comment for State use	Variable text up to 100 characters; this field is optional

Primary Key* * FIPS codes*

Table 18: Collection Method Types and Valid Values

Type	Description	Value Numeric	
AADT_Pct_Actual	Percent total section-level AADTs reported that are based on actual counts for the reported data year. For example, if using a 3-year counting cycle, then the percentage would be 33%.	Enter value to the nearest whole percent	
AADT_24	Number of portable counter locations that were counted for a duration of 24 hours to 47 hours	Integer	
AADT_48	Number of portable counter locations that were counted for a duration of 48 hours or more	Integer	
Travel_Class_Type	Type of classification counts used for reporting purposes	*Code*	*Description*
		1	Short-term counts only (>=24 hrs in duration)
		2	Continuous permanent class counts only
		3	Both short term and continuous counts
IRI_Equip_Type	Type of equipment used predominately for measuring the International Roughness Index (IRI)	*Code*	*Description*
		1	3-dimensional (3-D) imaging system/scanning laser
		2	Laser
		3	Other
IRI_Report_Interval	Longitudinal distance between the outputs of a profile index (IRI) value. (Ref: AASHTO Designation: M328-14; 3.1.15)	Report interval to the nearest foot	
IRI_Sample_Interval	Longitudinal distance between data capture points. These data points are combined to create one profile data point. These points, in turn, may be combined to create a final value in the reported profile. (Ref:AASHTO Designation M328-14; 3.1.18)	Report interval to the nearest 0.1 inch	
Rutting_Method	Method (Manual or Automated) used to collect most of the rutting data	*Code*	*Description*
		1	Manual
		2	Automatic
Rutting_Equip_Type		*Code*	*Description*

Type	Description	Value Numeric	
	Type of equipment used predominately for collection of rutting data	1	3-dimensional (3-D) imaging system/scanning laser
		2	Laser
		3	Other/Manual
Rutting_Num_Sensors	Number of sensors for the equipment used predominately for collection of rutting data	*Code*	*Description*
		1	Three (3) sensors
		2	Five (5) sensors
		3	Greater than five (>5) sensors
		4	3-dimensional (3-D) imaging system/scanning laser
		5	Other
Rutting_Interval	For automatic rutting method: report interval—the travel distance between the reported data (Ref: AASHTO Designation R87-18 and/or R88-18)	Report interval to the nearest foot	
Rutt_Trans_Prof_Interval	Transverse profile data point separation distance (Ref: AASHTO Designation R88-18)	Report interval to the nearest 0.1 inch	
Faulting_Interval	Sampling interval (Ref: AASHTO Designation R36-21)	Report interval to the nearest 0.1 inch	
Faulting_Method	Method (Manual or Automated) used to collect most of the faulting data	*Code*	*Description*
		1	Manual
		2	Automatic
Faulting_Equipment_Type	Type of equipment used predominately for measuring the faulting data	*Code*	*Description*
		1	Manual
		2	Laser
		3	3-dimensional (3-D) imaging system/scanning laser
		4	Other
Cracking_Pct_Equip	Type of equipment used predominately for measuring the percent of cracking (Cracking_Percent)	*Code*	*Description*
		1	Windshield survey
		2	Visual distress survey (side of road)
		3	Manually identify cracking from video
		4	

Type	Description	Value Numeric	
			Automated crack identification to detect cracking from video
		5	Combined manual and automatic crack identification from video
		6	3-dimensional (3-D) imaging system
		7	Other
Cracking_Method	Protocol used to identify pavement distresses	*Code*	*Description*
		1	Long-Term Pavement Performance (LTPP)
		2	American Association of State Highway and Transportation Officials (AASHTO)
		3	Modified LTPP
		4	Modified AASHTO
		5	State developed protocol
		6	Other
Pave_Rep_Method	Reporting method for pavement distresses and related data items (e.g., IRI, PSR, Surface Type, etc.) associated with Interstate roadway sections	*Code*	*Description*
		1	Inventory direction (only)
		2	Inventory & Non-inventory direction
Ramp_Termini_Desc	Ramp Termini	*Code*	*Description*
		1	Gore to Gore
		2	Taper to Taper
		3	Other
Ramp_Traf_Est_Method	Ramp Traffic Estimation Method	*Code*	*Description*
		1	Manual counts
		2	Portable counts
		3	Permanent count equipment
		4	ITS equipment
		5	Ramp metering equipment
		6	Ramp balancing
		7	Turning or ramp movement estimation software
		8	Estimation based on fixed percent of mainline volumes

Type	Description	Value Numeric	
		9	Other estimation method not described above

Chapter 7: ARNOLD Routes & Urban Area Boundaries

The two geospatial files States are to submit to HPMS are All Roads Network of Linear Referenced Data (ARNOLD) Routes and Urban Area Boundaries. These files must be submitted as zipped ESRI shapefiles (.shp) or ESRI file geodatabases (.gdb).

The ARNOLD Routes is the primary geospatial component of HPMS, which links the geometry and the attribute data (RoadDesignations, RoadEvents and SampleLimits). The Linear Referencing Fields used to make the linkage for linear features are a unique Route ID, a beginning mile point, and an ending mile point. For reference on the development of a Statewide Linear Referencing System (LRS), see the FHWA publication, *All Public Roads Geospatial Representation Study*, as well as the FHWA website Certified Public Road Mileage Data and ARNOLD. If a State uses more than one Linear Refencing Method LRM, it is necessary for the State to designate one LRM to be used for HPMS reporting purposes. The required format for the LRS data is an ESRI shapefile or ESRI file geodatabase. **The ARNOLD Routes dataset shall be submitted annually. The Interstate must be submitted before April 15th. The remainder of the ARNOLD Routes dataset must be submitted** in its entirety before the June 15th extraction**,** and include all public roads, as well as ramps. Geometry for divided roadways should be Dual Carriageway, and single Centerline for other roadways. Furthermore, the file must have a projection of WGS-84 EPSG 4326, and units must be in miles. Table 19 provides detailed information on the format for the ARNOLD file.

The Urban Area Boundaries dataset shall be updated after each decennial census, and should include all adjusted Urban Area Boundaries, as submitted by the States and approved by the FHWA. The process for adjusting Urban Area Boundaries should follow FHWA's guidance, Highway Functional Classification Concepts, Criteria and Procedures 2023 Edition. The State's FHWA Division Administrator is responsible for the final approval of a State's adjusted Urban Area Boundaries, as prescribed by FHWA Order M1100.1A. Once approved by the FHWA, the State should upload their adjusted Urban Area Boundaries with their next HPMS Submittal. Table 20 provides detailed information on the format for the Urban Area Boundaries file.

