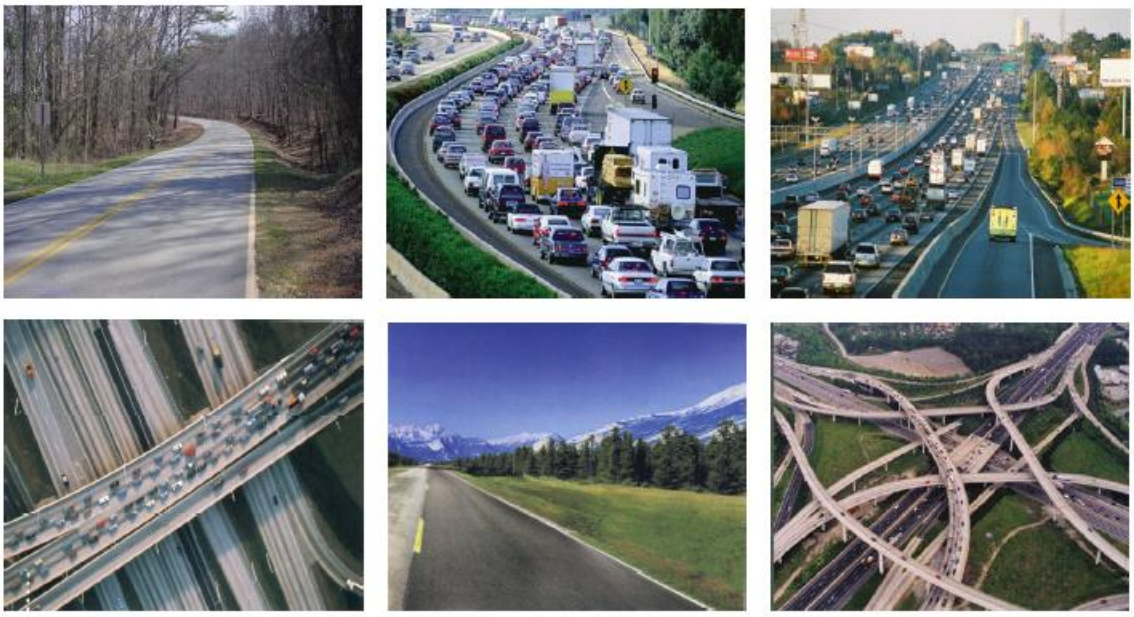
Highway Performance Monitoring System

Field Manual



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Chapter 1 INTRODUCTION

1.1 Background

The Federal Highway Administration (FHWA) is responsible for assuring that adequate highway transportation data and systems performance information is available to support its functions and responsibilities, as well as those of the Administration and United States Congress.

A biennial Conditions & Performance report of the future highway investment needs of the nation is mandated by Congress (23 U.S.C. 502(h)). The Highway Performance Monitoring System (HPMS) data are used for assessing highway system performance under the U.S. DOT and FHWA's strategic planning and performance reporting process in accordance with requirements of the Government Performance and Results Act (GPRA, Sections 3 and 4) and for apportioning Federal-aid highway funds in accordance with title 23, U.S.C. To address these needs, the HPMS was first developed in 1978 as a national highway transportation information program.

This *HPMS Field Manual* provides a comprehensive overview of the HPMS program, and describes in detail the data collection and reporting requirements for HPMS. The requirements outlined in the *Field Manual* are authorized under 23 U.S.C. 315, which places the authority on the Secretary of Transportation for National management decisions affecting transportation. In addition, The United States Code of Federal Regulations (CFR) title 23, §1.5 provides the Federal Highway Administrator with authority to request such information deemed necessary to administer the Federal-aid highway program. Also, 23 CFR 420.105(b) requires the States to provide data that support FHWA's responsibilities to the Congress and the public. The *HPMS Field Manual* is a valuable resource that guides the States as they address their HPMS data collection and reporting responsibilities. This manual includes detailed information on technical procedures, a glossary of terms, and various tables to be used as reference by those collecting and reporting HPMS data. Information related to the use of the HPMS software web application is contained in a stand-alone document.

1.2 Scope of the HPMS

The HPMS is a national program that includes inventory information for all of the Nation's public roads as certified by the States' Governors annually. All roads open to public travel are reported in HPMS regardless of ownership, including Federal, State, county, city, and privately owned roads such as toll facilities. Each State is required to annually furnish all data per the reporting requirements specified in this *HPMS Field Manual*. The District of Columbia and the Commonwealth of Puerto Rico are treated as States for HPMS reporting purposes. 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 limited HPMS summary data only, in addition to the separate reporting of certified public road mileage.

Public road mileage certifications are due no later than June 1st of each year to FHWA Headquarters, Office of Highway Policy Information (HPPI). FHWA Field Division Offices are free to set an earlier date. The certifications shall be provided in an electronic format via email sent to the FHWA Office of Highway Policy Information official electronic mailbox (HPInfoMail@dot.gov). The requirements for submitting the public road mileage are in accordance with CFR 23, Part 460.3; see http://www.fhwa.dot.gov/policy/ohpi/prmcguidance.cfm. HPMS uses the certified public road mileage as a control total for the mileage in each State.
HPMS requires more detailed information for the National Highway System (NHS), which is a network of the most highways concerning the nation's economy, defense, and mobility. The NHS was first designated on

November 28, 1995 and expanded on October 1, 2012, to include principal arterial routes but the processes to update functional classification and NHS designation remain separate. Note that although ramps may be part of the NHS, the NHS data in HPMS does not cover ramps except for five data items: Functional System, Urban Code, Facility Type, Through Lanes, and AADT.

1.3 Uses of HPMS Data

HPMS is the official Federal government source of data on the extent, condition, performance, use, and operating characteristics of the nation's highways. HPMS data are used for assessing and reporting highway system performance under FHWA's strategic planning process. HPMS data also form the basis of the analyses that support the *Conditions and Performance (C&P) Report to Congress* and are the source for a substantial portion of the information published in the annual *Highway Statistics* publication and in other FHWA publications including information that is reported to the media. HPMS data are used to calculate following performance measures:

- Rate of fatalities in 23 CFR 490.207(a)(2);
- Rate of serious injuries in 23 CFR 490.207(a)(2);
- Percentage of pavements of the Interstate System in Good condition in 23 CFR 490.307(a)(1);
- Percentage of pavements of the Interstate System in Poor condition in 23 CFR 490.307(a)(2);
- Percentage of pavements of the non-Interstate NHS in Good condition in 23 CFR 490.307(a)(3); and
- Percentage of pavements of the non-Interstate NHS in Poor condition in 23 CFR 490.307(a)(4).

Additionally, the HPMS is used for reporting metrics with respect to targets for established performance measures per 23 CFR 490. Finally, the HPMS data are widely used throughout the transportation community, including other governmental entities, business and industry, institutions of higher learning for transportation research purposes, and the general public. The HPMS data may also be used for performance measurement purposes in National, State and local transportation decision-making to analyze trade-offs among the different modes of transportation as part of the metropolitan and statewide transportation planning process.

FHWA has identified measures (23 CFR 490) for the States to assess pavement conditions that will be used to establish performance targets for pavement condition on roadways that are located on the National Highway System (NHS). In addition, FHWA has set a minimum condition level for pavement condition on Interstate roadways (23 CFR 490.315) that States will be required to meet under 23 U.S.C. 119(f)(1). FHWA will use HPMS data for assessing States' minimum pavement condition level for the Interstate System on an annual basis (23 CFR 490.317) and will use HPMS data for determining States' significant progress towards pavement condition targets biennially (23 CFR 490.109).

Certain data items within HPMS including length, lane-miles, and travel are required for all public roads that are eligible for Federal-aid highway funds. These three data items in particular are used in the apportionment of Federal-aid highway funds. The data items reported for all Federal-aid eligible roads are known as Full Extent data items.

In addition to Full Extent data items, there are data items that are reported on a partial extent basis, which are known as Sample Panel data items. The Sample Panel provides more detailed statistical data on a randomly selected sample of roadway sections in the State's public road system. Finally, there is a set of summary data included in the HPMS system known as Summary data items. The summary data are reported in aggregate form, for roadways functionally classified as minor collectors in rural areas and local roads in any area. Table 1.1 contains information on the source of selected length, lane-mile, and travel data from the HPMS data set.

Table 1.1 Minimum Data Reporting for Selected HPMS Products

RURAL

HPMS Product	Federal-Aid				Non-Federal-Aid	
	National Highway System (NHS)	Non-National Highway System (non-NHS)				
	Interstate & Non-Interstate	Other Freeways & Expressways and Other Principal Arterials	Minor Arterial	Major Collector	Minor Collector	Local
Miles	Full Extent	Full Extent	Full Extent	Full Extent	Summary	Summary
Lane-Miles	Full Extent	Full Extent	Full Extent	Full Extent	Summary 1/	Summary 1/
Total VMT	Full Extent	Full Extent	Full Extent	Full Extent	Summary 2/	Summary 2/
Truck VMT	Full Extent	Sample Panel	Sample Panel	Sample Panel	Summary	Summary
International Roughness Index (IRI)	Full Extent	Full Extent	Sample Panel	Optional		
Total Public Road Miles	Certified Mileage ----------					

URBAN

HPMS Product	Federal-Aid					Non-Federal- Aid
	National Highway System (NHS)	Non-National Highway System (non-NHS)				
	Interstate Non-Interstate	Other Freeways & Expressways and Other Principal Arterials	Minor Arterial	Major Collector	Minor Collector	Local
Miles	Full Extent	Full Extent	Full Extent	Full Extent	Full Extent	Summary
Lane-Miles	Full Extent	Full Extent	Full Extent	Full Extent	Full Extent	Summary 1/
Total VMT	Full Extent	Full Extent	Full Extent	Full Extent	Full Extent	Summary 2/
Truck VMT	Full Extent	Sample Panel	Sample Panel	Sample Panel	Sample Panel	Summary
International Roughness Index (IRI)	Full Extent	Full Extent	Optional	Optional	Optional	
Total Public Road Miles	Certified Mileage ----------					

1/ Data for Lane-Miles on Rural Minor Collector, and Local roads are calculated using Summary miles times 2. Since the States are not required to report the number of through lanes on these systems, except for NHS sections, FHWA uses a multiplier of 2 for the number of lanes, to be consistent across all States.
2/ Data reported for Total VMT on Rural Minor Collector and Local roads are provided at a summary level of detail. States are not required to report section level AADT on these systems, except for NHS sections.

Full Extent Data: Reported for an entire roadway system or systems.
Sample Panel Data: Reported for defined sample sections associated with the Federal-aid roadway system.
Summary Data: Reported in aggregate for defined areas and/or roadways functionally classified as rural minor collector or local.

1.4 HPMS Staff Roles and Responsibilities

The annual provision of HPMS data is a cooperative effort between State Departments of Transportation (DOTs), local governments, and metropolitan planning organizations (MPOs) working in partnership to collect, assemble, and report the necessary information. The process resulting from this relationship is depicted in Figure 1.1. In consultation with its HPMS partners, stakeholders, and customers, FHWA identifies the data to be reported and provides data definitions and standards. FHWA develops and maintains web-based applications, analytical models and techniques that FHWA and various State DOTs use in conjunction with HPMS data to conduct policy-level, corridor-level, and subarea planning analysis and programming. Taken together, these activities support informed highway planning, policy development, and decision-making at the Federal and State levels.

Within each DOT, the responsibilities for collecting and reporting HPMS data is generally a cooperative process between a central office, which prepares, analyzes, and submits HPMS data on behalf of the State, and other district or regional offices responsible for field data collection activities, including roadway inventory, and traffic and pavement data collection. To help facilitate this effort, this manual provides guidance to the States in support of their field data collection activities for HPMS.

The required State and sub-State coordination is exemplified by the process to prepare a geospatial file for each HPMS submission. Because the necessary geospatial file must be maintained in such a way that it easily links to information about condition, performance, use and operating characteristics of Federal-aid system roadways, DOT staff must work closely and coordinate with State GIS, road inventory, traffic and pavement staff.

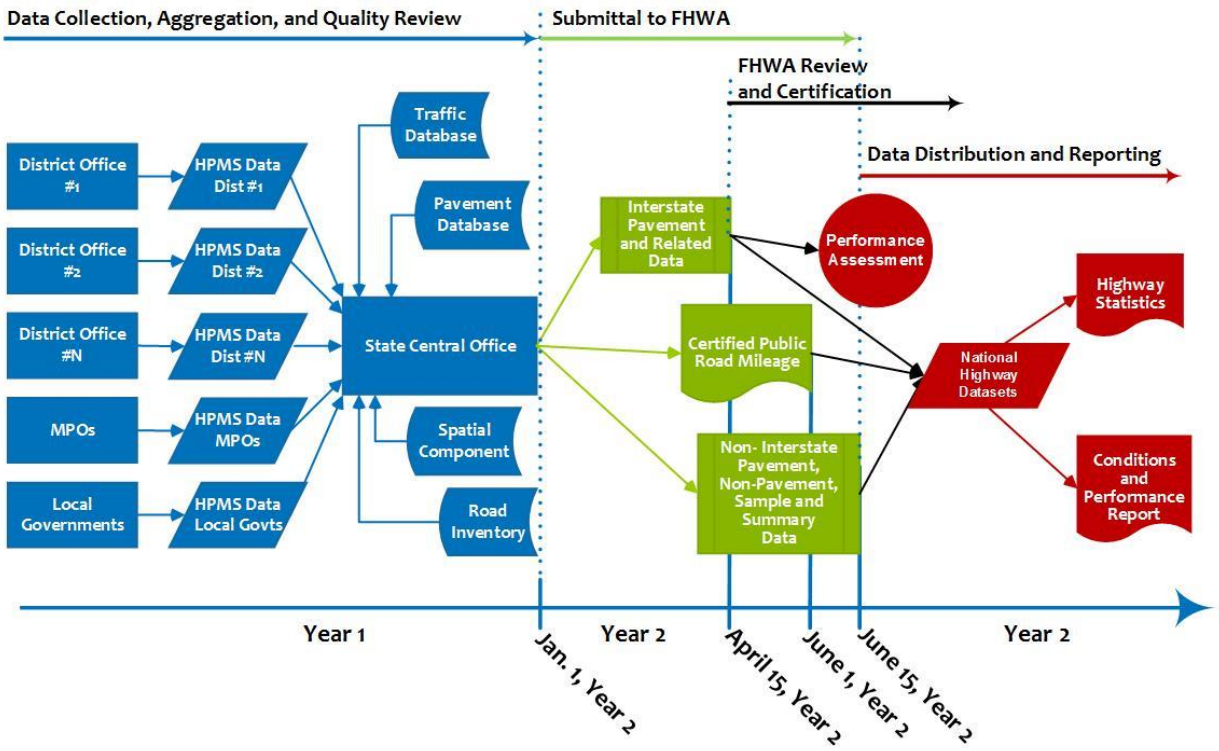
The process of coordinating these activities is usually performed under the direction of an HPMS Manager or HPMS Coordinator within each State DOT. This person serves as the primary liaison with the FHWA on all matters related to the preparation and submittal of the State's HPMS submittal.

After each State has submitted their HPMS data, it is the responsibility of the FHWA Office of Highway Policy Information (OHPI) to integrate each submittal into the national HPMS database. The HPMS database then becomes the source of information provided in the *Conditions and Performance (C&P) Report to Congress* on a biennial basis.

The HPMS submittal from the State represents the condition of the road network as of December 31st of each year. Moreover, annual data collection activities are to be performed during the calendar year (i.e., January through December) prior to the reporting year (e.g., data collected up to December 31st 2015 would be used for reporting in 2016). 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. In order to allow time for States to integrate pavement and traffic related data, which requires additional time for processing and analysis, the phased HPMS submittal is due to FHWA beginning on April 15th of the following year.

Figure 1.1 illustrates a potential workflow for the process and roles involved in the preparation of a State's HPMS data submittal.

Figure 1.1 Suggested State HPMS Processing Cycle



1.5 Reporting Requirements

Each State is required to prepare an annual submittal of HPMS data in accordance with the procedures, formats, and codes specified in this manual. This data submittal must represent the condition and performance of the road network as of December 31st of each year. In order to ensure that FHWA has sufficient time to process and analyze data for annual pavement performance reporting purposes, the initial HPMS submittal is due to FHWA by April 15th of the year following the data collection year. For example, Interstate pavement data and related data elements collected from January 1st 2016 through December 31st 2016 must be submitted (to FHWA) by April 15th 2017.

Each State should also assure that there is an agreement between the Certified Public Road Mileage and the total public road system extent (in miles) reported to FHWA via HPMS. Data from the current inventory year (i.e., year of data collection) will be reported in HPMS unless otherwise noted. For the most part, actual values are to be reported for the various roadway attributes (i.e., Sections data) that are collected in HPMS. However, factored or estimated data is permissible where specified in this manual for specified attribute data. Each State is to include, as part of the annual submittal, their Linear Reference System (LRS), which enables the attribute data to be represented in a geospatial format. If a State uses more than one LRS for their own purposes, it is necessary for the State to designate one LRS to be used for Federal reporting purposes. This Federal reporting LRS is the one that should be maintained and submitted annually as part of the HPMS submittal.