Table 19: ARNOLD Routes Table

Field Name	Data Type (characters)	Description	Valid Values
BeginDate*	Date	Date at which the data becomes active	MM/DD/YYYY
StateID*	Numeric(2)	State FIPS code	Up to two digits for the FIPS code**
RouteID*	VarChar(120)	Location reference ID for the linear feature	Up to 120 alpha-numeric digits that identify the route; this ID must be consistent with the Route ID in the Road Events dataset
Comments (optional)	VarChar(200)	Text descriptor for the route	Up to 200 text characters.
Shape	Geometry	Line feature	Coordinates for geometries have 3 dimensions – Longitude(x), Latitude(y), and Measure/Station (m), the LRS network is expected to contain lines with valid X and Y points

Primary Key* * FIPS codes*

Table 20: Urban Area Boundary Table

Field Name	Data Type (characters)	Description	Valid Values
BeginDate*	Date	Date at which the data becomes active	MM/DD/YYYY
StateID*	Numeric(2)	State FIPS code	Up to two digits for the FIPS code**
UrbanID*	Numeric(5)	Up to five digits for the Census Urban Code	Census Urban Codes can be found at this link. Code 99999 for rural roadways. Code 99998 for small urban roadways.
UrbanName	Text	Name of the Census defined Urban Area	Census Urban Area names can be found at this link.
CensusVintage*	Integer	The four-digit year of the Census on which this Urban Area Boundary is based	YYYY
Shape	Geometry	Polygon feature	

**Primary Key* ***FIPS codes*

Chapter 8: Travel Time Metrics

States are required to submit travel time metric data for the Interstate System and non-Interstate National Highway System by June 15th to the HPMS, **annually,** as required in 23 CFR 490. All data are to be reported for both the Inventory and non-inventory directions of travel. Table 20 describes the format for the dataset and provides the extent and valid values for each data item. More detailed specifications for the data items can be found following Table 21.

Table 21: Travel Time Metrics Dataset

Field Name	Extent	Data Type (characters)	Description	Valid Values
DataYear*	NHS	Date	The year the data represents	YYYY
StateID*	NHS	Numeric (2)	State FIPS code	Up to two digits for the FIPS code**
TravelTimeCode*	NHS	VarChar (50)	Unique identifier for a given reporting segment	The TMC code, concatenated TMC Codes, or State generated identifier
FSystem	NHS	Numeric (1)	FHWA-approved functional classification system	Codes 1-7, see Chapter 3.4
UrbanID	NHS	Numeric (5)	Census urban code	Up to five digits for the Census urban code***
FacilityType	NHS	Numeric (1)	Operational characteristic of the roadway.	Codes 1-6, see Chapter 3.4
NHS	NHS	Numeric (1)	FHWA-approved NHS.	Codes 1-9, see Chapter 3.4
SegmentLength	NHS	Decimal (8,3)	Reporting segment length from Travel Time Dataset	Decimal value rounded to the nearest thousandth of a mile.
Directionality	NHS	Numeric (1)	Direction of travel associated with the reporting segment from Travel Time Dataset	Code 1 for Northbound, 2 for Southbound, 3 for Eastbound, 4 for Westbound, or 5 for Other
DIRAADT	NHS	Numeric (6)	AADT for a given direction of travel	A positive number (must be > 0), the # of vehicles rounded to the nearest integer

Field Name	Extent	Data Type (characters)	Description	Valid Values
LOTTRAMP	NHS	Decimal (4,2)	TTR for AM Peak	A positive number (must be > = 1), rounded to the nearest hundredth
TTAMP50PCT	NHS	Numeric (4)	50th percentile travel time for AM Peak	A positive number (must be > = 0), seconds rounded to the nearest integer
TTAMP80PCT	NHS	Numeric (4)	80th percentile travel time for AM Peak	A positive number (must be > = 0), seconds rounded to the nearest integer
LOTTRMIDD	NHS	Decimal (4,2)	TTR for Midday	A positive number (must be > = 1), rounded to the nearest hundredth
TTMIDD50PCT	NHS	Numeric (4)	50th percentile travel time for Midday	A positive number (must be > = 0), seconds rounded to the nearest integer
TTMIDD80PCT	NHS	Numeric (4)	80th percentile travel time for Midday	A positive number (must be > = 0), seconds rounded to the nearest integer
LOTTRPMP	NHS	Decimal (4,2)	TTR for PM Peak	A positive number (must be > = 1), rounded to the nearest hundredth
TTPMP50PCT	NHS	Numeric (4)	50th percentile travel time for PM Peak	A positive number (must be > = 0), seconds rounded to the nearest integer
TTPMP80PCT	NHS	Numeric (4)	80th percentile travel time for PM Peak	A positive number (must be > = 0), seconds rounded to the nearest integer
LOTTRWE	NHS	(Decimal (4,2)	TTR for Weekend	A positive number (must be > = 1), rounded to the nearest hundredth
TTWE50PCT	NHS	Numeric (4)	50th percentile travel time for Weekend	A positive number (must be > = 0), seconds rounded to the nearest integer
TTWE80PCT	NHS	Numeric (4)	80th percentile travel time for Weekend	A positive number (must be > = 0), seconds rounded to the nearest integer
TTTRAMP	Interstate	Decimal (4,2)	Truck TTR for AM Peak	A positive number (must be > = 1), rounded to the nearest hundredth

Field Name	Extent	Data Type (characters)	Description	Valid Values
TTTAMP50PCT	Interstate	Numeric (4)	50th percentile truck travel time for AM Peak	A positive number (must be > = 0), seconds rounded to the nearest integer
TTTAMP95PCT	Interstate	Numeric (4)	95th percentile truck travel time for AM Peak	A positive number (must be > = 0), seconds rounded to the nearest integer
TTTRMIDD	Interstate	Decimal (4,2)	Truck TTR for Midday	A positive number (must be > = 1), rounded to the nearest hundredth
TTTMIDD50PCT	Interstate	Numeric (4)	50th percentile truck travel time for Midday	A positive number (must be > = 0), seconds rounded to the nearest integer
TTTMIDD95PCT	Interstate	Numeric (4)	95th percentile truck travel time for Midday	A positive number (must be > = 0), seconds rounded to the nearest integer
TTTRPMP	Interstate	Decimal (4,2)	Truck TTR for PM Peak	A positive number (must be > = 1), rounded to the nearest hundredth
TTTPMP50PCT	Interstate	Numeric (4)	50th percentile truck travel time for PM Peak	A positive number (must be > = 0), seconds rounded to the nearest integer
TTTPMP95PCT	Interstate	Numeric (4)	95th percentile truck travel time for PM Peak	A positive number (must be > = 0), seconds rounded to the nearest integer
TTTROVN	Interstate	Decimal (4,2)	Truck TTR for Overnight	A positive number (must be > = 1), rounded to the nearest hundredth
TTTOVN50PCT	Interstate	Numeric (4)	50th percentile truck travel time for Overnight	A positive number (must be > = 0), seconds rounded to the nearest integer
TTTOVN95PCT	Interstate	Numeric (4)	95th percentile truck travel time for Overnight	A positive number (must be > = 0), seconds rounded to the nearest integer
TTTRWE	Interstate	Decimal (4,2)	Truck TTR for Weekend	A positive number (must be > = 1), rounded to the nearest hundredth
TTTWE50PCT	Interstate	Numeric (4)	50th percentile truck travel time for Weekend	A positive number (must be > = 0), seconds rounded to the nearest integer

Field Name	Extent	Data Type (characters)	Description	Valid Values
TTTWE95PCT	Interstate	Numeric (4)	95th percentile truck travel time for Weekend	A positive number (must be > = 0), seconds rounded to the nearest integer
PHED	NHS (select urbanized areas)	Decimal (13,3)	Total peak hour excessive delay	A positive number (must be > 0), person-hours rounded to the nearest thousandths
OCCFAC	NHS	Decimal (3,1)	Average vehicle occupancy factor	A positive number (must be > = 1), rounded to the nearest tenth; optional
MetricSource	NHS	Numeric (1)	Travel time metric data source	Code 1 for NPRMDS, 2 for equivalent data set

**Primary Key* ***FIPS codes* ****Census urban codes*

TravelTimeCode (Travel Time Code)

- Alpha-numeric code used to identify the reporting segment location on a given route.
- For reporting segments from the National Performance Management Research Data Set (NPMRDS), code the 9-digit Traffic Message Channel (TMC) Code.
- If a reporting segment consists of contiguous multiple travel time segments in NPMRDS, code concatenated alpha-numeric TMC Codes for the travel time segments, separated by an underscore (_).
- For reporting segments determined from equivalent data sets other than NPMRDS, code the State generated alphanumeric unique identifier.

FSystem (Functional System)

- For reporting segments determined from NPMRDS and where HPMS Data Item 71 (TravelTimeCode) has not been reported, report FSystem value from NPMRDS.
- For reporting segments determined from NPMRDS and where HPMS Data Item 71 (TravelTimeCode) has been reported, report FSystem value as reported for HPMS Data Item 1 for the same data year.
- For reporting segments determined from equivalent data set, code appropriate FSystem value.
- If multiple travel time segments with differing Functional System values are associated with a single reporting segment, the highest functional order (i.e. the lowest code/value) must be assigned.

UrbanID (Urban ID)

- For reporting segments determined from NPMRDS and where HPMS Data Item 71 (TravelTimeCode) has not been reported, report Urban ID value from NPMRDS.
- For reporting segments determined from NPMRDS and where HPMS Data Item 71 (TravelTimeCode) has been reported, report Urban ID value as reported for HPMS Data Item 2 for the same data year.

- For reporting segments determined from “equivalent” data set, code appropriate Urban ID value.
- If multiple travel time segments with differing Urban ID values are associated with a single reporting segment, the length-based predominant Urban ID value must be assigned.

FacilityType (Facility Type)

- For reporting segments from determined from NPMRDS and where HPMS Data Item 71 (TravelTimeCode) has not been reported, report FacilityType value from NPMRDS.
- For reporting segments determined from NPMRDS and where HPMS Data Item 71 (TravelTimeCode) has been reported, report FacilityType value as reported for HPMS Data Item 3 for the same data year.
- For reporting segments determined from “equivalent” data set, code appropriate FacilityType value.
- If multiple travel time segments with differing Facility Type codes/values are associated with a single reporting segment, the length-based predominant FacilityType code must be assigned.

NHS (National Highway System)

- For reporting segments from the travel time segments in NPMRDS without Item 71 (Travel Time Code), report NHS value from NPMRDS.
- For reporting segments determined from NPMRDS and where HPMS Data Item 71 (TravelTimeCode) has been reported, report NHS value as reported for HPMS Data Item 64 for the same data year.
- For reporting segments determined from “equivalent” data set, code appropriate value.
  If multiple travel time segments with differing NHS codes/values are associated with a single reporting segment, the length-based predominant NHS code must be assigned.

DIRAADT (Directional Annual Average Daily Traffic)

- The Annual Average Daily Traffic (AADT) for a given direction of travel, reported as a positive number (greater than zero). To be reported in units of an average number of vehicles rounded to the nearest integer.
- For reporting segments determined from NPMRDS and where HPMS Data Item 71 (TravelTimeCode) has not been reported, DIRAADT may be derived from AADT contained in the NPMRDS.
- For reporting segments where HPMS Data Item 71 (TravelTimeCode) has been reported, report DIRAADT value as reported for HPMS Data Item 21 for the same data year.
- If directional AADT changes within a reporting segment, a length-based weighted average of directional AADT must be computed and reported.

LOTTRAMP (AM Peak Level of Travel Time Reliability)

- The level of travel time reliability (LOTTR) metric for a reporting segment for the AM Peak. The AM Peak is between the hours of 6:00 a.m. and 10:00 a.m. for every weekday (Monday through Friday) from January 1st through December 31st of the same calendar year. The reported value for a reporting segment is the AM Peak 80th Percentile Travel Time (TTAMP80PCT) for that reporting segment divided by the AM Peak 50th Percentile Travel Time (TTAMP50PCT) for that

reporting segment, rounded to the nearest hundredth. For computing the LOTTRAMP metric, the travel time values for TTAMP50PCT and TTAMP80PCT should not be rounded. However, the reported TTAMP50PCT and TTAMP80PCT values must be in units of seconds rounded to the nearest integer.

TTAMP50PCT (AM Peak 50th Percentile Travel Time)

- The normal (50th percentile) travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the travel time in which 50 percent of the times are shorter in duration and 50 percent are longer in duration during the AM Peak for the entire calendar year. The AM Peak is between the hours of 6:00 a.m. and 10:00 a.m. each weekday. TTAMP50PCT values must be reported in units of seconds, rounded to the nearest integer.