HPMS Submission Deadlines

The tiered HPMS submission process is depicted in Figure 1.1. Submission deadlines begin with Interstate pavement and other related data items on April 15th (HPMS Submission 1), followed by the Certified Mileage on June 1st. Non-Interstate pavement, non-pavement, sample, and summary data are due to be submitted on June 15th (HPMS Submission 2).

Moreover, the following pavement condition-related data must be reported by April 15 of the year following the data inventory year: Sections data for Functional System (Data Item 1 in Section 4.2), Urban Code (Data Item 2 in Section 4.2), Facility Type (Data Item 3 in Section 4.2), Structure Type (Data Item 4 in Section 4.2), Through Lanes (Data Item 7 in Section 4.2), IRI (Data Item 47 in Section 4.2), Surface Type (Data Item 49 in Section 4.2), Rutting (Data Item 50 in Section 4.2), Faulting (Data Item 51 in Section 4.2), Cracking Percent (Data Item 52 in Section 4.2), NHS (National Highway System) (Data Item 64 in Section 4.2) and a dual-carriageway, LRS-enabled, geospatial Routes dataset (Section 3.3). See Chapter 4, Sec. 4.3 and 4.4 for details on data item-specific collection and reporting requirements.

HPMS Component Data Sets

The data required for the annual submittal of HPMS includes: (1) limited data on all public roadway sections, which includes the Federal-aid system (i.e., Full Extent data), (2) more detailed data for designated sections of the Federal-aid system (i.e., Sample Panel data), and (3) area-wide summary information primarily for lower functional system roads (i.e., Summary data).

- **Full Extent Data**

  Full Extent Data refers to a limited set of data items that are reported for an entire roadway system such as the National Highway System (NHS) or an entire functional system (e.g., Interstate roadways).

- **Sample Panel Data**

  Sample Panel Data consists of data items that are reported for a select portions of of a given roadway system. The sampled sections are a fixed sample panel of roadway sections that are monitored from year to year and, when expanded, represent the Full Extent of the systems that are sampled. The more detailed information collected for a Sample Panel section is used to represent similar conditions on the associated functional system after expansion.

- **Partial Extent Data**

  Partial Extent Data refers to those data items that are reported on a Full Extent basis for some functional systems and on a Sample Panel basis for other functional systems.

- **Statewide Summary Data**

  Statewide Summary Data includes information on travel, system length, and vehicle classification by functional system and area type, in addition to land area and population by area type. The area types include rural, small urban, and individual urbanized, non-attainment, and maintenance areas. Pollutant type is also reported as indicators of air quality in non-attainment areas.

Linear Referencing System (LRS) Data

LRS data provides a spatial reference for the Full Extent and Sample Panel data on selected highway functional systems. This spatial data coupling (i.e. representing roadway attribute data in a spatial format) enables the analysis of HPMS data in a GIS environment. Within the HPMS software, the State-provided LRS represents all roadways in a given State's road network for a designated set of functional classifications.

HPMS Regulations

Regulations governing the FHWA State Planning and Research (SPR) funded work programs [23 Code of Federal Regulations (CFR), Part 420] outline responsibilities for furnishing FHWA adequate information for administering the Federal-aid highway program. Maintaining a valid HPMS database is an item of national significance and items of national significance must be adequately addressed in each State's annual work program. This extends beyond the simple reporting of data each year and includes taking actions to assure that all data are complete, current, and accurate. Although there may be other participants in the collection and reporting process, the ultimate responsibility for the accuracy and timely reporting of HPMS data lies with the State highway agency.

The submission of false data is a violation of the United States Code (U.S.C.), Title 18, Section 1020.

The annual HPMS submittal is to be transmitted to FHWA via a web-based HPMS application. The HPMS software web application, to be used by the States, can be accessed via the Office of Highway Policy Information homepage at: http://www.fhwa.dot.gov/policyinformation/. Questions pertaining to the annual submittal should be directed to The Office of Highway Policy Information at 202-366-0175.

Chapter 2 HPMS CORE COMPONENTS

2.1 Overview

The HPMS process is designed to be a cooperative effort between the States and the Federal Highway Administration (FHWA). Chapter 1 described the background of the HPMS program and discussed the scope and uses of the national database. The roles and responsibilities of the States and FHWA regarding HPMS were also presented in the previous chapter. This chapter focuses on the States' responsibilities for collecting the HPMS data and discusses the way in which the data will be used to support the core components of HPMS.

There are three sources of data for the national HPMS database. These include:

1 - Data that are to be developed and supplied by the States

2 - Data that are obtained by FHWA from other non-State sources

3 - Data that are generated or calculated by FHWA

Data that are to be maintained by FHWA are done so in both geospatial and non-geospatial formats, and is available for use by the States for research and analysis, or to help States as they prepare their HPMS submittal. Data that are generated by FHWA are created during the submittal process, and are discussed in Chapter 4 of this manual. Since the purpose of this manual is to assist the States with their data collection and reporting activities, the remainder of this chapter focuses on the types of data that are to be supplied by the States.

The States are responsible for providing the following types of data to FHWA: Full Extent, Sample Panel, Summary, Estimates, and Metadata. The geospatial component of the HPMS data model links the data from these categories to a geographic location on each State's respective linear referencing system (LRS) network. More information on the geospatial component of the data model can be found in Chapter 3 of this manual.

2.2 Full Extent Data

Within the context of the HPMS system, some data elements must be reported for their full extent (i.e. system-wide). The Full Extent network consists of the National Highway System (NHS) routes (including intermodal connectors) and all other roads, excluding those functionally classified as minor collectors in rural areas and local roads in any area.. Data elements that are reported for these types of roads are referred to as Full Extent data items. For some data items, the Full Extent's coverage also includes ramps associated with grade-separated interchanges for which a limited number of Full Extent data items are to be reported.

2.3 Sample Panel Data

Within the extent of all Federal-aid eligible roads, a random selection of roadway sections is used to represent various attributes at a system-wide level for the purposes of assessing the performance and condition of the network. This process helps to reduce any burden that may be imposed on the States to perform data collection to meet their HPMS reporting requirements. These sections of the network are referred to as Sample Panel sections. Moreover, the Sample Panel sections are selected randomly and are intended to give a statistically valid representation of the State's road network. Due to the structure of the HPMS data model (discussed in

Chapter 3), the States are not required to extract the Sample Panel data items, as long as the data in their submittal covers the Sample Panel. States are encouraged to submit their entire dataset for each data item. FHWA will dynamically assign values to the Sample Panel sections, using the data provided by the States. This should help to lessen the data processing burden on States that are currently collecting more than the minimum coverage. Additional information on the Sample selection process is provided in Chapter 6.

2.4 Data Items Required for the Full Extent and/or Sample Panel Sections

The data items listed in Table 2.1 are to be submitted as part of the Sections dataset, which will be stored as a table within FHWA's database. Detailed information for these data items is provided in Chapter 4.

- **Item Number** is the number assigned to each data item
- **Data Item** identifies the type of attribute data to be reported
- **Extent** indicates if the data item is required for the Full Extent (FE), Sample Panel (SP) sections, or the Full Extent and Ramp sections (FE+R)

Table 2.1 Data Items to be Reported

Data Item Type	Item Number	Data Item	Extent	
Inventory	1	Functional System	FE + R	
	2	Urban Code	FE + R	
	3	Facility Type	FE + R	
	4	Structure Type	FE**	
	5	Access Control	FE*	SP*
	6	Ownership	FE	
	7	Through Lanes	FE + R	
	8	Managed Lane Operations Type	FE**	
	9	Managed Lanes	FE**	
	10	Peak Lanes		SP
	11	Counter Peak Lanes		SP
	12	Right Turn Lanes		SP
	13	Left Turn Lanes		SP
	14	Speed Limit		SP
	15	Toll Charged	FE**	
	16	Toll Type	FE**	
Route	17	Route Number	FE*	
	18	Route Signing	FE*	
	19	Route Qualifier	FE*	
	20	Alternate Route Name	FE	

Data Item Type	Item Number	Data Item	Extent	
Traffic	21	Annual Average Daily Traffic	FE + R	
	22	Single-Unit Truck & Bus AADT	FE*	SP*
	23	Percent Peak Single-Unit Trucks & Buses		SP
	24	Combination Truck AADT	FE*	SP*
	25	Percent Peak Combination Trucks		SP
	26	K-factor		SP
	27	Directional Factor		SP
	28	Future AADT		SP
	29	Signal Type		SP
	30	Percent Green Time		SP
	31	No. of Signalized Intersections		SP
	32	No. of Stop Sign-Controlled Intersections		SP
	33	No. of Intersections, Type - Other		SP
Geometric	34	Lane Width		SP
	35	Median Type		SP
	36	Median Width		SP
	37	Shoulder Type		SP
	38	Right Shoulder Width		SP
	39	Left Shoulder Width		SP
	40	Peak Parking		SP
	41	Widening Obstacles		SP
	42	Widening Potential		SP
	43	Curve Classification		SP*
	44	Terrain Type		SP
	45	Grade Classification		SP*
	46	Percent Passing Sight Distance		SP
Pavement	47	International Roughness Index (IRI)	FE*	SP*
	48	Present Serviceability Rating (PSR)	FE***#	SP*
	49	Surface Type	FE***	SP
	50	Rutting	FE***	SP
	51	Faulting	FE***	SP
	52	Cracking Percent	FE***	SP
	54	Year of Last Improvement		SP
	55	Year of Last Construction		SP

Data Item Type	Item Number	Data Item	Extent	
	56	Last Overlay Thickness		SP
	57	Thickness Rigid		SP
	58	Thickness Flexible		SP
	59	Base Type		SP
	60	Base Thickness		SP
	61	Climate Zone		SP
	62	Soil Type		SP
Inventory	63	County Code	FE	
Special Networks	64	National Highway System (NHS)	FE**	
	65	Strategic Highway Network (STRAHNET)	FE**	
	66	National Truck Network (NN)	FE**	
	67	Future Facility (Planned/Unbuilt NHS)	FE**	
Inventory	68	Maintenance and Operations	FE	
Traffic	69	Capacity		SP
Inventory	70	Directional Through Lanes	FE****#	

FE = Full Extent for all functional systems (including State and non-State roadways)
FE* = Full Extent for some functional systems, (see Chap. 4, Sec. 4.4 for more details)
FE** = Full Extent wherever data item is applicable, (see Chap. 4, Sec. 4.4 for more details)
FE*** = Full Extent for all NHS roadways (including State and non-State roadways)
FE***# = (Optional) Full Extent for NHS roadways (including State and non-State roadways)
FE****# = (Optional) Full Extent for Interstate roadways (including State and non-State roadways)
FE + R = Full Extent including ramps located within grade-separated interchanges
SP = All Sample Panel Sections (as defined by HPMS)
SP* = Some Sample Panel Sections (see Chap. 4, Sec. 4.4 for more details)

2.5 Summary Data

The summary data are intended to provide general information on the use, extent, condition, and performance of the public roads, particularly on the lower functional systems (minor collectors in rural areas and local roads in any area). For example, non-Federal-aid roads do not require section-level detail and can be summarized from State and local sources. These sources include statewide highway databases, inventory management systems, Intelligent Transportation Systems (ITS), traffic monitoring systems, and data made available from local governments and Metropolitan Planning Organizations (MPOs).

The type of data reported in the summary data includes travel, system length, and vehicle classification by functional system and area type, in addition to land area and population by area type. The area types include rural, small urban, and individual urbanized, non-attainment, and maintenance areas. Pollutant type is also reported as an indicator of air-quality in non-attainment areas.

The following summaries are to be reported as five individual datasets, which will be stored as tables within FHWA's database:

1 - Statewide Summaries

2 - Vehicle Summaries

3 - Urban Summaries

4 - County Summaries

5 - NAAQS Summaries

Statewide Summaries

This summary contains information about population, land area (in thousands), and system length (in miles) as it pertains to rural areas, and daily travel (vehicle-miles traveled (VMT) in thousands) with respect to small urban areas. The data for the extent of the road network are further subdivided by the extent of paved and unpaved roads in the rural and small urban areas.

Vehicle Summaries

This summary contains travel activity data summarized by vehicle type and highway system group. The highway system group includes six categories: the first three for rural roads and the last three for urban roads. Each of these categories represents the group for which travel by vehicle type is summarized.

Urban Summaries

This summary contains information about travel, population, and land area for roads functionally classified as local, for each adjusted urbanized area.

County Summaries

This summary contains system length data by county for all roads functionally classified as minor collectors in rural areas and local roads in any area. Any National Highway System (NHS) routes on these roads are also included in this summary for each county. This summary also includes information about the ownership of the roads (public or private), as well as jurisdictional responsibility for the road. Some examples of the types of

roads that may be included in this summary are park roads, military roads, toll roads, public roads at an airport, school, or university, and roads under the jurisdiction of the Bureau of Indian Affairs.

NAAQS Summaries

This summary includes system length and travel data for rural minor collectors and rural/urban locals summarized by non-attainment and maintenance areas, and pollutant type. HPMS uses the Environmental Protection Agency (EPA) defined non-attainment or maintenance area for identification purposes.

2.6 Estimates Data

The estimates dataset that is to be submitted will be stored as a table within FHWA's database. This data will only be used for national-level analysis. The sole purpose of these data is to provide an estimate of current State and local pavement conditions and construction practices where measured data are not available. These data are used for analysis in various FHWA models. Estimated values may be provided for the following pavement-related items:

- Last Overlay Thickness
- Thickness of Rigid Pavement
- Thickness of Flexible Pavement
- Base Type
- Base Thickness
- Binder Type
- Dowel Bar Presence
- Typical Joint Spacing

2.7 Metadata

The metadata that are to be submitted will be stored within FHWA's database. The purpose of the metadata is to provide additional information for understanding and/or explaining the variability in certain traffic and pavement-related data items that are reported in HPMS. Metadata within HPMS are used to describe data collection procedures and post-processing that may affect the consistency or quality of the data. The metadata contains information related to the collection and reporting of the following:

- Traffic counts
- Vehicle classification
- Source of the travel data
- Type of IRI equipment used to measure the International Roughness Index (IRI)
- Method and equipment used to collect rutting data
- Method and equipment used to collect faulting data
- Method and equipment used to measure pavement cracking

- Pavement distress data reporting format
- Ramp termini descriptions, and traffic estimation method used for reporting traffic data on ramps

Some metadata may be published annually in the *Highway Statistics* publication, or, are provided to data users as requested. The metadata provided by each State will not be used by FHWA to alter a State's HPMS submittal.

Chapter 3 DATA MODEL & REQUIRED DATASETS

3.1 Overview

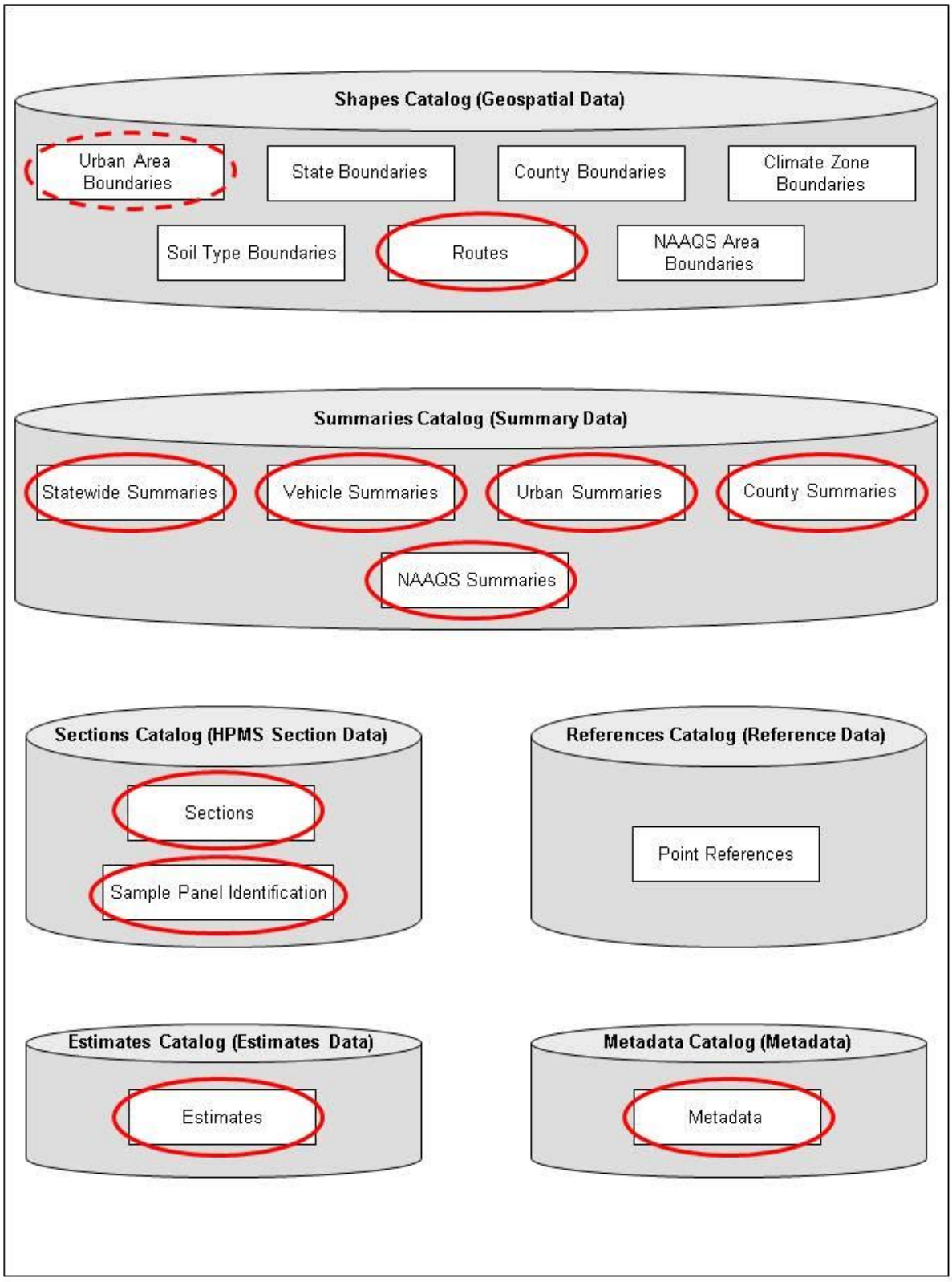
The HPMS data model has been developed within a Geographic Information System (GIS) framework, to take full advantage of the spatial relationships that exist between data elements which are both internal and external to HPMS. The data model is designed to be flexible in terms of compatibility with other data sources and expandable as additional data becomes available. In addition, the data model is designed to achieve independence with respect to the way in which the various data components relate to one another. This approach allows for future modification to a particular area of the model (e.g. a dataset, or data item) with little or no impact on other datasets or data items. For instance, if a change is needed to a roadway section's surface type (e.g. changing it from a code 1-unpaved to code 2-conventional asphalt concrete), it can be done so without impacting the value that is coded for that section's annual average daily traffic (AADT).