TTAMP80PCT (AM Peak 80th Percentile Travel Time)

- The 80th percentile travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the travel time in which 80 percent of the times are shorter in duration and 20 percent are longer in duration during the AM peak for the entire calendar year. The AM Peak is between the hours of 6:00 a.m. and 10:00 a.m. each weekday. TTAMP80PCT values must be reported in units of seconds, rounded to the nearest integer.

LOTTRMIDD (Midday Level of Travel Time Reliability)

- The level of travel time reliability (LOTTR) metric for a reporting segment for the Midday. Midday is between the hours of 10:00 a.m. and 4:00 p.m. for every weekday (Monday through Friday) from January 1st through December 31st of the same calendar year. The reported value for a reporting segment is the Midday 80th Percentile Travel Time (TTMIDD80PCT) for that reporting segment divided by the Midday 50th Percentile Travel Time (TTMIDD50PCT) for that reporting segment, rounded to the nearest hundredth. For computing the LOTTRMIDD metric, the travel time values for TTMIDD50PCT and TTMIDD80PCT should not be rounded. However, reported TTMIDD50PCT and TTMIDD80PCT values must be in units of seconds, rounded to the nearest integer.

TTMIDD50PCT (Midday 50th Percentile Travel Time)

- The normal (50th percentile) travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the travel time in which 50 percent of the times are shorter in duration and 50 percent are longer in duration during the Midday for the entire calendar year. The Midday is between the hours of 10:00 a.m. and 4:00 p.m. each weekday. TTMIDD50PCT values must be reported in units of seconds, rounded to the nearest integer.

TTMIDD80PCT (Midday 80th Percentile Travel Time)

- The 80th percentile travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the travel time in which 80 percent of the times are shorter in duration and 20 percent are longer in duration during the Midday for the entire

calendar year. The Midday is between the hours of 10:00 a.m. and 4:00 p.m. each weekday. TTMIDD80PCT values must be reported in units of seconds, rounded to the nearest integer.

LOTTRPMP (PM Peak Level of Travel Time Reliability)

- The level of travel time reliability (LOTTR) metric for a reporting segment for the PM Peak. PM Peak is between the hours of 4:00 p.m. and 8:00 p.m. for every weekday (Monday through Friday) from January 1st through December 31st of the same calendar year. The reported value for a reporting segment is the PM Peak 80th Percentile Travel Time (TTPMP80PCT) for that reporting segment divided by the PM Peak 50th Percentile Travel Time (TTPMP50PCT) for that reporting segment, rounded to the nearest hundredth. For computing the LOTTRPMP metric, the travel time values for TTPMP50PCT and TTPMP80PCT should not be rounded. However, reported TTPMP50PCT and TTPMP80PCT values must be in units of seconds, rounded to the nearest integer.

TTPMP50PCT (PM Peak 50th Percentile Travel Time)

- The normal (50th percentile) travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the travel time in which 50 percent of the times are shorter in duration and 50 percent are longer in duration during the PM Peak for the entire calendar year. The PM Peak is between the hours of 4:00 p.m. and 8:00 p.m. each weekday. TTPMP50PCT values must be reported in units of seconds, rounded to the nearest integer.

TTPMP80PCT (PM Peak 80th Percentile Travel Time)

- The 80th percentile travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the travel time in which 80 percent of the times are shorter in duration and 20 percent are longer in duration during the PM Peak for the entire calendar year. The PM Peak is between the hours of 10:00 a.m. and 4:00 p.m. each weekday. TTPMP80PCT values must be reported in units of seconds, rounded to the nearest integer.

LOTTRWE (Weekend Level of Travel Time Reliability)

- The level of travel time reliability (LOTTR) metric for a reporting segment for the Weekend. Weekend is between the hours of 6:00 a.m. and 8:00 p.m. for every weekend day (Saturday and Sunday) from January 1st through December 31st of the same calendar year. The reported value for a reporting segment is the Weekend 80th Percentile Travel Time (TTWE80PCT) for that reporting segment divided by the Weekend Peak 50th Percentile Travel Time (TTWE50PCT) for that reporting segment, rounded to the nearest hundredth. For computing the LOTTRWE metric, the travel time values for TTWE50PCT and TTWE80PCT should not be rounded. However, reported TTWE50PCT and TTWE80PCT values must be in units of seconds, rounded to the nearest integer.

TTWE50PCT (Weekend 50th Percentile Travel Time)

- The normal (50th percentile) travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the travel time in which 50 percent of the times are shorter in duration and 50 percent are longer in duration during the Weekend for the

entire calendar year. The Weekend is between the hours of 6:00 a.m. and 8:00 p.m. each weekend day. TTWE50PCT values must be reported in units of seconds, rounded to the nearest integer.

TTWE80PCT (Weekend 80th Percentile Travel Time)

- The 80th percentile travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the travel time in which 80 percent of the times are shorter in duration and 20 percent are longer in duration during the Weekend for the entire calendar year. The Weekend is between the hours of 6:00 a.m. and 8:00 p.m. each weekend day. TTWE80PCT values must be reported in units of seconds, rounded to the nearest integer.

TTTRAMP (AM Peak Truck Travel Time Reliability)

- Truck travel time reliability (TTTR) metric for a reporting segment for the AM Peak. The AM Peak is between the hours of 6:00 a.m. and 10:00 a.m. for every weekday (Monday through Friday) from January 1st through December 31st of the same calendar year. The reported value for a reporting segment is the AM Peak 95th Percentile Truck Travel Time (TTTAMP95PCT) for that reporting segment divided by the AM Peak 50th Percentile Truck Travel Time (TTTAMP50PCT) for that reporting segment, rounded to the nearest hundredth. For computing the TTTRAMP, the travel time values for TTTAMP50PCT and TTTAMP95PCT should not be rounded. However, the reported TTTAMP50PCT and TTTAMP95PCT values must be in units of seconds rounded to the nearest integer.

TTTAMP50PCT (AM Peak 50th Percentile Truck Travel Time)

- The normal (50th percentile) truck travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the truck travel time in which 50 percent of the times are shorter in duration and 50 percent are longer in duration during the AM Peak for the entire calendar year. The AM Peak is between the hours of 6:00 a.m. and 10:00 a.m. each weekday. TTTAMP50PCT values must be reported in units of seconds, rounded to the nearest integer.