The data model's design is structured in a way that allows external data sources to be used to populate the various data fields in HPMS. For example, National Ambient Air Quality Standards (NAAQS) boundary spatial data can be used to assign a pollutant standard to each roadway section for the purpose of generating area-wide totals (e.g. vehicle miles of travel).

This data model is organized conceptually into a group of six catalogs. Each catalog groups the various datasets by type and/or function. The types of data can be categorized as: (1) geospatial data, representing various highway systems, geographic boundaries etc., (2) roadway attribute data that can be linked to a related GIS dataset, which allows the attribute data to be represented spatially via linear referencing or (3) metadata, which provides additional global information about the data.

Figure 3.1 illustrates the structure of the HPMS data model. The HPMS attribute data that are submitted by the States are grouped within the Sections Catalog. The Sections dataset that is identified in this catalog stores all of the records for each data item as they are reported by the States. The Sample Panel Identification dataset stores the limits for each State's sample panel as identified by the States. The Data Item field in the Sections dataset specifies the type of record (e.g. AADT, Lane Width, etc.), with the corresponding data stored in the Value (Numeric, Text, or Date) fields. These records act independently of one another, as they indicate the properties of the attribute they portray. Furthermore, the records in both the Sections and Sample Panel Identification datasets are linked to each State's geospatial network (i.e. LRS network) via its attribute table, which is identified as the Routes dataset that is identified in the model's Shapes Catalog. Data associated with the lower functional systems (i.e. minor collectors in rural areas and local roads in all areas) are summarized and reported in the datasets identified in the Summaries Catalog. The level of data for these functional systems is commensurate with the Federal need for analyzing and reporting these data. The Estimates Catalog contains a dataset of pavement attributes that will be used as input to FHWA's pavement models. The Metadata Catalog contains data that describe the methods and tools that are used for the collection and reporting of traffic, pavement, and ramp data. The References Catalog identifies the geospatial data which will ultimately be maintained by FHWA or other non-State entities. The data in these datasets are available for use by the States throughout the year for reference.

Figure 3.1 HPMS Data Model Structure



<u>Note</u>: Circled items in Figure 3.1 must be developed by the States and submitted to FHWA

3.2 Geospatial Component

The geospatial component of the data model provides the foundation for a national-level linear referencing system (LRS) that will serve primarily as a resource for HPMS, but will also be used to support a number of other interagency work program objectives. It will also be used to facilitate analysis and research efforts, using HPMS data.

Incorporating a geospatial component enhances the HPMS sampling process by providing an alternative methodology for sample selection and maintenance. This component allows a GIS-based process to be used to identify sections of road that have homogenous (or uniform) characteristics for key data items, which can be used for sampling purposes. More information on the GIS procedures associated with sampling is found in Chapter 6, Sampling.

The primary catalog used to identify the model's geospatial data is the Shapes Catalog. However, the Sections Catalog identifies the attribute data that is linked to the geospatial data, which can be spatially located on the network for mapping, analysis, and reporting purposes.

Furthermore, the geospatial component of the data model involves the use of a LRS, which links the HPMS attribute data to a series of shape files. Both the geospatial and attribute data contain three referencing elements that are used to perform the linkage for linear features: (1) A unique Route ID, (2) a beginning milepoint, and (3) an ending milepoint. Point features use a route milepoint in place of a beginning and ending milepoint for referencing purposes. Data Items are identified in the Point References datasets of the model's References Catalog and are linked to and spatially referenced in the same manner. For general guidance on the development of a State wide LRS, see the FHWA publication, *All Public Roads Geospatial Representation Study*.

3.3 Catalogs and Associated Datasets

This section describes each of the following catalogs and their associated datasets, which will be stored as tables in FHWA's database. The datasets which are required to be developed by the States and provided to FHWA are circled in the figures for each catalog description contained in this section of the manual.

1 - Shapes

2 - Sections

3 - Summaries

4 - References

5 - Estimates

6 - Metadata

The datasets that are to be assembled by the States can either be submitted to FHWA as character separated value (CSV) files or entered manually on-screen via the HPMS software web application provided by FHWA.

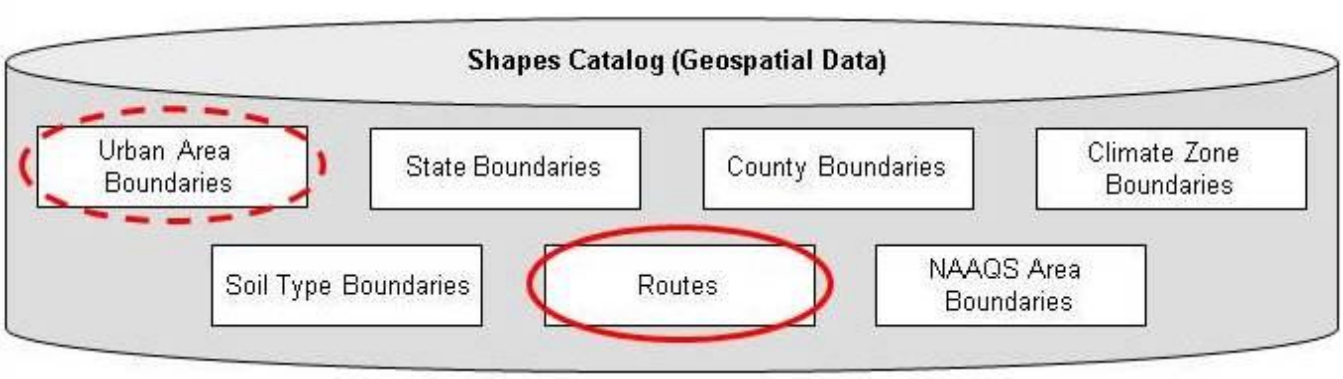
The remainder of this section describes the structure of the various datasets that are to be provided by the States, as well as those that will be developed and maintained by FHWA. Tables 3.1-3.21 include the identification of constraints (indicates if the field is part of a key field, either primary (PK) or unique (UK), and is used to establish relationships within the model), field name (identifies the field of information), data type (contains the format for each data item), and description (definition of the field). Valid values for the fields are also included in the tables, where appropriate. Furthermore, the data types used in the tables are as follows:

- Text – text entries are permitted
- Variable Character or Varchar (X) – alphanumeric entries are with a maximum length of X are permitted
- Numeric (X) – numeric values with a maximum length of X are permitted
- Decimal (X, Y) – numeric values with a maximum length of X and a length of Y decimal places are permitted
- Date – Preferred format is MM/YYYY but other formats may also be acceptable. See specific Data Item formats in Chapter 4.

Shapes Catalog

The Shapes Catalog identifies the geographic data that are used for geospatial analysis in HPMS. This catalog is comprised of seven datasets which are as follows:

- Routes
- State Boundaries
- County Boundaries
- Climate Zone Boundaries
- Soil Type Boundaries
- Urban Area Boundaries
- NAAQS Boundaries



The information in these datasets is derived from Federal, State and local geospatial data sources. It is preferred that the States submit their data to FHWA in an ESRI shapefile, ESRI geodatabase, or Intergraph GeoMedia Access Warehouse format. However, other formats will be accommodated provided that they are in compliance with Open Geospatial Consortium (OGC) standards: Well Known Text (WKT), Well Known Binary (WBT), and/or Geography Markup Language (GML).[1]

The Routes dataset will be stored in FHWA's database per the following specifications:

- Spatial Reference (i.e. Coordinate System) – North American Datum 1983 (NAD83), un-projected coordinates (Longitude/Latitude)
- Linear Units – Miles

The spatial boundaries and associated data in many of these datasets will not change from year to year, but are expected to be updated as needed to reflect any changes made over the course of the year. Furthermore, some of these datasets will be maintained by FHWA using data provided by the States and other Federal Agencies.

The States shall submit their Routes and adjusted Urban Area Boundaries (if applicable) spatial data to FHWA annually. The State Boundaries, County Boundaries, Climate Zone Boundaries, Soil Type Boundaries, Census

Urban Area Boundaries, and NAAQS Area Boundaries datasets are maintained by FHWA and used for display and data management/analysis purposes.

Tables 3.1-3.7 contain information on the structure of each dataset identified in the Shapes Catalog.

The States shall include the field names, which are specified in Tables 3.5-3.8, 3.10, 3.11-3.15, 3.17, and 3.19, in the datasets that are to be submitted to FHWA.

Table 3.1 State Boundaries

Table 3.1 describes the polygon shapes dataset representing each of the US States. This data will be maintained by FHWA.

STATE BOUNDARIES TABLE			
Constraint	**Field Name**	**Data Type**	**Description**
PK	State Code	Numeric(2)	State FIPS code
	State Abbreviation	Text	State abbreviation
	State Name	Text	State name
	Shape	Geometry	Polygon feature

Table 3.2 County Boundaries

Table 3.2 describes the polygon shapes dataset representing all counties for each State. This data will be maintained by FHWA.

COUNTY BOUNDARIES TABLE			
Constraint	**Field Name**	**Data Type**	**Description**
PK	State Code	Numeric(2)	State FIPS code
PK	County Code	Numeric(3)	County FIPS code
	County Name	Text	County name
	Shape	Geometry	Polygon feature

Table 3.3 Climate Zone Boundaries

Table 3.3 describes the polygon shapes dataset representing the different climate zones for each State. This data will be maintained by FHWA.

CLIMATE ZONE BOUNDARIES TABLE			
Constraint	**Field Name**	**Data Type**	**Description**
PK	Climate Zone	Numeric(1)	Climate zone code
	Climate Zone Name	Text	Climate zone description
	Shape	Geometry	Polygon feature

Table 3.4 Soil Type Boundaries

Table 3.4 describes the polygon shapes dataset representing the AASHTO soil zones for each State. This data will be maintained by FHWA.

SOIL TYPE BOUNDARIES TABLE			
Constraint	**Field Name**	**Data Type**	**Description**
PK	Soil Type	Numeric(5)	Soil type code
	Soil Type Name	Text	Soil type description
	Shape	Geometry	Polygon feature

Table 3.5 Routes

Table 3.5 describes the State's linear referenced network dataset. HPMS attribute data (i.e. Sections data) are linked to the network through the Route ID field in this dataset. The Route IDs, which must be unique in character, are to be defined by the States and must be in concert with the Route IDs that are contained in the Sections data. Furthermore, the submitted LRS must include, All Public Roads Including; all Federal-aid highways, with its component National Highway System (NHS) routes and NHS intermodal connectors. FHWA recommends that one ROUTE ID logically represents a highway in its entirety.

ROUTES TABLE				
Constraint	**Field Name**	**Data Type**	**Description**	**Valid Values**
PK	Year_Record	Numeric(4)	Year for which the data apply	The four digits of the year that the data represents.
PK	State_Code	Numeric(2)	State FIPS code	Up to two digits for the FIPS code. See Appendix C for a complete list.
PK	Route_ID	VarChar(120)	Location reference ID for the linear feature	Up to 120 alpha-numeric digits that identify the route. This ID must be unique within the State.
	Comments (optional)	Text(50)	Text descriptor for the route	Up to 50 text characters to be used for specifying an English descriptor for the route (e.g. Interstate 70, I-70, I-70 from Exit 2 to Exit 4, etc.).
	Shape*	Geometry	Line feature	This field is automatically generated when the State's LRS network is developed. 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.

*Automatically generated when the dataset is created.

Extent – All public roads including Federal-aid highways, and ramps located within grade-separated interchanges (including NHS routes). This roadway network is termed 'All Roads Network' or ARNOLD.

Guidance for the development of the required ARNOLD network at the State level can be found on the Office of Highway Policy Information website: http://www.fhwa.dot.gov/policyinformation/hpms/arnold.cfm, and in the "All Public Road Geospatial Representation Study" published by the Federal Highway Administration in 2014.

Specific Requirements for Routes dataset:

1. File Format – Shall be in accordance with the HPMS Software User Guide.
2. Dual Carriageway geometry for divided roadways including all Interstates and single Centerline for other roadways.
3. Spatial Reference with either projected or unprojected X/Y coordinates must be assigned
4. Linear units – miles, feet, etc.
5. Resolution - 1:100,000 or better

Figure 3.2 is an illustration of the road network for State of Massachusetts. The red (bold) line represents the route for Interstate-90 (I-90), which is represented as a single record in the example Routes dataset excerpt (shown below Figure 3.2). It should be noted that a route can consist of a single polyline feature (i.e. one record) or multiple polyline features (i.e. multiple records).

Figure 3.2 Example Routes File

The following is an example record for this route (I-90) as it would appear in the Routes dataset:

Year_ Record	State_Code	Route_ID	Shape	
2007	25	0000I90	Polyline M	Where M indicates that there are individual measures for each line segment embedded in the record for this dataset.

Table 3.6 Urban Area Boundaries

Table 3.6 describes the polygon shapes dataset representing either the Census urban area boundaries (UABs), or the adjusted Census UABs for each State. Each time the Census generates new urban boundaries for decennial census, the FHWA will acquire and use them for performance measure and metric evaluation, mapping and analysis purposes. At a States option, they can adjust (expand) the Census defined UABs for transportation purposes. Adjusted UABs must be approved by each States' FHWA Division Office, prior to being included in the submitted HPMS data.

Adjusted UAB polygons are required to be included with the HPMS submission representing the calendar year data that is reported two years after the official urban areas have been released by the U.S. Census Bureau. For example, for the 2010 Census, the UABs were made available during March 2012 (i.e., two years after the decennial Census). States then had two additional years to adjust their boundaries and submit them no later than April 15, 2015 (reflecting calendar year 2014 data). At FHWA's option, urban area information may be derived in an automated fashion based on the Census urban area polygons if a State does not report the adjusted UAB data within the aforementioned time-frame. NOTE: When adjustments are made to UABs, States must also submit updated information for Data Item 2 (Urban Code) as part of the Sections data to coincide with new boundary delineation (see Chapter 4, Sec. 4.4 for additional guidance).

URBAN AREA BOUNDARIES TABLE			
Constraint	**Field Name**	**Data Type**	**Description**
PK	Year_Record	Numeric(4)	Year for which the data apply
PK	Urban_Code	Numeric(5)	Census urban code
	Urban_Name	Text	Urban name
	Census_Pop	Numeric(8)	Decennial Census urban area population
	Census_Land_Area	Numeric(4)	Census land area (in square miles)
	Shape	Geometry	Polygon feature

Table 3.7 NAAQS Area Boundaries

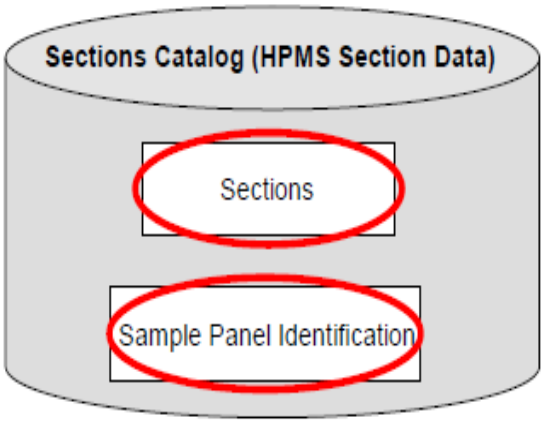
Table 3.7 describes the polygon shapes dataset representing the EPA-defined non-attainment and maintenance areas for each State. This dataset will be maintained by FHWA.

The definition of a Maintenance Area is any geographic region of the Unites States previously designated as non-attainment pursuant to the Clean Air Act (CAA) Amendments of 1990 and subsequently re-designated to attainment subject to the requirement to develop a maintenance plan under Section 175A of the CAA, as amended. The national HPMS database is used for tracking travel for air quality assurance purposes in non-attainment and maintenance areas as required by EPA under the 1990 CAA (Section 187) and the Transportation Conformity Rule, 40 CFR parts 51 and 93. More specifically, the database is used primarily for establishing regional transportation-related emissions for transportation conformity purposes. Estimated travel based on these data is used for the calibration and validation of base-year network travel models when required for non-attainment or maintenance areas.

NAAQS AREA BOUNDARIES TABLE			
Constraint	**Field Name**	**Data Type**	**Description**
	NAAQS Area Name	Text	NAAQS area name
PK	Pollutant Standard	Text	Pollutant standard
	Shape	Geometry	Polygon feature

Sections Catalog

The Sections Catalog identifies the HPMS attribute data that are submitted by the States. The data identified in this catalog are geospatially linked to the *Routes* network file, using a unique identifier (i.e. Route ID). In general, these data are required for all Federal-aid highways and NHS routes. This requirement excludes the need to report data for any roads functionally classified as minor collector in rural areas or local in any area. Moreover, these data are optional for non-Federal-aid highways. This catalog is comprised of two datasets, Sections and Sample Panel Sections. The Sections dataset stores each State's entire HPMS attribute dataset as they provide it to FHWA. The Sample Panel Identification dataset stores the limits for each State's sample panel as identified by the States. The descriptions for each of the data items that are to be reported in the Sections dataset are listed in Chapter 4. The data items that are only required on a Sample Panel basis are identified as such in the individual data item descriptions (Chapter 4).



Sections data can either be imported as a file in Character Separated Value (CSV) format, or entered manually on-screen via the HPMS software web application. The data requirements for each dataset identified in this catalog are listed below.

Table 3.8 Sections

Table 3.8 describes the State reported HPMS Section dataset representing all Federal-aid highways and other applicable sections. . The specific requirements for the information to be reported in the Data Item field are defined in detail in Chapter 4. See Table 4.2 for a full list of the required HPMS Data Items and related reporting requirements.

SECTIONS TABLE				
Constraint	**Field Name**	**Data Type**	**Description**	**Valid Values**
PK	Year_Record	Numeric(4)	Year for which the data apply	The four digits of the year the data represents.
PK	State_Code	Numeric(2)	State FIPS code	Up to two digits for the FIPS code. See Appendix C for a complete list.
PK	Route_ID	VarChar(120)	Location reference ID for the linear feature	Up to 120 alpha-numeric digits that identify the route. This ID must match a record in the Routes dataset.
PK	Begin_Point	Decimal(8,3)	Beginning Milepoint	Decimal value in thousandths of a mile.
PK	End_Point	Decimal(8,3)	Ending Milepoint	Decimal value in thousandths of a mile.
PK	Data_Item	Text	HPMS Data Items	See Chapter 4 for detailed Data Item descriptions and valid values. Table 3.9 shows the Data Item names that can be entered in this field.
	Section_Length	Decimal(8,3)	Section length	Decimal value in thousandths of a mile. This length must be consistent with the difference between End_Point and Begin_Point.
	Value_Numeric	Numeric	Numeric value for data item	Must be numeric value as specified in the detailed Data Item descriptions (see Chapter 4).
	Value_Text	VarChar(50)	Text value for data item	Must be text value as specified in the detailed Data Item descriptions (see Chapter 4). This field is available for State use where data is not required for a particular Data Item. This field is limited to 50 characters.
	Value_Date	Date	Date Value for data item	Must be a date value as specified in the detailed Data Item descriptions (see Chapter 4). This field is available for State use where data is not required for a particular Data Item.
	Comments	VarChar(100)	Comment for State use	Variable Text up to 100 characters. This field is optional.

Extent: All Federal-aid highways and ramps located within grade separated interchanges and applicable items on other sections where a toll facility exists; optional for other sections.

Table 3.9 Sample Panel Identification

Table 3.9 describes the dataset containing the geographic limits for each States' Sample Panel. Therefore, the States must provide FHWA with the geographic limits for their sample data for the purposes of this table. The Sample Panel Identification dataset will be used to properly identify the Sample Panel data that is contained within the Sections dataset. Each Sample Panel data item must be, at the very least, reported for the entire extent of the Sample Panel, where applicable. The data in Table 3.9 should represent only the samples resulting from the random selection process discussed in Chapter 6, Sampling. This dataset will be used in conjunction with the Sections and References datasets to create a View or Export of the sample data for use in various national models, such as the HERS (Highway Economic Requirements System) model. As this view/export is generated, each sample will have a single attribute for each data item corresponding to the Data Item field in the Sections dataset. The single attribute will be calculated based on a particular Calculation Method, as discussed in Appendix G.

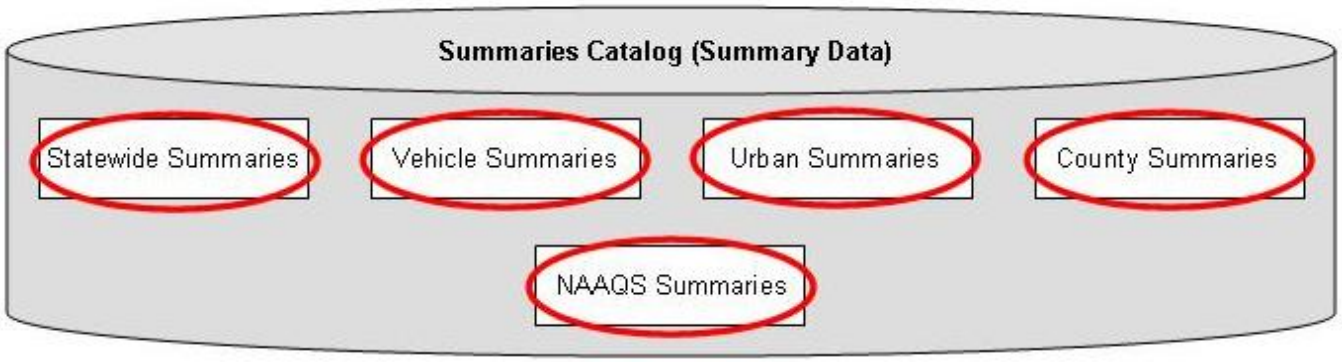
SAMPLE PANEL IDENTIFICATION TABLE				
Constraint	**Field Name**	**Data Type**	**Description**	**Valid Values**
PK	Year_Record	Numeric(4)	Year for which the data apply	The four digits of the year the data represents.
PK	State_Code	Numeric(2)	State FIPS code	Up to two digits for the FIPS code. See Appendix C for a complete list.
PK	Route_ID	VarChar(120)	Location reference ID for the linear feature	Up to 120 alpha-numeric digits that identify the route.
PK	Begin_Point	Decimal(8,3)	Beginning Milepoint	Enter a decimal value.
PK	End_Point	Decimal(8,3)	Ending Milepoint	Enter a decimal value.
	Section_Length	Decimal(8,3)	Section length	Enter a decimal value. This could be calculated from End MP – Beg MP.
UK	Sample_ID	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.

Extent: All Sample Panel Sections.

Summaries Catalog

The Summaries Catalog identifies the datasets that store a variety of data for a defined area, such as a State or an Urban Area. The datasets that comprise this catalog are provided by the States to FHWA as a supplement to the data that is identified in the Sections Catalog. These datasets consist of summarized data for the local and rural minor collector roads, as these roads do not require section-level detail and can be generalized from State and local sources. Moreover, the datasets identified in this catalog store summary-level data for travel, highway system length, and demographics. These datasets capture travel by vehicle type, since only State estimates are required.

Summary data can either be imported as a file in Character Separated Value (CSV) format, or entered manually on-screen via the HPMS software web application. The data requirements and specifications for each dataset identified in this catalog are listed below.



This catalog is comprised of the following five datasets:

- Statewide Summaries
- Vehicle Summaries
- Urban Area Summaries
- County Summaries
- NAAQS Summaries

The data requirements for each dataset are identified in the following pages.

Table 3.10 Statewide Summaries

Table 3.10 describes the dataset which contains demographic and system length estimates for all Urban and Rural public roads, functionally classified as minor collector in rural areas or local in any area, summarized by State. In addition, this dataset contains daily vehicle-miles traveled (VMT) estimates for all public roads located in Small Urban areas, functionally classified as minor collector or local. This includes NHS roads located on these functional systems.

STATEWIDE SUMMARIES TABLE				
Constraint	**Field Name**	**Data Type**	**Description**	**Valid Values**
PK	Year_Record	Numeric(4)	Calendar year for the data	The four digits of the year the data represents.
PK	State_Code	Numeric(2)	State FIPS code	Up to two digits for the FIPS code. See Appendix C for a complete list.
	RMC_VMT	Numeric(8)	Daily Travel for Rural Minor Collectors	Report total daily vehicle-miles of travel as a whole number (round to the nearest 1,000 if preferred).
	RL_VMT	Numeric(8)	Daily Travel for Rural Locals	Report total daily vehicle-miles of travel as a whole number (round to the nearest 1,000 if preferred).
	SU_VMT	Numeric(8)	Daily Travel for Small Urban Locals	Report total daily vehicle-miles of travel as a whole number (round to the nearest 1,000 if preferred).
	Rural_Pop	Numeric(8)	Rural Population (> 5,000)	Estimate/report rural population as a whole number (in thousands)
	Rural_Land_Area	Numeric(8)	Rural Land Area	Estimate of rural land area to the nearest square mile.
	SU_Pop	Numeric(8)	Small Urban Population (5,000 to 49,000)	Estimate/report rural population as a whole number (in thousands)
	SU_Land_Area	Numeric(8)	Small Urban Land Area	Estimate of small urban land area to the nearest square mile.
	Paved_RMC_Length	Decimal(8,3)	Paved Rural Minor Collectors	Report total miles of paved roads to the nearest mile.
	Paved_RL_Length	Decimal(8,3)	Paved Rural Locals	Report total miles of paved roads to the nearest mile.
	Paved_UL_Length	Decimal(8,3)	Paved Urban Locals	Report total miles of paved roads to the nearest mile.
	Unpaved_RMC_Length	Decimal(8,3)	Unpaved Rural Minor Collectors	Report total miles of unpaved roads to the nearest mile.
	Unpaved_RL_Length	Decimal(8,3)	Unpaved Rural Locals	Report total miles of unpaved roads to the nearest mile.
	Unpaved_UL_Length	Decimal(8,3)	Unpaved Urban Locals	Report total miles of unpaved roads to the nearest mile.

Extent: All public roads functionally classified as Rural Minor Collector/Local and Small Urban Local. Any NHS routes or toll roads on these functional systems should be included.

Metadata: See Metadata Catalog

Table 3.11 Vehicle Summaries

Table 3.11 describes the dataset which contains Travel Activity data summarized by Highway System Group and Vehicle Type.

VEHICLE SUMMARIES TABLE					
Constraint	**Field Name**	**Data Type**	**Description**	**Valid Values**	
PK	Year_Record	Numeric(4)	Calendar year for the data	The four digits of the year the data represents.	
PK	State_Code	Numeric(2)	State FIPS code	Up to two digits for the FIPS code. See Appendix C for a complete list.	
PK	FS_Group	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)
				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)
	Pct_MC	Decimal(5,2)	Percent of motorcycle VMT (Vehicle Class 1)	Code percentage as 0.00 to 100.00.	
	Pct_Cars	Decimal(5,2)	Percent of passenger car VMT (Vehicle Class 2)	Code percentage as 0.00 to 100.00.	
	Pct_Lgt_Trucks	Decimal(5,2)	Percent of light truck VMT (Vehicle Class 3)	Code percentage as 0.00 to 100.00.	
	Pct_Buses	Decimal(5,2)	Percent of bus VMT (Vehicle Class 4)	Code percentage as 0.00 to 100.00.	
	Pct_SU_Trucks	Decimal(5,2)	Percent of single-unit truck VMT (Vehicle Classes 5-7)	Code percentage as 0.00 to 100.00.	
	Pct_CU_Trucks	Decimal(5,2)	Percent of combination-unit truck VMT (Vehicle Classes 8-13)	Code percentage as 0.00 to 100.00.	

Extent: All public roads

Metadata: See Metadata Catalog.

Reporting cycle: Review annually; update as needed.

Collection requirements: Percentages for each FS Group reported to the nearest hundredth of a percent (i.e., 45.33).

Table 3.12 Urban Area Summaries

Table 3.12 describes the dataset which contains daily travel and demographics data for all local functional system roads for each adjusted urbanized area.

URBAN AREA SUMMARIES TABLE				
Constraint	**Field Name**	**Data Type**	**Description**	**Valid Values**
PK	Year_Record	Numeric(4)	Calendar year for the data	The four digits of the year the data represents.
PK	State_Code	Numeric(2)	State FIPS code	Up to two digits for the FIPS code. See Appendix C for a complete list of FIPS codes.
PK	Urban_Code	Numeric(5)	Census urban code	Up to five digits for the Census urban code. See Appendix I for a complete list eligible of codes.
	Local_VMT	Numeric(8)	Local (daily) travel	Report total daily vehicle-miles of travel as a whole number (round to the nearest 1,000 if preferred). Metadata: See Metadata Catalog
	State_Portion_Pop	Numeric(8)	Population for State portion	Estimate/report current population as a whole number (in thousands)
	State_Portion_Land	Numeric(8)	Land area for State portion	Estimate of current land area to the nearest square mile.

Extent: All urbanized area public roads functionally classified as Local. Any NHS routes or toll roads on these functional systems should be included.

Table 3.13 County Summaries

Table 3.13 describes the dataset which contains system length data for all roads functionally classified as minor collector in rural areas or local in any area, summarized by county.

COUNTY SUMMARIES TABLE					
Constraint	**Field Name**	**Data Type**	**Description**	**Valid Values**	
PK	Year_Record	Numeric(4)	Calendar year for the data	The four digits of the year the data represents.	
PK	State_Code	Numeric(2)	State FIPS code	Up to two digits for the FIPS code. See Appendix C for a complete list.	
PK	County_Code	Numeric(3)	County FIPS code	Up to three digits for the Census county code.	
PK	F_System	Numeric(1)	Functional System	Report only for roads functionally classified as Local (7) and Minor Collector (rural only) (6). NHS roads on these systems should be included in this summary.	
				Code	*Description*
				6	Minor Collector (Rural only)
				7	Local
PK	Urban_Code	Numeric(5)	Urban Code	Up to five digits for the Census urban code. See Appendix I for a complete list of valid values. Code 99999 for rural sections and 99998 for small urban sections (not within the adjusted urbanized area and with an urban population of at least 5,000).	
PK	Ownership	Numeric(2)	Ownership Code	*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 (e.g., Airport, School, University)
				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	Corps of Engineers
				72	Air Force
				73	Navy/Marines
				74	Army
				80	Other
	RMC_L_System_Length	Decimal(8,3)	Rural minor collector and local roadways length within county	Total length to the nearest thousandth of a mile.	

Extent: All public roads functionally classified as Minor Collector (Rural) and Local. Any NHS routes or toll roads on these functional systems should be included.

Reporting cycle: Report annually; update as needed.

Table 3.14 NAAQS Summaries

Table 3.14 describes the dataset which contains system length and travel data for all roads functionally classified as minor collector in rural areas or local in any area summarized by EPA Non-Attainment or Maintenance Area, and the relative pollutant standard.

NAAQS SUMMARIES TABLE				
Constraint	**Field Name**	**Data Type**	**Description**	**Valid Values**
PK	Year_Record	Numeric(4)	Calendar year for the data	The four digits of the year the data represents.
PK	State_Code	Numeric(2)	State FIPS code	Up to two digits for the FIPS code. See Appendix C for a complete list.
PK	Pollutant_Stnd	Text	Pollutant Standard	See Appendix K for a complete list of the applicable pollutant standards.
	RMC_L_System Length	Decimal(8,3)	Rural minor collector and local system length	Report total miles to the nearest mile.
	RMC_L_System Travel	Numeric(8)	Rural minor collector and local system daily travel	Report total daily vehicle-miles of travel as a whole number (round to the nearest 1,000 if preferred).

Extent: All public roads functionally classified as minor collector in rural areas or local in any area. Any NHS routes or toll roads on these functional systems should be included.

Reporting cycle: Review annually; update as needed.

Collection requirements: Travel and system length data for each pollutant standard within the applicable NAAQS area within the State.