TTTAMP95PCT (AM Peak 95th Percentile Truck Travel Time)

- The 95th percentile truck travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the truck travel time in which 95 percent of the times are shorter in duration and 5 percent are longer in duration during the AM Peak for the entire calendar year. The AM Peak is between the hours of 6:00 a.m. and 10:00 a.m. each weekday. TTTAMP95PCT values must be reported in units of seconds, rounded to the nearest integer.

TTTRMIDD (Midday Truck Travel Time Reliability)

- The truck travel time reliability metric for a reporting segment for the Midday. Midday is between the hours of 10:00 a.m. and 4:00 p.m. for every weekday (Monday through Friday) from January 1st through December 31st of the same calendar year. The reported value for a reporting segment is the Midday 95th Percentile Truck Travel Time (TTTMIDD95PCT) for that reporting segment divided by the Midday 50th Percentile Truck Travel Time (TTTMIDD50PCT) for

that reporting segment, rounded to the nearest hundredth. For computing the TTTRMIDD metric, the travel time values for TTTMIDD50PCT and TTTMIDD95PCT should not be rounded. However, reported TTTMIDD50PCT and TTTMIDD95PCT values must be in units of seconds, rounded to the nearest integer.

TTTMIDD50PCT (Midday 50th Percentile Truck Travel Time)

- The normal (50th percentile) truck travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the truck travel time in which 50 percent of the times are shorter in duration and 50 percent are longer in duration during the Midday for the entire calendar year. The Midday is between the hours of 10:00 a.m. and 4:00 p.m. each weekday. TTTMIDD50PCT values must be reported in units of seconds, rounded to the nearest integer.

TTTMIDD95PCT (Midday 95th Percentile Truck Travel Time)

- The 95th percentile truck travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the truck travel time in which 95 percent of the times are shorter in duration and 5 percent are longer in duration during the Midday for the entire calendar year. The Midday is between the hours of 10:00 a.m. and 4:00 p.m. each weekday. TTTMIDD95PCT values must be reported in units of seconds, rounded to the nearest integer.

TTTRPMP (PM Peak Truck Travel Time Reliability)

- The truck travel time reliability metric for a reporting segment for the PM Peak. PM Peak is between the hours of 4:00 p.m. and 8:00 p.m. for every weekday (Monday through Friday) from January 1st through December 31st of the same calendar year. The reported value for a reporting segment is the PM Peak 95th Percentile Truck Travel Time (TTTPMP95PCT) for that reporting segment divided by the PM Peak 50th Percentile Truck Travel Time (TTTPMP50PCT) for that reporting segment, rounded to the nearest hundredth. For computing the TTTRPMP metric, the travel time values for TTTPMP50PCT and TTTPMP95PCT should not be rounded. However, reported TTTPMP50PCT and TTTPMP95PCT values must be in units of seconds, rounded to the nearest integer.

TTTPMP50PCT (PM Peak 50th Percentile Truck Travel Time)

- The normal (50th percentile) truck travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the truck travel time in which 50 percent of the times are shorter in duration and 50 percent are longer in duration during the PM Peak for the entire calendar year. The PM Peak is between the hours of 4:00 p.m. and 8:00 p.m. each weekday. TTTPMP50PCT values must be reported in units of seconds, rounded to the nearest integer.

TTTPMP95PCT (PM Peak 95th Percentile Truck Travel Time)

- The 95th percentile truck travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the truck travel time in which 95 percent of the times are shorter in duration and 5 percent are longer in duration during the PM Peak for the

entire calendar year. The PM Peak is between the hours of 4:00 p.m. and 8:00 p.m. each weekday. TTTPMP95PCT values must be reported in units of seconds, rounded to the nearest integer.

TTTROVN (Overnight Truck Travel Time Reliability

- The truck travel time reliability metric for a reporting segment for Overnight. Overnight is between the hours of 8:00 p.m. and 6:00 a.m. for every day (Sunday through Saturday) from January 1st through December 31st of the same calendar year. The reported value for a reporting segment is the Overnight 95th Percentile Truck Travel Time (TTTOVN95PCT) for that reporting segment divided by the Overnight Peak 50th Percentile Truck Travel Time (TTTOVN50PCT) for that reporting segment, rounded to the nearest hundredth. For computing the TTTROVN metric, the travel time values for TTTOVN50PCT and TTTOVN95PCT should not be rounded. However, reported TTTOVN50PCT and TTTOVN95PCT values must be in units of seconds, rounded to the nearest integer.

TTTOVN50PCT (Overnight 50th Percentile Truck Travel Time)

- The normal (50th percentile) truck travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the truck travel time in which 50 percent of the times are shorter in duration and 50 percent are longer in duration during the Overnight for the entire calendar year. The Overnight is between the hours of 8:00 p.m. and 6:00 a.m. each day. TTTOVN50PCT values must be reported in units of seconds, rounded to the nearest integer.

TTTOVN95PCT (Overnight 95th Percentile Truck Travel Time)

- The 95th percentile truck travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the truck travel time in which 95 percent of the times are shorter in duration and 5 percent are longer in duration during the Overnight for the entire calendar year. The Overnight is between the hours of 8:00 p.m. and 6:00 a.m. each day. TTTOVN95PCT values must be reported in units of seconds, rounded to the nearest integer.

TTTRWE (Weekend Truck Travel Time Reliability)

- The truck travel time reliability metric for a reporting segment for Weekend. Weekend is between the hours of 6:00 a.m. and 8:00 p.m. for every weekend day (Saturday and Sunday) from January 1st through December 31st of the same calendar year. The reported value for a reporting segment is the Weekend 95th Percentile Truck Travel Time (TTTWE95PCT) for that reporting segment divided by the Weekend Peak 50th Percentile Truck Travel Time (TTTWE50PCT) for that reporting segment, rounded to the nearest hundredth. For computing the TTTRWE metric, the travel time values for TTTWE50PCT and TTTWE95PCT should not be rounded. However, reported TTTWE50PCT and TTTWE95PCT values must be in units of seconds, rounded to the nearest integer.

TTTWE50PCT (Weekend 50th Percentile Truck Travel Time)

- The normal (50th percentile) truck travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the truck travel time in which 50

percent of the times are shorter in duration and 50 percent are longer in duration during the Weekend for the entire calendar year. The Weekend is between the hours of 6:00 a.m. and 8:00 p.m. each weekend day. TTTWE50PCT values must be reported in units of seconds, rounded to the nearest integer.

TTTWE95PCT (Weekend 95th Percentile Truck Travel Time)

- The 95th percentile truck travel time for a reporting segment, determined from the travel time data set (NPMRDS or equivalent), representing the truck travel time in which 95 percent of the times are shorter in duration and 5 percent are longer in duration during the Weekend for the entire calendar year. The Weekend is between the hours of 6:00 a.m. and 8:00 p.m. each weekend day. TTTWE95PCT values must be reported in units of seconds, rounded to the nearest integer.

PHED (Peak Hour Excessive Delay)

- The Total Peak Hour Excessive Delay metric is calculated to the nearest one hundredth of a person-hour. A State DOT is required to report PHED metric values if mainline highways on the NHS cross any part of an urbanized area with a population of more than 200,000 within its State geographic boundary and that urbanized area contains any part of nonattainment or maintenance areas for any one of the criteria pollutants (O_3, CO, PM_{10} or $PM_{2.5}$) listed under the National Ambient Air Quality Standards (NAAQS). PHED values must be reported in units of person-hours to the nearest thousandths.

OCCFAC (Occupancy Factor)

- Average vehicle occupancy associated with a reporting segment, reported as a positive number > 1, and rounded to the nearest tenth. This is an optional metric, and is required only if a State DOT does not elect to use the most recently available data tables published by FHWA for Travel Time Reliability measures.

METRICSOURCE (Travel Time Metric Data Source)

- The travel time data set used for reported metrics for the reporting segments is to be identified as either NPMRDS dataset or equivalent dataset. Code 1 for NPRMDS, or 2 for an equivalent date set.

Chapter 9: Sampling Procedures

The Sample Limits dataset stores the geographic limits for each State's sampled sections. This dataset and the Roadway Attribute datasets relate to each other through the ARNOLD Routes dataset, as described in Chapter 7. **The Sample Limits dataset shall be updated annually.**

9.1 Sample Limits

HPMS uses a sampling of all public roads not functionally classified as local roads or rural minor collectors to provide an expandable base to represent condition, use, and operational information for the nation's roadways. FHWA will dynamically assign Roadway Attribute data item values to the Samples, using the Sample Limits data provided by the States. The Sample Limits are to be updated annually, imported in a Pipe-delimited Character Separated Value (CSV) format. Table 22 describes the format for the dataset containing the geographic limits for each States' Samples. This dataset will be used to properly identify the sampled data contained within the Roadway Attributes datasets. Each relevant data item must be reported for the entire extent of a Sample's identified limits. Only Samples resulting from the random selection process discussed in this Chapter should be used.

Table 22: Sample Limits Table

Field Name	Data Type (characters)	Description	Valid Values
DataYear*	Date	Date at which the data becomes active.	YYYY
StateID*	Numeric (2)	State FIPS code	Up to two digits for the FIPS code**
RouteID*	VarChar (120)	Location reference ID for the linear feature	Up to 120 alpha-numeric digits that identify the route; this ID must be consistent with the Route ID in the State's LRS
BeginPoint*	Decimal (8,3)	Beginning milepoint	Identifies the point of origin for a given section, using a decimal value in thousandths of a mile
EndPoint*	Decimal (8,3)	Ending milepoint	Identifies the terminus point for a given section, using a decimal value in thousandths of a mile
SampleID	VarChar (12)	Sample Identifier	12-character unique ID
Comments	VarChar (100)	Comment for State use	Variable text up to 100 characters; this field is optional

*Primary Key **FIPS codes

9.2 The Table of Potential Samples

The Table of Potential Samples (TOPS) provides the universe of all valid sample sections from which States select Sample Limits for reporting to HPMS 9.0. The selection of roadway sections from the TOPS is referred to as the Sample Panel, and is stratified by a defined set of 12 traffic volume groups for rural, small urban, and urbanized areas (see Table 23). The TOPS is developed based on the geospatial intersection of a select group of data items (AADT, Functional System, Urban ID, Through Lanes, and Facility Type), where their respective values are homogenous for defined extents along a given route. Figure 101 provides an example of this process. After a State's Roadway Attribute data has been uploaded to the HPMS software, States will generate TOPS via tools in the Sample Management process screens. Once the TOPS has been established, Samples are selected at random from the TOPS (e.g. sections A, B, and C in Figure 101). Once the Sample Panel is chosen, the State must provide data for every Sample data item in the Sample Panel. A TOPS that is generated based on the data submitted in one year may be used in the next year for sampling purposes, except where there is a change in the limits for one or more of the required homogenous data items.

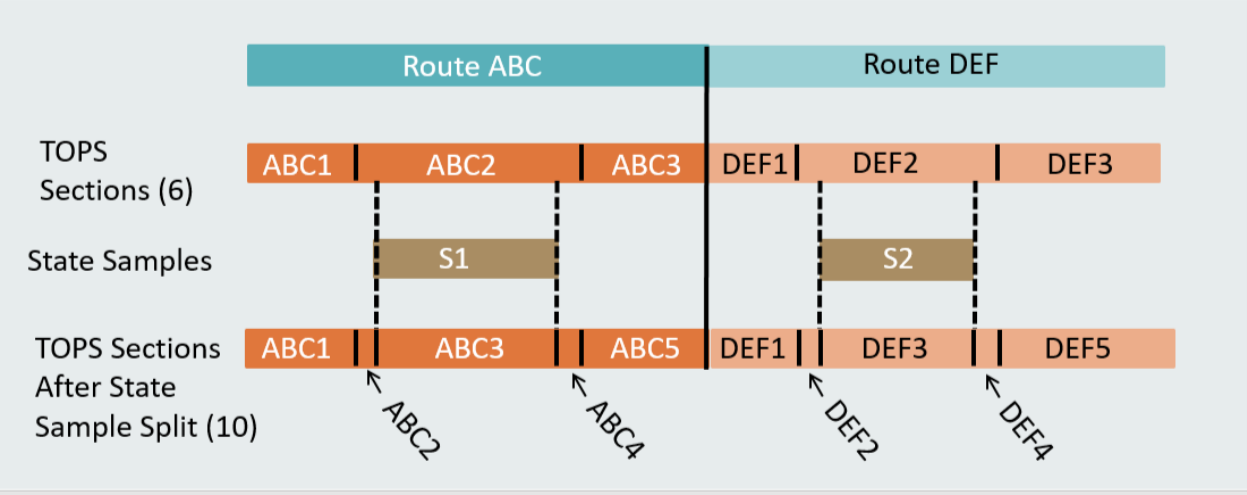
Table 23: Volume Group / AADT Range

Volume Group	AADT Ranges
1	Under 500
2	500 to 1,999
3	2,000 to 4,999
4	5,000 to 9,999
5	10,000 to 19,999
6	20,000 to 34,999
7	35,000 to 54,999
8	55,000 to 84,999
9	85,000 to 124,999
10	125,000 to 174,999
11	175,000 to 249,999
12	250,000 and more

Figure 101: TOPS Development Process

Other factors influencing TOPS beyond the 5 elements include ARNOLD Routes and Sample Limits, as illustrated below.