References Catalog

The References Catalog identifies the reference data that will be maintained by FHWA or other Non-State DOT entities at some point in the future. This catalog identifies the Point References dataset, which contains data for grade-separated interchanges that are located on the Federal-aid system, excluding roads functionally classified as minor collector in rural areas or local in any area.

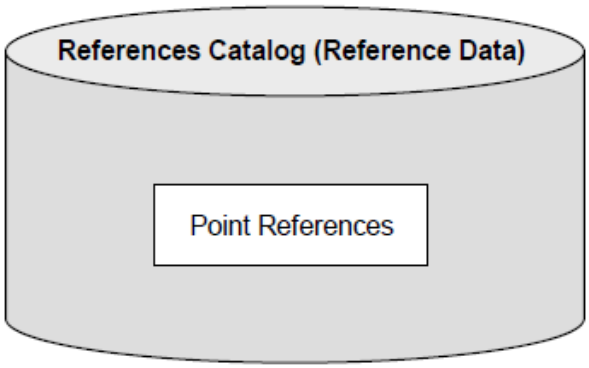


Table 3.15 Point References

Table 3.15 describes the dataset which contains data for grade-separated interchanges that are located on the Federal-aid system, excluding roads functionally classified as minor collector in rural areas or local in any area. Currently, this dataset only contains the location and type of grade-separated interchanges. This dataset will be populated by FHWA for the States that do not currently have these data.

POINT REFERENCES TABLE				
Constraint	**Field Name**	**Data Type**	**Description**	**Valid Values**
PK	Year_Record	Numeric(4)	Year for which the data apply	The four digits of the year the data represents.
PK	State_Code	Numeric(2)	State FIPS code	Up to two digits for the FIPS code. See Appendix C for a complete list.
PK	Route_ID	VarChar(120)	Location reference ID for the point feature	Up to 120 alpha-numeric digits that identify the route. This ID must match a record in the Routes dataset.
PK	Route_Point	Decimal(8,3)	Route Milepoint	Enter a decimal value that falls between the beginning and ending MPs of the Route's section as referenced by the Route ID.
PK	Data_Item	Text	Attribute	Future use
	Value_Numeric	Numeric	Numeric value for data item	Must be numeric as specified under Data Items with their Value Numeric descriptions.
	Value_Text	Varchar(50)	Text value for data item	Text information as specified under the Data Items with their Value Text descriptions. This field is available for State use where data is not required for a particular Data Item. This field is limited to 50 characters.
	Value_Date	Date	Date value for data item	Date value as specified under the Data Items with their Value Date descriptions. This field is available for State use where data is not required for a particular Data Item.

Estimates Catalog

The dataset identified in this catalog stores information which describes the estimated values associated with the various pavement-related data items reported in the Sections dataset. The data identified in this catalog are used only for national-level analysis and are not used for reporting purposes. The data contained in the Estimates dataset represents the State's best estimate of current conditions or construction practices where measured data are not available for reporting purposes.

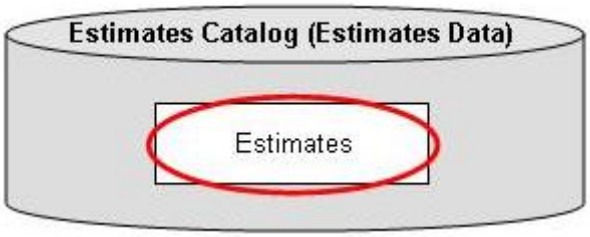


Table 3.16 Estimates

Table 3.16 describes the dataset which contains statewide estimates to be used as default inputs for FHWA's pavement deterioration models. Table 3.18 contains a list of the valid entries for the Estimate Type Field and their associated values.

ESTIMATES TABLE					
Constraint	**Field Name**	**Data Type**	**Description**	**Valid Values**	
PK	Year_Record	Numeric(4)	Calendar year for the data	The four digits of the year the data represents.	
PK	State_Code	Numeric(2)	State FIPS code	Up to two digits for the FIPS code. See Appendix C for a complete list.	
PK	Estimate_Type*	Text	Estimates Type	A detailed list of the estimate types is provided in Table 3.18 below.	
PK	F_System	Numeric(1)	Functional System	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
PK	Is_Urban	Text	Rural or Urban	Code	Description
				Y	Urban (Population of at least 5,000)
				N	Rural
PK	Is_State_Owned**	Text	On State/Off State System	Code	Description
				Y	On-State System
				N	Off-State System
	Value_Numeric	Decimal(5,1)	Numeric Value	Must be numeric as specified (in Table 3.18) under the Value Numeric descriptions.	

Extent: All Federal-aid highways

*Determine and code the predominant Estimate Type value when multiple Estimates Types apply.

**This field is intended to communicate to FHWA what each State considers to be their off-state system vs. on-state system.

Table 3.17 Estimate Types and Valid Values.

ESTIMATE TYPES AND VALUE NUMERIC SPECIFICATIONS			
Type	**Description**	**Value Numeric**	
Last_Overlay_Thickness	Typical design or construction last overlay thickness.	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
		5	Hot mix AC (Bituminous)
		6	Lean concrete
		7	Stabilized open-graded permeable
		8	Fractured PCC
Base_Thickness	Typical design or construction thickness	Base thickness to the nearest whole inch.	
Binder_Type	Binder Type	See following table below.	
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.	

CODES FOR VISCOSITY GRADED BINDERS	
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

CODES FOR SUPER PAVE BINDERS										
		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
High Temperature Grade	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

Metadata Catalog

This catalog consists of metadata, which is data that describes the other datasets and data items in the State's HPMS dataset. Metadata within HPMS are used to describe data collection procedures and post-processing that may impact the consistency or quality of the data. Metadata applies to an entire data item or group of data items, and not any single data item entry. Some Metadata may be published annually in the *Highway Statistics* publication and may be provided to data users as requested. FHWA will not use Metadata to modify or alter a State's HPMS data submittal.

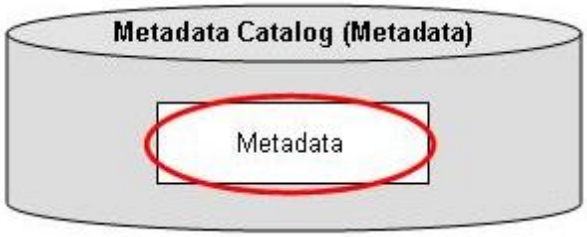


Table 3.18 Metadata

Table 3.18 describes the dataset which contains data that captures and explains variability in the collection and reporting of traffic and pavement data in HPMS. Table 3.20 lists the valid entries for the Metadata Type Field and their associated values.

METADATA TABLE					
Constraint	**Field Name**	**Data Type**	**Description**	**Valid Values**	
PK	Year_Record	Numeric(4)	Calendar year for the data	The four digits of the year the data represents.	
PK	State_Code	Numeric(2)	State FIPS code	Up to two digits for the FIPS code. See Appendix C for a complete list.	
PK	Metadata_Type*	Text	Metadata Type	A detailed list of the metadata types is provided in Table 3.20 below. Multiple metadata types are permitted per data item.	
PK	F_System	Numeric(1)	Functional System	*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
PK	Is_Urban	Text	Rural or Urban	*Code*	*Description*
				Y	Urban (population of at least 5,000)
				N	Rural
PK	Is_State_Owned**	Text	On State/Off State System	*Code*	*Description*
				Y	On-State System
				N	Off-State System
	Value_Numeric	Numeric(5)	Numeric Value	Must be numeric as specified (in Table 3.20) under the Value Numeric descriptions.	

Extent: All Federal-aid highways; optional for other sections.

*Determine and code the predominant Metadata Type value when multiple Metadata Types apply.

**This field is intended to communicate to FHWA what each State considers to be their off-state system vs. on-state system.

Table 3.19 Metadata Types and Valid Values.

METADATA TYPES AND VALUE NUMERIC SPECIFICATIONS			
Type	**Description**	**Value Numeric**	
AADT_Pct_Actual	Percent total section-level AADTs reported that are based on actual counts for the reported data year	Enter value to the nearest whole percent.	
AADT_24	Number of permanent and portable counter locations that were counted for a duration of 24 hours or more	Integer	
AADT_48	Number of permanent and portable counter locations that were counted for a duration of 48 hours or more	Integer	
AADT_Season	AADT Seasonal Adjustment	*Code*	*Description*
		1	AADT is not seasonally adjusted
		2	AADT is seasonally adjusted
		3	AADT is from counts taken throughout the year
AADT_Week	AADT Day-of-Week Adjustment	*Code*	*Description*
		1	AADT is not adjusted for day-of-week
		2	AADT is adjusted for day-of-week
		3	AADT is from counts taken throughout the week
AADT_Axle	AADT Axle Adjustment	*Code*	*Description*
		1	AADT is not adjusted for number of axles
		2	AADT is adjusted for number of axles
		3	AADT is from vehicle count data
AADT_Growth	AADT Growth Adjustment	*Code*	*Description*
		1	AADT is not adjusted for annual growth/change
		2	AADT is adjusted for annual growth/change
		3	AADT is from current year (i.e., data year) counts
Class_Pct_Actual	Percent of class AADTs (i.e., Single-unit Truck & Bus, and Combination Truck AADT) reported that are based on actual counts for the reported data year	Enter value to the nearest whole percent.	
Class_24	Number of permanent and portable classification count locations that were counted for a duration of 24 hours or more	Integer	
Class_48	The number of permanent and portable classification count locations that were counted for a duration of 48 hours or more	Integer	
Class_Season	Class Seasonal Adjustment	*Code*	*Description*
		1	No adjustment
		2	With adjustment
Class_Week	Class Weekly Adjustment	*Code*	*Description*
		1	No adjustment
		2	With adjustment
Class_Growth	Class Growth Adjustment	*Code*	*Description*
		1	No adjustment
		2	With adjustment

METADATA TYPES AND VALUE NUMERIC SPECIFICATIONS			
Type	**Description**	**Value Numeric**	
Travel_Source	Source of Travel Data	*Code*	*Description*
		1	State traffic database only
		2	State traffic database and local governments (MPO, Cities, and Counties)
		3	Other
Travel_Volume_Type	Type of volume 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
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
Travel_QA	Quality assurance program exists for any traffic data	*Code*	*Description*
		1	No existing traffic data quality assurance program
		2	State traffic data only
		3	State and Local traffic data
		4	Local traffic data only
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	Type of equipment used predominately for collection of rutting data.	*Code*	*Description*
		1	3-dimensional (3-D) imaging system/scanning laser
		2	Laser
		3	Other/Manual

METADATA TYPES AND VALUE NUMERIC SPECIFICATIONS			
Type	**Description**	**Value Numeric**	
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 manual rutting method: sampling interval. (Ref: AASHTO Designation R48-10(2013); 7.1.6) ***or*** For automatic rutting method: report interval—the travel distance between the reported data. (Ref: AASHTO Designation PP70-14 (2016); 4.2)	Report interval to the nearest foot.	
Rutt_Trans_Prof_Interval	Transverse profile data point separation distance. (Ref: AASHTO Designation PP70-14 (2016); 5.1)	Report interval to the nearest 0.1 inch.	
Faulting_Interval	Sampling interval. (Ref: AASHTO Designation R36-13; 5.2.5)	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
			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	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

METADATA TYPES AND VALUE NUMERIC SPECIFICATIONS			
Type	**Description**	**Value Numeric**	
		6	Other
Pave_Rep_Method	Reporting method for pavement distresses and related data items (e.g., IRI, PSR, Surface Type, etc.) associated with divided 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
		9	Other estimation method not described above

[1] Environmental Systems Research Institute, Inc. (ESRI), Shapefile Technical Description: an ESRI White Paper, July 1998

[2] Open Geospatial Consortium Inc, OpenGIS Implementation Specification for Geographic information – Simple feature access – Part 1:Common Architecture Version 1.1.0, Pg 28, Nov 2005

[3] Open Geospatial Consortium Inc, OpenGIS Implementation Specification for Geographic information – Simple feature access – Part 1:Common Architecture Version 1.1.0, Pg 29, Nov 2005

[4] http://www.opengeospatial.org/standards/gml

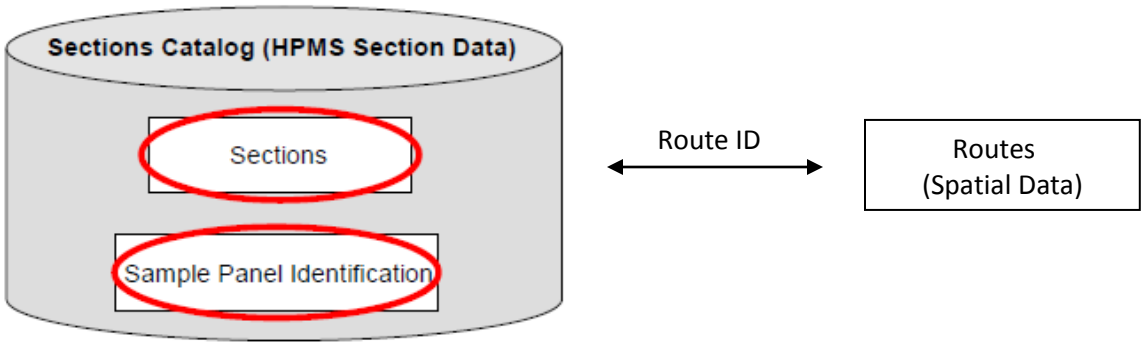
Chapter 4 DATA REQUIREMENTS AND SPECIFICATIONS

4.1 Overview

This chapter provides in-depth information on the data collection and reporting requirements for the Sections and Sample Panel Identification datasets, which comprise the linear features of HPMS. In addition, this chapter contains information on the datasets that are developed and maintained by FHWA, and the datasets that are gathered by FHWA from other sources.

The Sections and Sample Panel Identification datasets will be stored in the Sections Catalog. These datasets relate to each other through the states Linear Reference System (LRS) as described in Chapter 3.

Figure 4.1: Sections/Routes (LRS) Data Linkage



This chapter specifies the data items that are to be reported for the Sections and Sample Panel Identification datasets. Included in this chapter are the detailed requirements, along with applicable guidance for the data items that are to be reported in the Sections dataset.

Based on the data reported by the State DOT, FHWA will derive other data items. These derived data is described in this chapter.

4.2 Sections Data Reporting Requirements

Data Fields Required for Section Reporting Purposes

The data fields listed in Table 4.1 are to be reported as part of the Sections dataset which will be stored in the Sections Catalog (discussed in Chapter 3) within FHWA's system.

- **Field Number** is the number assigned to each data field for reference purposes.
- **Field Name** specifies the type of information that shall be reported for each field. The Data Item field (Field No. 6) in Table 4.1 stores the name of the Data Item that is being reported. A complete list of these data items is shown in Table 4.2.

Table 4.1: HPMS Sections File Structure

	Field Number	Field Name
Section	1	Year_Record
	2	State_Code
	3	Route_ID
	4	Begin_Point
	5	End_Point
	6	Data_Item
	7	Section_Length
	8	*Value_Numeric*
	9	*Value_Text*
	10	*Value_Date*
	11	Comments (Optional)

Italicized fields are used to report values and additional information pertaining to the data item (in Field 6).

The next section describes the detailed specifications for the fields identified in Table 4.1, in terms of their Descriptions, Usage, Data Formats, Coding instructions, and Guidance (where applicable) for each Field.

Field 1: Year_Record

Description: The calendar year for which the data are being reported.

Use: For identifying the representative year of the data.

Data Type: Numeric (Integer)

Coding: Enter the four digits for the calendar year that the data represents.

Guidance: The value that is coded shall reflect the calendar year for which the data is being reported, not the year that the data is being submitted.

Field 2: State_Code

Description: The State Federal Information Processing Standard (FIPS) code.

Use: For identifying the State for which the data is being reported.

Data Type: Numeric (Integer)

Coding: Enter up to two digits for the State FIPS code.

Guidance: See Appendix C for a complete list of FIPS codes.

Field 3: Route_ID

Description: The unique identifier for a given roadway (i.e., route).

Use: For identifying the specific route for which the data is being reported.

Data Type: Text

Coding: Enter an alphanumeric sequence consisting of no more than 120 characters.

Guidance: The Route ID is to be developed per the States' preference. However, the ID schema shall be consistent with the Route ID schema that is contained in the State's LRS network attribute data.

Field 4: Begin_Point

Description: The point of origin for a given section of road.

Use: For identifying the beginning point of a section for spatial referencing purposes.

Data Type: Numeric (Decimal (8,3))

Coding: Enter a decimal value to the nearest thousandth of a mile.

Guidance: N/A

Field 5: End_Point

Description: The terminus point for a given section of road.

Use: For identifying the ending point of a section for spatial referencing purposes.

Data Type: Numeric (Decimal (8,3))

Coding: Enter a decimal value to the nearest thousandth of a mile.

Guidance: N/A

Field 6: Data_Item

Description: The attribute being reported for a given section of road.

Use: For specifying the particular attribute being reported for a given section of road.

Data Type: Text

Coding: Code the database-specific data item name for each data item listed in Section 4.4 of this chapter.