Figure 102: TOPS Additional Influences



Generally, it is not necessary that a Roadway Attribute data item record have the same begin and end points matching a section in the TOPS, provided that data for the required length of the Sample is accounted for. However, there are a select group of data items (Number of Signalized Intersections, Number of Stop Sign-Controlled Intersections, Number of At-Grade-Other Intersections, Curve Classification, and Grade Classification) for which the data item records must have begin and end points that align with the limits of a TOPS section.

Sample size requirements by functional system will vary by State according to the total number of TOPS sections, the number of volume groups, the validity of the State's AADT data, and a desired precision level. Precision level is the degree of accuracy attained from a statistical Sample. Table 24 provides the confidence interval and precision rates used for each functional class within each area type. As shown in the Table, the HPMS Sample size requirements (i.e. precision level) are more stringent for the principal arterial systems.

Table 24: Precision Levels

	Interstate	Other Freeways and Expressways	Other Principal Arterial	Minor Arterial	Major Collector	Minor Collector
RURAL	90-5	90-5	90-5	90-10	80-10	–
SMALL URBAN	90-5	90-5	90-5	90-10	80-10	80-10
URBANIZED < 200,000 population	80-10	80-10	80-10	80-10 or 70-15*	80-10 or 70-15 *	80-10 or 70-15 *

	Interstate	Other Freeways and Expressways	Other Principal Arterial	Minor Arterial	Major Collector	Minor Collector
URBANIZED ≥ 200,000 population	90-10	90-10	90-10	90-10	80-10	80-10

*These precision levels will be applied if a State has three or more urbanized areas with a population < 200,000.

The HPMS 9.0 software will calculate Sample size requirements for each volume group, using the desired precision level, using the following formula:

$$n = \frac{\left(\frac{Z^2C^2}{d^2}\right)}{1+\left(\frac{1}{N}\right)\left(\left(\frac{Z^2C^2}{d^2}\right)-1\right)}$$

Where:

n = Required Sample size

Z = Value of the standard normal statistic for an alpha confidence level (two-sided):

- If the confidence level is 90%, the value of *Z* is 1.645
- If the confidence level is 80%, the value of *Z* is 1.282
- If the confidence level is 70%, the value of *Z* is 1.040

C = AADT coefficient of variation from a State's AADT data: this is generated by the HPMS software using a State's Roadway Attributes data as inputs to standard statistical procedures.

d = Desired precision rate (from Table 24)

N = TOPS or population stratum size (number of TOPS sections available for sampling in a volume group)

9.3 Sample Adequacy

Each Sample section should be relatively homogeneous as to geometrics, traffic volume, cross-section, and condition, and should be long enough to constitute a logical section for National-level analysis purposes. FHWA recommends that:

- The length for a rural section should range from 0.3 to 10.0 miles.
- The length for a section that is an urban access-controlled facility typically should not exceed 5.0 miles.
- The length for all other urban sections should range from 0.1 to 3.0 miles.

These suggested lengths are intended to normalize the Sample data at a national level. Shorter sections

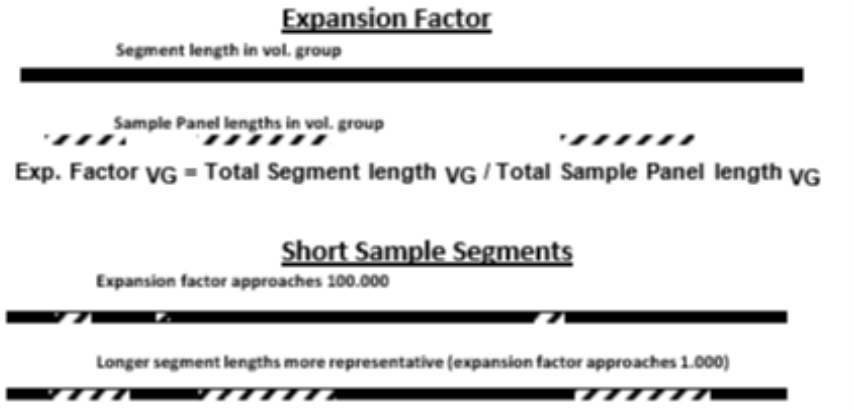
may be warranted where there are breaks in homogenous roadway elements. Conversely, longer sections reduce the number of TOPS sections and result in a somewhat smaller number of initial Samples. However, longer sections may need to be split in later years in order to maintain Sample homogeneity, which will increase the number of sampling units within the Sample Panel and may result in an increase in the required number of Samples. It is important to precisely document the exact location of each sampled section to ensure that yearly and cyclical updates, field reviews, and traffic counts are performed on the appropriate roadway sections.

Sample adequacy and maintenance is a process that should be integrated as part of the routine data management activities of the State throughout the year. The States will need to review their Sample Panel in the TOPS to determine any necessary adjustments and add new Sample sections (if needed) prior to the following HPMS submittal cycle. It is recommended that States do the following as part of their routine Sample maintenance:

- Provide a 5-10 percent Sample surplus per volume group
- Add/delete Samples as needed using a random process.
- Provide their Sample deletion plan to FHWA for the review of any significant deletions.
- Check for un-sampled, under-sampled, and over-sampled volume groups.
- Ensure a minimum of 3 Samples per volume group; Sample all TOPS sections if there are less than 3 Samples in a volume group.
- Maintain a maximum expansion factor of 100.000 (see explanation below).

An expansion factor is calculated for each of the 12 traffic volume groups within each functional system (except for local and rural minor collector) for rural, small urban, and urbanized areas. The HPMS software calculates this for each Sample section. This is accomplished by dividing the total length (in miles) of a particular group by the total Sample Panel length of that group's Samples. The more sampled miles in a group, the lower the expansion factor will be. States are encouraged to not exceed a maximum expansion factor of 100; otherwise, it is possible that the Sample Panel would be too sparse for adequate representation. States must avoid having no Sample in a given traffic volume group if mileage exists in the State, because then that volume group cannot be expanded and represented in modeling analysis. Figure 103 illustrates the Expansion Factor calculation, using the Roadway Attributes data and Sample Panel lengths, and the effect of excessively short Sample Panel length.

Figure 103: Expansion Factor



Both rural and small urban area data are to be sampled on a statewide basis and are stratified only by functional system and volume group. Urbanized area data are also to be sampled for each individual urbanized area. In multi-State urbanized areas, each State must sample its own portion of the urbanized area. The volume group for each roadway section in the sampling frame will be identified in the HPMS software. Sections should be selected randomly within each volume group for a given functional system, until the required number of Samples is reached. The HPMS software can assist in identifying the potential Sample sections using GIS-based spatial analysis procedures. A minimum of three Sample sections are required for each volume group. If less than three TOPS sections exist in a volume group, then it is recommended that they all be sampled.

9.4 Sample Maintenance

Sample reviews should be performed annually as part of the State's maintenance activities. This review should be completed shortly after the final submittal/extraction of the HPMS datasets and before data collection activities begin the following year, so that deficiencies can be addressed prior to the next HPMS data submission cycle. When conducting a Sample review, State's should ensure Sample adequacy requirements by functional system, volume group, and area are being met. The State should also check on the presence of Sample biases that may have been introduced. Common Sample bias considerations include State versus non-State-owned roads or sub-area by highway district, county, or non-random selection of adjacent roadway sections. A comparison of the number of miles sampled by ownership or jurisdiction may reveal such biases. Reviewing Samples spatially may also help reveal clustering along facilities or within subareas.

Besides eliminating Sample bias, there are a variety of other reasons why the Sample Panel may need to be adjusted. Some common reasons include: the decennial census may have changed the number or boundaries of small urban or urbanized areas; functional (re)classification of new or existing roadways may have occurred; or, migration of sections among and between traffic volume groups may be taking place. Conducting an annual Sample review provides the State a regular opportunity to stay on top of these changing conditions. Table 25 provides an overview of common conditions which generally require changes to the Sample Panel, as well as recommendations for how to address these conditions.

In making Sample Panel adjustments, the State should utilize the tools available in the HPMS software. The HPMS software will generate the TOPS and calculate the number of Samples needed in each volume group for the State. The State can easily compare the number of Samples needed against the number of existing Samples. Outside of the HPMS software, States can conduct spatial evaluations of their Sample Panel, such as a review of potential Sample sections in a given district or state subregion.

Significant deletions of Samples should be approved by FHWA prior to the actual deletion of the Samples. The deleting of Samples may occur for a variety of reasons, such as the abandonment of a roadway, or the reclassification of a roadway to a lower functional classification. Reducing oversampling in a volume group is probably the most common reason for the deletion of Samples, and this is considered a normal component of Sample maintenance. However, before proceeding with a sample reduction exercise, States should prepare a Sample reduction plan and provide it to the FHWA for review. The Sample reduction plan should include a list of the Sample ID numbers with reasons for deletion. In addition, the plan should ensure that:

- Sample size requirements are being met for each functional system and volume group and area type;
- AADT is updated annually for correct volume group assignment;
- at least three Sample sections remain in any volume group;
- potential deletions are being chosen randomly;
- trends of Sample Panel migration among volume groups are examined (volume groups that continually lose Samples may warrant retaining a surplus);
- an expansion factor maximum of 100 should be observed; and,
- if the HPMS database is being used by the State for other purposes, there may be a need to retain the surplus Samples.

When reviewing Samples during the annual review, the sections should be analyzed to see if they are excessively short or long in length. Short Samples not meeting minimum length recommendations should be lengthened into longer Sample sections if possible while still meeting homogeneity requirements. In cases where the TOPS still does not provide sufficient Sample lengths, AADT should be examined at the source data to see if it can be re-calculated to produce extended Sample section lengths still meeting homogeneity requirements. However, Samples do not need to be as long as the associated TOPS section, provided they meet minimum length recommendations. For example, long Samples can be reduced in length by subdividing a TOPS section, so long as minimum length recommendations continue to be met. If no data item changes in value over an excessively long section, there is no need to subdivide the section for HPMS purposes.

When updating the Sample Panel, any change in length of the Sample requires an update of the expansion factors. Expansion factors should be recalculated before the next HPMS extraction to ensure that all changes to AADT data have been properly accommodated. Expansion factor recalculation occurs automatically in the HPMS software when changes are made to the Sample Panel.

Table 25: Sample Panel Change Cause / Recommendation

	CAUSE	RECOMMENDATION
Census-Related	New Small Urban Areas (Rural to Small Urban)	Adjust all rural Sample Panel records within the new area to urban requirements. Verify statewide rural and small urban area Sample and Full Extent bases and select additional Samples as necessary.
	New Urbanized Areas (Small Urban and/or Rural to Urbanized)	Adjust all rural and small urban area Sample Panel records within the new area to urbanized area requirements. Procedures for drawing new standard Samples for individual panels are discussed above. Verify all Sample Panel and Full Extent bases and select additional samples as necessary.
	Expansion of the Adjusted Boundaries of Small Urban or Urbanized Areas (Rural to Small Urban and Rural and/or Small Urban to Urbanized)	Adjust all affected rural Sample Panel records to urban requirements. Verify all affected Sample Panel and Full Extent bases and select additional Samples as necessary.
	Functional System Reclassification-Any Area	Reassign reclassified sections (TOPS and Sample Panel) to appropriate areas and volume groups. Sample new sections as necessary to maintain required volume group precision levels.

	CAUSE	RECOMMENDATION
	Losses in Urban Population	No action until Census area designation changes.
	Major Revision of Boundaries Based on New Census	Redraw Sample Panel and include old Samples, if possible.
	Changes or Additions to Maintenance Area(s).	Updates to the Samples are made based on the procedures outlined in this chapter.
Non-Census-Related	New Length by Functional System	Verify Sample Panel and Full Extent base; sample new sections, if necessary.
	Functional System Reclassification in Any Area	In addition to the movement of sections because of reclassification, there may be a need for possible volume group changes for TOPS and/or Sample Panel sections, precision level changes, and additional Samples.
	AADT Changes	Reassign Sample sections but no further action is needed if changes are minor. If changes are major, verify volume group Sample Panel and Full Extent bases for all affected volume groups and add Samples, if necessary.
	Sample Limits Modification	Recalculate expansion factor values for Sample Panel records in the affected group.