Guidance: Guidance for each data item is discussed in Section 4.4 of this chapter.

CAUTION: The States shall use the database-specific data item names that are listed in Table 4.2. Failure to use the database-specific data item names as they are specified will cause the States' records to fail validation when the records are uploaded for HPMS submittal purposes.

Field 7: Section_Length

Description: The true length (i.e., measured length) for a given section of road.

Use: For analysis and comparison of various data items for apportionment, administrative, legislative, analytical, and national highway database purposes.

Data Type: Numeric (Decimal (8,3))

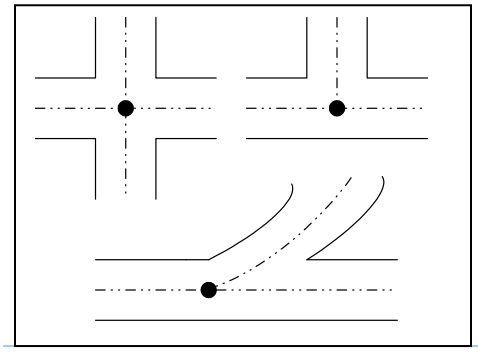
Coding: Code the length in decimal format to the nearest thousandth of a mile.

Guidance: Report either the inventory or LRS-based length for a given section of road, per the States' preference. This length shall be consistent with the length that is reported in the State's Certified Public Road Mileage. Furthermore, the reported length shall be consistent with the difference between Field 5 (End_Point) and Field 4 (Begin_Point). 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 (see Fig. 4.4b)), 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 4.2.

Figure 4.2: At-Grade Intersection Reference Points



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 metadata for ramp reporting. Figures 4.3A, 4.3B, and 4.3C provide examples of begin and end taper points for grade-separated interchanges.

Figure 4.3A: Grade-Separated Interchange (Taper Points)

Source: Google Maps.

Figure 4.3B: Begin Taper Point

Source: Google Maps.

Figure 4.3C: End Taper Point

Source: Google Maps.

The begin taper point (Figure 4.3B) 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 (Figure 4.3C) is the point at which the entrance (acceleration) lane joins the outermost lane of the mainline roadway to become one lane.

Metadata: See Chapter 3 for a description of the metadata reporting requirements for ramps.

Field 8: Value_Numeric

Description: The numeric value that is associated with a particular data item.

Use: For identifying the corresponding numeric value for a particular data item, for a given section of road.

Data Type: Numeric (Decimal (8,3))

Coding: Shall be coded in accordance with the individual data item descriptions discussed in Section 4.4 of this chapter.

Guidance: N/A

Field 9: Value_Text

Description: The text value that is associated with a particular data item.

Use: For identifying the corresponding text value for a particular data item, for a given section of road.

Data Type: Text

Coding: Shall be coded in accordance with the individual data item descriptions discussed in Section 4.4 of this chapter. This field is available for State use where text data is not required for a particular data item. This field is limited to 50 characters.

Guidance: N/A

Field 10: Value_Date

Description: The date value that is associated with a particular data item.

Use: For identifying the corresponding date value for a particular data item, for a given section of road.

Data Type: Date

Coding: Shall be coded in accordance with the individual data item descriptions discussed in Section 4.4 of this chapter. This field is available for State use where date data is not required for a particular data item.

Guidance: N/A

Field 11: Comments (Optional)

Description: Additional information for State use (formerly referred to as the "State Control Field").

Use: For storing supplemental information provided by the States which is used to manage their various databases.

Data Type: Text

Coding: This item can be coded as variable text up to 100 characters, in accordance with the State's needs.

Guidance: The information provided in this field **is not required** by FHWA.

Example records: The following example shows a potential arrangement of records for various data items (e.g., Annual Average Daily Travel (AADT), IRI, Through Lanes, etc.) for the State of Oregon, based on the file structure described in Table 4.1. This file is to be developed by the States and submitted to FHWA in a Character Separated Value (CSV) file format as shown below. In most cases, the Value Numeric field shall be used to report the primary information for each data item. The Value Text and Value Date fields can be used by the States to enter additional information, when data for these fields are not required for a particular data item (e.g., AADT). Furthermore, the Comment field is not required for FHWA purposes, but is available as an optional field for State-use. The States can either submit one aggregate CSV file containing all records for all of the required data items, or submit a series of individual CSV files. Upon submittal, this data will be stored in the Sections Catalog within FHWA's system.

NOTE: The Value Numeric field should contain a value of zero (0) only when it is representative of the condition or performance indicator for a given data item (see Section 4.4 for a description of valid values by data item).

Year_Record|State_Code|Route_ID|Begin_Point|End_Point|Data_Item|Section_Length|Value_Numeric|Value_Text|Value_Date|Comments

2009|41|000100200S00|0|0.75|AADT|0.75|14800|Factored '06 AADT||

2009|41|000100200S00|0.75|5.32|AADT|4.57|14700||4/21/2009|

2009|41|000100200S00|0|0.75|IRI|0.75|118||3/2009|

2009|41|000100200S00|0.75|5.32|IRI|4.57|94|||

2009|41|000100200S00|5.32|5.69|IRI|0.37|66||4/2008|

2009|41|000100200S00|0|0.75|Through_Lanes|0.75|4|||

2009|41|000100200S00|0.75|5.32|Through_Lanes|4.57|4|||Widened in '08

4.3 Data Items to be Reported

The States shall report the data items as listed in Table 4.2. Five types of data items that are to be reported are as follows: Inventory, Route, Traffic, Geometric, and Pavement data. Table 4.2 also lists the Item Numbers for each Data Item, the specific name for each Data Item, and the Extent for which the Data Item is to be reported. Detailed information on coding instructions, extent requirements, and additional guidance for each Data Item is contained in Section 4.4.

The Table of Potential Samples (TOPS) (discussed in Section 6.2) is developed based on the spatial intersection of the following five data items: Functional System, Urban Code, Facility Type, Through Lanes, and AADT. Accordingly, the length of these data items are used as control totals for system extent. Each of these data items shall be reported for the entire extent of all Federal-aid highways for a given State.

The HPMS is an inventory system that requires reported data to represent the condition and operation for all public roadways. As a result, directional conflicts in coding may arise for specific data items under certain reporting conditions. The following provides some guidance on how these conflicts can be addressed.

Data items may differ in shape or dimension on either side of a roadway. For reporting purposes, one side of the 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 (i.e., always South to North, East to West, or vice versa) and should never change once it has been designated.

Information reported for certain data items (e.g., AADT and Through Lanes) must reflect attributes associated with both directions of travel (i.e., inventory and non-inventory direction) on two-way roadways, regardless of whether or not these roadways are divided facilities. Caution should be exercised when reporting this information, as these data are used for Federal-aid apportionment purposes.

For pavement performance analysis purposes, a State can opt to report specified pavement data items for its divided Interstate roadway sections either solely for the inventory direction, or for both directions of travel (i.e., inventory and non-inventory directions). The selected reporting method shall be specified in the Metadata accordingly (see Chapter 3, Sec. 3.3, Tables 3.18 and 3.19 for specifications). NOTE: If this data is reported for both directions of travel, then FHWA will use this information to compute metrics (for all divided Interstate roadways sections) that will ultimately be used for assessing pavement performance. Please see Table 4.2 for the full list of items that can be reported for both directions of travel associated with divided Interstate roadway sections. Additionally, please see the data item descriptions in this chapter for detailed coding guidance.

Table 4.2: Data Items, Related Submission Deadlines and Required Reporting Formats

Data Item Type	Data Item No.	Database-Specific Data Item Name	Data Item Name	Extent		Due Date	LRS Reporting Req. for Divided Highways
Inventory	1	F_System	Functional System	FE + R		April 15#	I&NI
	2	Urban_Code	Urban Code	FE + R		April 15#	I or I&NI*
	3	Facility_Type	Facility Type	FE + R		April 15#	I&NI
	4	Structure_Type	Structure Type	FE**		April 15#	I or I&NI*
	5	Access_Control	Access Control	FE*	SP*	June 15	I
	6	Ownership	Ownership	FE		June 15	I&NI
	7	Through_Lanes	Through Lanes	FE + R		April 15#	I or I&NI*
	8	HOV_Type	Managed Lane Operations Type	FE**		June 15	I
	9	HOV_Lanes	Managed Lanes	FE**		June 15	I
	10	Peak_Lanes	Peak Lanes		SP	June 15	I
	11	Counter_Peak_ Lanes	Counter Peak Lanes		SP	June 15	I
	12	Turn_Lanes_R	Right Turn Lanes		SP	June 15	I
	13	Turn_Lanes_L	Left Turn Lanes		SP	June 15	I
	14	Speed_Limit	Speed Limit	FE*	SP	June 15	I
	15	Toll_Charged	Toll Charged	FE**		June 15	I
	16	Toll_Type	Toll Type	FE**		June 15	I
Route	17	Route_Number	Route Number	FE*		June 15	I or I&NI*
	18	Route_Signing	Route Signing	FE*		June 15	I
	19	Route_Qualifier	Route Qualifier	FE*		June 15	I
	20	Alternative_Route_Name	Alternative Route Name	FE		June 15	I
Traffic	21	AADT	Annual Average Daily Traffic	FE + R		June 15	I
	22	AADT_Single_Unit	Single Unit Truck and Bus AADT	FE*	SP*	June 15	I
	23	Pct_Peak_Single	Percent Peak Single-Unit Trucks and Buses		SP	June 15	I
	24	AADT_Combination	Combination Truck AADT	FE*	SP*	June 15	I
	25	Pct_Peak_Combination	Percent Peak Combination Trucks		SP	June 15	I
	26	K_Factor	K-factor		SP	June 15	I
	27	Dir_Factor	Directional Factor		SP	June 15	I

Data Item Type	Data Item No.	Database-Specific Data Item Name	Data Item Name	Extent		Due Date	LRS Reporting Req. for Divided Highways
	28	Future_AADT	Future AADT		SP	June 15	I
	29	Signal_Type	Signal Type		SP	June 15	I
	30	Pct_Green_Time	Percent Green Time		SP	June 15	I
	31	Number_Signals	Number of Signalized Intersections		SP	June 15	I
	32	Stop_Signs	Number of Stop Sign-Controlled Intersections		SP	June 15	I
	33	At_Grade_Other	Number of Intersections, Type - Other		SP	June 15	I
Geometric	34	Lane_Width	Lane Width		SP	June 15	I
	35	Median_Type	Median Type		SP	June 15	I
	36	Median_Width	Median Width		SP	June 15	I
	37	Shoulder_Type	Shoulder Type		SP	June 15	I
	38	Shoulder_Width_R	Right Shoulder Width		SP	June 15	I
	39	Shoulder_Width_L	Left Shoulder Width		SP	June 15	I
	40	Peak_Parking	Peak Parking		SP	June 15	I
	41	Widening_Obstacle	Widening Obstacle		SP	June 15	I
	42	Widening_Potential	Widening Potential		SP	June 15	I
	43	Curves_A through Curves_F	Curve Classification		SP*	June 15	I
	44	Terrain_Type	Terrain Type		SP	June 15	I
	45	Grades_A through Grades_F	Grade Classification		SP*	June 15	I
	46	Pct_Pass_Sight	Percent Passing Sight Distance		SP	June 15	I
Pavement	47	IRI	International Roughness Index	FE***	SP*	April 15#	I or I&NI*
	48	PSR	Present Serviceability Rating	FE***#	SP*	April 15#	I or I&NI*
	49	Surface_Type	Surface Type	FE***	SP*	April 15#	I or I&NI*
	50	Rutting	Rutting	FE***	SP*	April 15#	I or I&NI*
	51	Faulting	Faulting	FE***	SP*	April 15#	I or I&NI*
	52	Cracking_Percent	Cracking Percent	FE***	SP*	April 15#	I or I&NI*
	54	Year_Last_Improv	Year of Last Improvement		SP	June 15	I
	55	Year_Last_Construction	Year of Last Construction		SP	June 15	I

Data Item Type	Data Item No.	Database-Specific Data Item Name	Data Item Name	Extent		Due Date	LRS Reporting Req. for Divided Highways
	56	Last_Overlay_Thickness	Last Overlay Thickness		SP	June 15	I
	57	Thickness_Rigid	Thickness Rigid		SP	June 15	I
	58	Thickness_Flexible	Thickness Flexible		SP	June 15	I
	59	Base_Type	Base Type		SP	June 15	I
	60	Base_Thickness	Base Thickness		SP	June 15	I
	61	Climate_Zone**	Climate Zone**		SP	June 15	I
	62	Soil_Type**	Soil Type**		SP	June 15	I
Inventory	63	County_Code	County Code	FE		June 15	I
Special Networks	64	NHS	National Highway System	FE**		April 15#	I&NI
	65	STRAHNET_Type	Strategic Highway Network	FE**		June 15	I
	66	Truck	National Truck Network	FE**		June 15	I
	67	Future_Facility	Future National Highway System	FE**		June 15	I
Inventory	68	Maintenance_Operations	Maintenance & Operations	FE		June 15	I
Traffic	69	Capacity	Capacity		SP	June 15	I
Inventory	70	Dir_Through_Lanes	Directional Through Lanes	FE****#		April 15	I or I&NI*

FE = Full Extent for all functional systems (including State and non-State roadways)
FE* = Full Extent for some functional systems, see Sec. 4.4 for more details
FE** = Full Extent wherever data item is applicable, see Sec. 4.4 for more details
FE*** = Full Extent for all NHS roadways (including State and non-State roadways)
FE*#** = (Optional) Full Extent for NHS roadways (including State and non-State roadways)
FE**#** = (Optional) Full Extent for Interstate roadways (including State and non-State roadways)
FE + R = Full Extent including ramps located within grade-separated interchanges
SP = All Sample Panel Sections (as defined by HPMS)
SP* = Some Sample Panel Sections, see Sec. 4.4 for more details
**** = States have the option to override initial codes assigned by FHWA
= This data item is required to be submitted for Interstate roadways by April 15th; conversely, this data item is required to be submitted for all non-Interstate roadways by June 15th.
I = Inventory direction reporting required (i.e., one directional approach associated with both undivided facilities and divided facilities (dual carriageways), see Sec. 4.4 for more details)
I&NI = Inventory and Non-inventory direction reporting required (i.e., both directional approaches associated with divided facilities (i.e., dual carriageways), see Sec. 4.4 for more details)
I&NI* = Inventory and Non-inventory direction reporting optional. For example, International Roughness Index (IRI) data can be reported independently for both the inventory and non-inventory directional approaches associated with all divided Interstate roadway sections, per the States' discretion.

NOTE: For pavement performance analysis purposes, if a State opts to report pavement distress items (i.e., IRI, PSR, Surface Type, Rutting, Faulting, and Cracking Percent) for both directions of travel associated with its divided Interstate roadway sections, then the following data items shall also be reported for both the inventory and non-inventory directions associated with these roadway sections:

- Urban Code (Data Item 2)
- Structure Type (Data Item 4)
- Route Number (Data Item 17)
- Directional Through Lanes (Data Item 70)

The States shall submit their section-level data for certain data items (Data Items 1-3, 7, and 21) as homogenous sections. For most other data items, this submittal format is optional. By definition, a homogenous section is a section that has the same value for a given data item over its entire extent. A homogenous section has a natural beginning and ending point where the value for a given data item changes beyond the limits of that section.

If preferred, the States may structure and submit their non-homogenous section-level data in accordance with the limits of the TOPS sections (i.e. section limits shall be equivalent to TOPS section limits). However, the States **shall** submit their section-level data for Data Items 31-33, 43, and 45 in accordance with the limits of TOPS sections. If a State submits section-level data that matches the limits of the TOPS sections, then, they shall apply one of the following calculation methods (per the data item specifications listed in Table 4.3) to ensure that the values reported provide the required representation of those sections:

1) No Calculation Required – Reported value shall be consistent within the limits of the section.

2) Combination – Reported value shall consist of a concatenation of multiple (text) values within the limits of the section.

3) Minimum Value – Reported value shall be the lowest value in a range of values within the limits of the section.

4) Predominance – Reported value shall be based on the most prevalent value within the limits of the section.

5) Weighted Averaging – Reported value shall be based on an averaging of values within the limits of the section, weighted by the length of the sub-section for each value.

The calculation method to be applied depends on the particular data item being reported. Table 4.3 provides a summary of the data items and their applicable calculation method:

Table 4.3: Calculation Method by Data Item

Item Number	Data Item Name	Method
1	**Functional System ***	No Calculation Required
2	**Urban Code ***	No Calculation Required
3	**Facility Type ***	No Calculation Required
4	Structure Type	No Calculation Required
5	Access Control	Predominance

Item Number	Data Item Name	Method
6	Ownership	Predominance
7	**Through Lanes ***	No Calculation Required
8	Managed Lane Operations Type	Predominance
9	Managed Lanes ***	Predominance
10	Peak Lanes	Predominance
11	Counter-Peak Lanes	Predominance
12	Right Turn Lanes	Predominance
13	Left Turn Lanes	Predominance
14	Speed Limit	Predominance
15	Toll Charged	Predominance
16	Toll Type	Predominance
17	Route Number	Predominance
18	Route Signing	Predominance
19	Route Qualifier	Predominance
20	Alternative Route Name	Predominance
21	**AADT ***	No Calculation Required#
22	Single-Unit Truck and Bus AADT	Weighted Averaging
23	Percent Peak Single-Unit Trucks and Buses	Weighted Averaging
24	Combination Truck AADT	Weighted Averaging
25	Percent Peak Combination Trucks	Weighted Averaging
26	K-factor	Weighted Averaging
27	Directional Factor	Weighted Averaging
28	Future AADT	Weighted Averaging
29	Signal Type	Predominance
30	Percent Green Time	Weighted Averaging
31	Number of Signalized Intersections **	No Calculation Required
32	Number of Stop Sign-Controlled Intersections **	No Calculation Required
33	Number of Intersections, Type – Other **	No Calculation Required
34	Lane Width	Predominance
35	Median Type	Predominance
36	Median Width	Predominance
37	Shoulder Type	Predominance
38	Right Shoulder Width	Predominance
39	Left Shoulder Width	Predominance

Item Number	Data Item Name	Method
40	Peak Parking	Predominance
41	Widening Obstacle	Combination
42	Widening Potential	Minimum Value
43	Curve Classification **	No Calculation Required
44	Terrain Type	Predominance
45	Grade Classification **	No Calculation Required
46	Percent Passing Sight Distance	Minimum Value
47	International Roughness Index	Weighted Averaging
48	Present Serviceability Rating	Weighted Averaging
49	Surface Type	Predominance
50	Rutting	Weighted Averaging
51	Faulting	Weighted Averaging
52	Cracking Percent	Weighted Averaging
54	Year of Last Improvement	Predominance
55	Year of Last Construction	Predominance
56	Last Overlay Thickness	Predominance
57	Thickness Rigid	Predominance
58	Thickness Flexible	Predominance
59	Base Type	Predominance
60	Base Thickness	Predominance
61	Climate Zone	Predominance
62	Soil Type	Predominance
63	County Code	Predominance
64	National Highway System	No Calculation Required
65	Strategic Highway Network	No Calculation Required
66	National Truck Network	No Calculation Required
67	Future National Highway System	No Calculation Required
68	Maintenance & Operations	Predominance
69	Capacity	Weighted Averaging
70	Directional Through Lanes *	No Calculation Required

*Data items shall be reported as homogenous sections (used to define the TOPS)
**Values for these data items shall be reported for the defined limits of the TOPS sections
***Section limits for this data item shall be consistent with those associated with Data Item 8
#Weighted Averaging may be used if multiple traffic counts are combined to comprise a homogenous section

4.4 Data Item Requirements

NOTE: The following descriptions for each Data Item include an ‘‘English’’ name (in parenthesis) for clarification purposes. However, **the States shall use the database-specific data item names shown in bold gray to populate Field 6 in their Sections datasets**.

Item 1: F_System (Functional System)

Description: The FHWA approved Functional Classification System.

Use: For querying and analysis of data (e.g., transportation performance management (TPM) metrics, Federal-aid project information, etc.) by functional system.

Extent: All Public highways including ramps located within grade-separated interchanges as identified in 23 U.S.C 101.a(27)

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R
Urban	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R

FE + R = Full Extent & Ramps

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Code the value that represents the FHWA approved functional system. These following codes are to be used for all rural and urban sections:

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

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: For LRS purposes, this Data Item shall be reported independently for both directions of travel associated with divided highway sections, for which dual carriageway GIS network representation is required per guidance in Chapter 3, Section 3.3 and Table 3.5.

This Data Item shall also be reported for all ramp sections contained within grade separated interchanges. If a section is defined as a ramp (i.e., Data Item 3 = Code '4'), then it shall be coded the same as the highest order Functional System roadway that traverses the interchange.

Codes '6' and '7' shall be reported for all National Highway System (NHS) sections.

Additional guidance on functional systems and the coding of this item can be found in Chapter 5.

Item 2: Urban_Code (Urban Code)

Description: The U.S. Census Urban Area Code.

Use: For the querying and analysis of data (e.g., transportation performance management (TPM) metrics, Federal-aid project information, etc.) by the unique identification of a State's urbanized areas, and generically by small urban or rural areas.

Extent: All Public highways including ramps located within grade-separated interchanges as identified in 23 U.S.C. 101.a(27).

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R
Urban	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R

FE + R = Full Extent & Ramps

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter up to five digits for the Census urban area code. Leading zeroes are not required.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: Code '99998' for small urban sections and '99999' for rural area sections. 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. Coding for this Data Item shall match the Urban Area boundaries

Appendix I lists the U.S. Census Urban Area Codes that are currently in use. FHWA may issue interim guidance when Urban Codes change.

This Data Item shall also be reported for all ramp sections contained within grade separated interchanges.

A Census Urbanized Area can be expanded for transportation purposes. This Adjusted Urbanized Area, once approved by FHWA, shall be identified using the Census Urban Area 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 the FHWA publication, "Highway Functional Classification Concepts and Criteria and Procedures, 2013 Edition".

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 per guidance in Chapter 3, Section 3.3 and Table 3.5. NOTE: This data item is required to be reported for both the inventory and non-inventory directional approaches associated with all divided Interstate roadway sections where the following pavement data items have been reported in the same manner (as specified in the Metadata; see Chapter 3, Sec. 3.3, Tables 3.18 and 3.19):

- Data Item 47 (IRI)
- Data Item 48 (PSR)
- Data Item 49 (Surface Type)
- Data Item 50 (Rutting)
- Data Item 51 (Faulting)
- Data Item 52 (Cracking Percent)

Item 3: Facility_Type (Facility Type)

Description: The operational characteristic of the roadway.

Use: For determining public road mileage, for investment requirements modeling to calculate capacity and estimate roadway deficiencies and improvement needs, in the cost allocation pavement model, and in the national highway database; for the querying and analysis of data (e.g., transportation performance management (TPM) metrics, Federal-aid project information, etc.) by facility type.

Extent: All Public highways including ramps located within grade-separated interchanges as identified in 23 U.S.C 101.a(27).

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R
Urban	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R

FE + R = Full Extent & Ramps

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Use one of the following codes as applicable regardless of whether or not 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	Description	
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.
7	Planned/Unbuilt	Planned roadway that has yet to be constructed.

Value_Text:	No entry required. Available for State Use.
Value_Date:	No entry required. Available for State Use.

Guidance: *General*

Public road mileage is based only on sections coded '1,' or '2'. This includes only those roads that are open to public travel regardless of the ownership or maintenance responsibilities. Ramps are not included in the public road mileage calculation.

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.

"One-way Pairs" (See Figure 4.5)

Characteristics:

- 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 may consist of directional connectors from either an Interstate to another Interstate, or from an Interstate to a different functional system. Moreover, ramps allow ingress and egress to grade separated highways. Ramps may 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 section such as bus terminals, park and ride lots, and rest areas. These may include: special bus lanes, limited access truck roads, ramps to truck weigh stations, or a turn-around.

For LRS purposes, this Data Item shall be reported independently for both directions of travel associated with divided highway sections, for which dual carriageway GIS network representation is required per guidance in Chapter 3, Section 3.3 and Table 3.5.

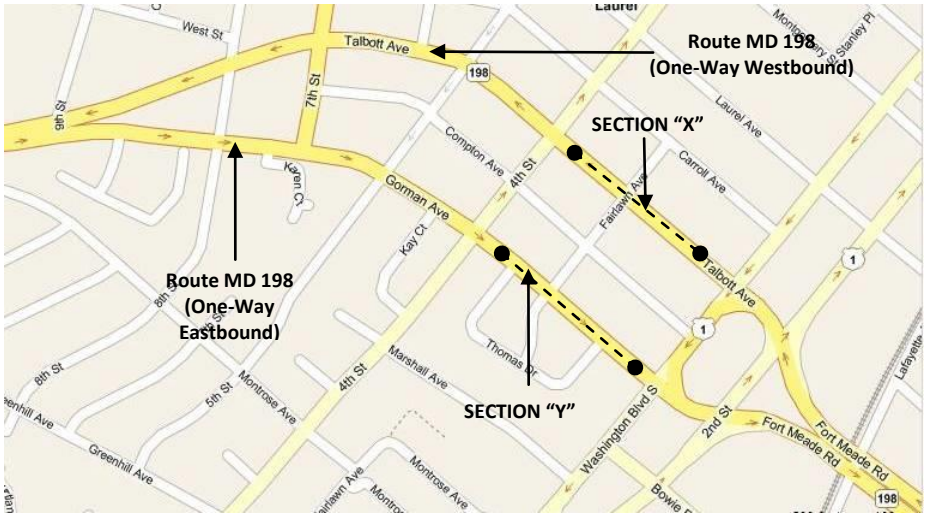
Figure 4.4 shows an example of a street (E. Baltimore St.), for which traffic is only permitted to move in the eastbound direction. In this particular case, this data item shall be assigned a Code '1' for a given section (Section "X") along this stretch of road.

Figure 4.4: One-Way Roadway (Code '1') Example

Source: Bing Maps

Figure 4.5 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 particular case, this data item shall be assigned a Code '1' for section "X", and section "Y".

Figure 4.5: "One-Way Pairs" (Code '1') Example



Source: Bing Maps

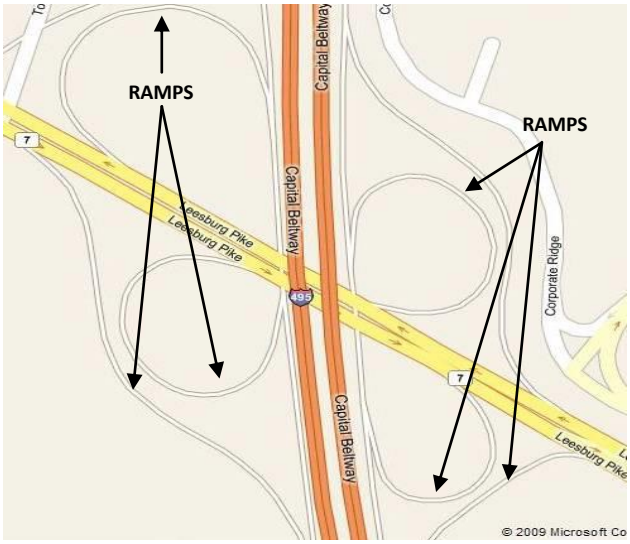
Figure 4.6 shows an example of a street (7th St. NW), for which traffic is permitted to move in both the north and southbound directions. In this particular case, this data item shall be assigned a Code '2' for a given section (Section "X") along this stretch of road.

Figure 4.6: Two-Way Roadway (Code '2') Example

Source: Bing Maps

Figure 4.7 shows an example of ramps contained within a grade-separated interchange located on a highway (Interstate 495). In this particular case, this data item shall be assigned a Code '4' for all applicable ramp sections (denoted as "Ramps" in the figure).

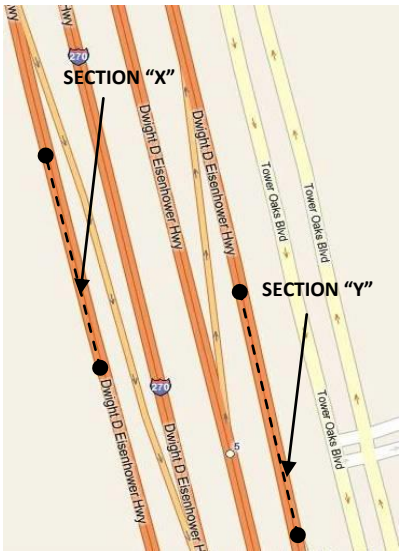
Figure 4.7: Ramp (Code '4') Example



Source: Bing Maps

Figure 4.8 shows an example of a highway (Interstate 270), which consists of express and local lanes in both the north and southbound directions. In this particular case, this data item shall be assigned a Code '5' for Sections "X" and "Y" to indicate that they are non-mainline facilities.

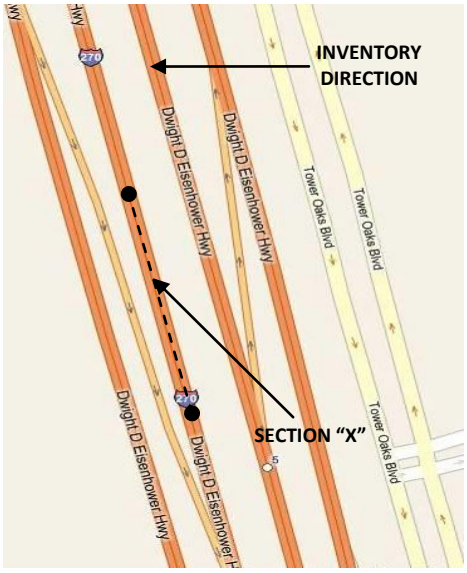
Figure 4.8: Non-Mainline (Code '5') Example



Source: Bing Maps

Figure 4.9 shows an example of a highway (Interstate 270), for which an inventory direction is defined (northbound). In this particular case, this data item shall be assigned a Code '6' for Section "X", as the southbound side of the roadway would be defined as the non-inventory direction.

Figure 4.9: Non-Inventory Direction (Code '6') Example



Source: Bing Maps

Item 4: Structure_Type (Structure Type)

Description: Roadway section that is a bridge, tunnel or causeway.

Use: For analysis in the national highway database and pavement performance analysis/reporting

Extent: All Federal-aid highways.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	FE**	FE**	FE**	FE**	FE**	FE**		
Urban	FE**	FE**	FE**	FE**	FE**	FE**	FE**	

FE** = Full Extent wherever data item is applicable

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Use the following codes:

Code	Description
1	Section is a Bridge

2	Section is a Tunnel
3	Section is a Causeway

Value_Text:	No entry required. Available for State Use.
Value_Date:	No entry required. Available for State Use.

Guidance: Code this data item wherever a bridge, tunnel, or causeway exists.

Bridges shall meet a minimum length requirement of more than 20 feet (per the National Bridge Inventory (NBI) guidelines in accordance with 23 CFR 650.305) in order to be deemed a "structure." Per NBI guidelines, bridge-sized culverts shall be reported for this data item; all other culverts are to be excluded.

A tunnel is a roadway below the surface connecting to at-grade adjacent sections.

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

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.

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.

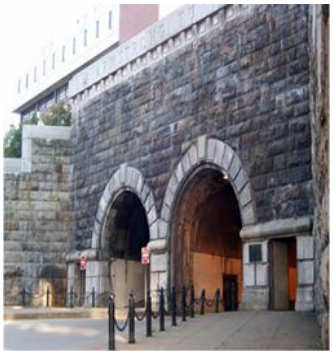
For LRS purposes, this Data Item can be reported independently for both directions of travel associated with divided highway sections, for which dual carriageway GIS network representation is required per guidance in Chapter 3, Section 3.3 and Table 3.5. NOTE: This data item is required to be reported for both the inventory and non-inventory directional approaches associated with all divided Interstate roadway sections where the following pavement data items have been reported in the same manner (as specified in the Metadata; see Chapter 3, Sec. 3.3, Tables 3.18 and 3.19):

- Data Item 47 (IRI)
- Data Item 48 (PSR)
- Data Item 49 (Surface Type)
- Data Item 50 (Rutting)
- Data Item 51 (Faulting)
- Data Item 52 (Cracking Percent)

Figure 4.10: Bridge (Code '1') Example

Source: PennDOT

Figure 4.11: Tunnel (Code '2') Example



Source: PennDOT

Figure 4.12: Causeway (Code '3') Example

Source: PennDOT Video-log.

Item 5: Access_Control (Access Control)

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

Use: For investment requirements modeling to calculate capacity and estimate type of design, in truck size and weight studies, and for national highway database purposes.

Extent: All principal arterials and Sample Panel sections; optional for other non-principal arterial sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE	FE	FE	FE	SP	SP		
Urban	FE	FE	FE	FE	SP	SP	SP	

FE = Full Extent SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

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).

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Figure 4.13: Full Control (Code '1'); all access via grade-separated interchanges

Source: TxDOT, Transportation Planning and Programming Division.

Figure 4.14: Partial Control (Code '2'); access via grade-separated interchanges and direct access roadways

Source: https://upload.wikimedia.org/wikipedia/commons/a/a9/Ohio_13_and_Possum_Run_Road.JPG

Figures 4.15 and 16: No Access Control (Code '3')

Figure 4.15

Figure 4.16

Source for Figures 4.15 and 4.16: FDOT RCI Field Handbook, Nov. 2008.

Item 6: Ownership (Ownership)

Description: The entity that has legal ownership of a roadway.

Use: For apportionment, administrative, legislative, analytical, and national highway database purposes, and in cost allocation studies; for the querying and analysis of data (e.g., transportation performance management (TPM) metrics, Federal-aid project information, etc.) by ownership.

Extent: All Public highways as identified in 23 U.S.C 101.a(27).

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	FE	FE	FE	FE	FE	FE	FE	FE
Urban	FE	FE	FE	FE	FE	FE	FE	FE

FE = Full Extent SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Code the level of government that best represents the highway owner irrespective of whether agreements exist for maintenance or other purposes. If more than one code applies, code the lowest numerical value using the following codes:

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

Value_Text: Optional. Code secondary ownership information, if applicable.

Value_Date: No entry required. Available for State Use.

Guidance: "State" means owned by one of the 50 States, the District of Columbia, or the Commonwealth of Puerto Rico 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 Data Field 9 for this item.

For LRS purposes, this Data Item shall be reported independently for both directions of travel associated with divided highway sections, for which dual carriageway GIS network representation is required per guidance in Chapter 3, Section 3.3 and Table 3.5.

Item 7: Through_Lanes (Through Lanes)

Description The number of lanes designated for through-traffic.

Use: For apportionment, administrative, legislative, analytical, pavement performance analysis/reporting and national highway database purposes.

Extent: All Federal-aid highways including ramps located within grade-separated interchanges.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R		
Urban	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	

FE = Full Extent & Ramps

Coding Requirements for Fields 8, 9, and 10:

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

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: This Data Item shall also be reported for all ramp sections contained within grade separated interchanges.

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 roadways, two-way roadways, and couplets, 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
- 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.

This data shall be collected and reported on an annual cycle for all required sections.

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 per guidance in Chapter 3, Section 3.3 and Table 3.5.

Figure 4.17: A Roadway with Four Through-Lanes

Source: TxDOT, Transportation Planning and Programming Division.

Item 8: HOV_Type (Managed Lane Operations Type)

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

Use: For administrative, legislative, analytical, and national highway database purposes.

Extent: All sections where managed lane operations exist. This shall correspond with the information reported for Data Item 9 (Managed Lanes).

Functional System		1	2	3	4	5	6	7
	NHS	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE**	FE**	FE**	FE**	FE**	FE**		
Urban	FE**	FE**	FE**	FE**	FE**	FE**	FE**	

FE** = Full Extent wherever data item is applicable

Coding Requirements for Fields 8, 9, and 10:

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 used for exclusive managed lanes during specified time periods.
3	Part-time Managed Lanes	Shoulder/Parking lanes used for exclusive managed lanes during specified time periods.

Value_Text: No Entry Required. Available for State Use.

Value_Date: No Entry Required. Available for State Use.

Guidance: Code this data item only when managed lane operations exist.

Code this Data Item for both directions to reflect existing managed lane operations. If more than one type of managed lane is present for the section, code the lesser of the two applicable Managed Lane Type codes (e.g., if Codes '2' and '3' are applicable for a section, then the section shall be coded as a Code '2').

Alternatively, if more than one type of managed lane operation exists, the secondary Managed Lane Type may be indicated in the Value_Text field.

This information may be indicated by either managed lane signing (e.g., the presence of a large diamond-shaped marking (HOV symbol) on the pavement, or both).

Figure 4.18: HOV Signage

Source: FDOT RCI Field Handbook, Nov. 2008.

Item 9: HOV_Lanes (Managed Lanes)

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

Use: For administrative, legislative, analytical, and national highway database purposes.

Extent: All Sections where managed lanes exist. This should correspond with the information reported for Data Item 8 (Managed Lane Operations Type).

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE**	FE**	FE**	FE**	FE**	FE**		
Urban	FE**	FE**	FE**	FE**	FE**	FE**	FE**	

FE** = Full Extent wherever data item is applicable

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the number of managed lanes in both directions.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: Code this data item when Data Item 8 (Managed Lane Operations Type) is coded.

If more than one type of managed lane operation exists on the section, code this data item with respect to all managed lanes available, and indicate (in the Value_Text field) how many lanes apply to the Managed Lane Operations Type reported in Data Item 8.

Item 10: Peak_Lanes (Peak Lanes)

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

Use: For investment requirements modeling to calculate capacity, and in congestion analyses, including estimates of delay. Also used in the Highway Capacity Manual (HCM)-based capacity calculation procedure.

Extent: All Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

FE = Full Extent SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Code the number of through lanes used during the peak period in the peak direction.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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; and
- 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 4.19: Peak Lanes Example (Peak Lanes = 3)

Source: Mike Kahn/Green Stock Media

Item 11: Counter_Peak_Lanes (Counter-Peak Lanes)

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

Use: For investment requirements modeling to calculate capacity, and in congestion analyses, including estimates of delay. It is used in the Highway Capacity Manual (HCM)-based capacity calculation procedure.

Extent: All Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

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

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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

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 (i.e., Peak Lanes + Counter-Peak Lanes >= Through Lanes). The number of peak 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.

Item 12: Turn_Lanes_R (Right Turn Lanes)

Description: The presence of right turn lanes at a typical intersection.

Use: For investment requirements modeling to calculate capacity and in congestion analyses, including estimates of delay.

Extent: All Sample Panel sections located in urban areas, optional for all other urban sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural								
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the code from the following table that best describes the peak-period turning lane operation in the inventory direction.

Code	Description
1	No intersection where a right turning movement is permitted exists on the 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.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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 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. Code a through lane that becomes an exclusive turning lane at an intersection as a shared (through/right turn) lane; 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 4.20) should be considered as an intersection where turns are permitted with no exclusive lanes. Use a 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 a 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.

Figure 4.20: Roundabout Configuration Example

Source: SRA Consulting Group, Nov. 2008

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.

Painted islands (Figure 4.21) 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 4.21: Painted Island Example

Source: TxDOT, Transportation Planning and Programming Division.

Right Turn Lanes Coding Examples:

Figure 4.22: 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 4.23: Continuous Turn Lane (Code '3') Example

Source: Minnesota Dept. of Transportation (MnDOT).

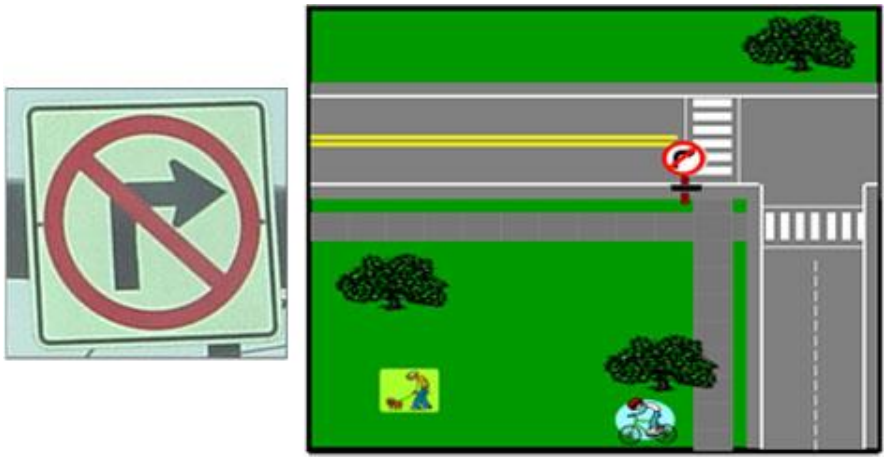
Figure 4.24: Single Turn Lane (Code '4') Example

Source: MoveTransport.com

Figure 4.25: No Exclusive Turn Lane (Code '5') Example

Source: FDOT RCI Field Handbook, Nov. 2008.

Figure 4.26 No Right Turn Permitted (Code '6') Example



Source: TxDOT, Transportation Planning and Programming Division.

Item 13: Turn_Lanes_ L (Left Turn Lanes)

Description: The presence of left turn lanes at a typical intersection.

Use: For investment requirements modeling to calculate capacity and in congestion analyses, including estimates of delay.

Extent: All Sample Panel sections located in urban areas, optional for all other urban sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural								
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the code from the following table that best describes the peak-period turning lane operation in the inventory direction.

Code	Description
1	No intersection where a left turning movement is permitted exists on the 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.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: 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.

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.

Through movements are prohibited in exclusive turn lanes.

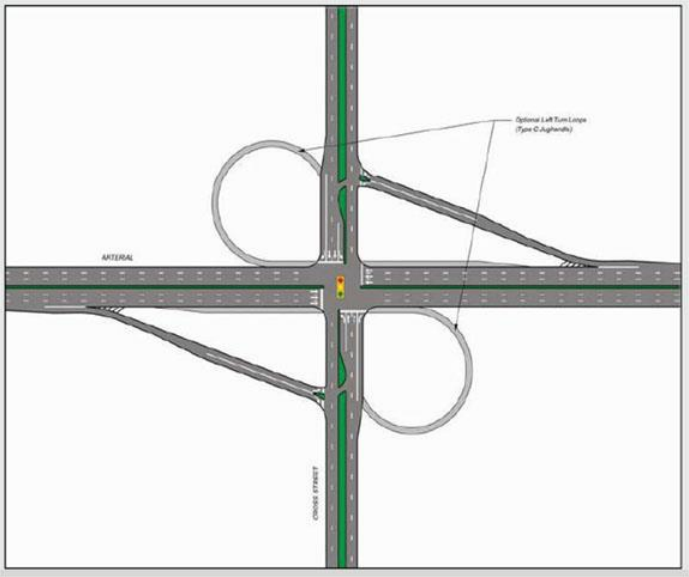
Use codes '2' through '6' for turn lanes at a signalized or stop sign intersection that is critical to the flow of traffic; otherwise enter the code that best describes the peak-hour turning lane situation for typical intersections on the sample.

Code a continuous turning lane with painted turn bays as a continuous turning lane. Code a through lane that becomes an exclusive turning lane at an intersection as a shared (through/left turn) lane; 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 4.20) should be considered as an intersection where turns are permitted with no exclusive lanes. Use a Code '5' for this item since traffic can either turn or go through the roundabout from the same lane. 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.

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

Figure 4.27: Jug Handle Configuration Example



Source: SRA Consulting Group, Nov. 2008

Jug handle configurations (as shown in Figure 4.27), or lanes on either side of the roadway should be considered as 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.'

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.

Painted islands located in the center of a roadway should be considered a median, for the purposes of determining whether or not a turn lane exists.

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

Left Turn Lanes Coding Examples:

Figure 4.28: 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 4.29: Multiple Turn Lanes (Code '2') Example

Source: Unavailable

Figure 4.30: Continuous Turn Lane (Code '3') Example

Source: Kentucky Transportation Cabinet

Example for Coding Turn Lanes and Through 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 4.31), 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 4.31: Exclusive Turn Lane (Code '4') Example

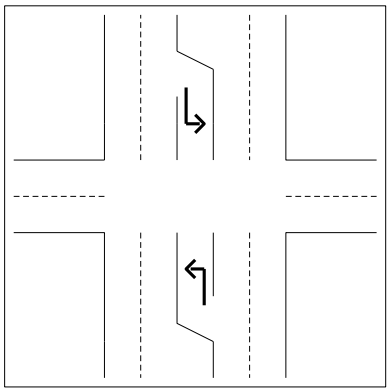


Figure 4.32: No Exclusive Left Turn Lane (Code '5') Example

Figure 4.33: No Left Turn Permitted (Code '6')

Item 14: Speed_Limit (Speed Limit)

Description: The posted speed limit.

Use: For investment requirements modeling to estimate running speed and for other analysis purposes, including delay estimation.

Extent: All Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE	FE	SP	SP	SP	SP		
Urban	FE	FE	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

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'.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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

Baseline speed limit data for the National Highway System (NHS) will be provided by FHWA. The State shall validate or update this information annually as needed.

Item 15: Toll_Charged (Toll Charged)

Description: Identifies sections that are toll facilities regardless of whether or not a toll is charged.

Use: For administrative, legislative, analytical, and national highway database purposes.

Extent: All roadways that are toll facilities, whether public or privately-owned / operated.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	FE**	FE**	FE**	FE**	FE**	FE**	FE**	FE**
Urban	FE**	FE**	FE**	FE**	FE**	FE**	FE**	FE**

FE** = Full Extent wherever data item is applicable

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Use the following codes:

Code	Description
1	Toll charged in one direction only.
2	Toll charged in both directions.
3	No toll charged

Value_Text: Assign the appropriate Toll ID. See Appendix D for the list of IDs.

Value_Date: No entry required. Available for State Use.

Guidance: Code this data item only when a toll facility is present.

Code each toll and non-toll portion of contiguous toll facilities as separate sections.

If tolls are charged in both directions, but only one direction at a given time, then use Code '1'.

Include High Occupancy Toll (HOT) lanes and other special toll lanes. Use Code '3' for subsections of a toll facility that do not have tolls.

Figure 4.34: Toll-Road Signage

Source: FDOT RCI Field Handbook, Nov. 2008.

Item 16: Toll_Type (Toll Type)

Description: Indicates the presence of special tolls (i.e., High Occupancy Toll (HOT) lane(s) or other managed lanes).

Use: For administrative, legislative, analytical, and national highway database purposes.

Extent: All roadways where special tolls exist.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE**	FE**	FE**	FE**	FE**	FE**	FE**	FE**
Urban	FE**	FE**	FE**	FE**	FE**	FE**	FE**	FE**

FE** = Full Extent wherever data item is applicable 7

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Use the following codes:

Code	Description
1	This section has toll lanes but no special tolls (e.g., HOT lanes).
2	This section has HOT lanes.
3	This section has other special tolls.

Value_Text: Assign the appropriate Toll ID. See Appendix D for the list of IDs.

Value_Date: No entry required. Available for State Use.

Guidance: This may not be an HOV facility, but has special lanes identified where users would be subject to tolls.

High Occupancy Toll (HOT) lanes are HOV lanes where a fee is charged, sometimes based on occupancy of the vehicle or the type of vehicle. Vehicle types may include buses, vans, or other passenger vehicles.

Item 17: Route_Number (Route Number)

Description: The signed route number.

Use: Used along with route signing and route qualifier to track information by specific route.

Extent: All principal arterials, minor arterials, and the entire NHS.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE	FE	FE	FE	FE			
Urban	FE	FE	FE	FE	FE			

FE = Full Extent

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Code the appropriate route number (leading zeroes shall not be used), e.g., Interstate 81 shall be coded as '81'; Interstate 35W shall be coded as '35'.

Value_Text: Enter the full route number, e.g., "35W" or "291A."

Value_Date: No entry required. Available for State Use.

Guidance: This shall be the same route number that is identified for the route in Data Items 18 and 19 (Route Signing and Route Qualifier).

If two or more routes of the same functional system are signed along a 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 functional systems are signed along a roadway section (e.g., Interstate 83 and U.S. 32), code this Data Item in accordance with the highest functional system on the route (in this example, Interstate).

For the official Interstate route number, enter an alphanumeric value for the route in Data Field 9.

If Data Items 18 or 19 (Route Signing or Route Qualifier) are coded '10,' code a text descriptor (in Field 9) for this Data Item.

If the official route number contains an alphabetic character (e.g. "32A"), then code the numeric portion of this value in Field 8, and the entire value in Field 9.

Where a route is designated with alphabetic characters only (e.g. "W"), then don't code the Value_Numeric field for this item and use the Value_Text field for the route name.

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 per guidance in Chapter 3, Section 3.3 and Table 3.5. NOTE: This data item is required to be reported for both the inventory and non-inventory directional approaches associated with all divided Interstate roadway sections where the following pavement data items have been reported in the same manner (as specified in the Metadata; see Chapter 3, Sec. 3.3, Tables 3.18 and 3.19):

- Data Item 47 (IRI)
- Data Item 48 (PSR)
- Data Item 49 (Surface Type)
- Data Item 50 (Rutting)
- Data Item 51 (Faulting)
- Data Item 52 (Cracking Percent)

Item 18: Route_Signing (Route Signing)

Description: The type of route signing.

Use: For tracking information by specific route; used in conjunction with Data Item 19 (Route Qualifier).

Extent: All principal arterials, minor arterials, and the entire NHS.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE	FE	FE	FE	FE			
Urban	FE	FE	FE	FE	FE			

FE = Full Extent

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Code the value that best represents the manner in which the roadway section is signed with route markers, using the following codes:

Code	Description	Code	Description
1	Not Signed	6	County
2	Interstate	7	Township
3	U.S.	8	Municipal
4	State	9	Parkway Marker or Forest Route Marker
5	Off-Interstate Business Marker	10	None of the Above

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: 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, Interstate). Follow the hierarchy as ordered above.

Item 19: Route_Qualifier (Route Qualifier)

Description: The route signing descriptive qualifier.

Use: For tracking information by specific route; used in conjunction with Data Item 18 (Route Signing).

Extent: All principal arterials, minor arterials, and the entire NHS.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE	FE	FE	FE	FE			
Urban	FE	FE	FE	FE	FE			

FE = Full Extent

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Code the value which best represents the manner in which the roadway section is signed on the route marker described in Data Item 18 (Route Signing).

Code	Description	Code	Description
1	No qualifier or Not Signed	6	Loop
2	Alternate	7	Proposed
3	Business Route	8	Temporary
4	Bypass Business	9	Truck Route
5	Spur	10	None of the Above

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: If more than one code is applicable, use the lowest code.

Figure 4.35 Business Route (Code '3') Example

Source: FDOT RCI Field Handbook, Nov. 2008.

Figure 4.36 Proposed Route (Code '7') Example

Source: FDOT RCI Field Handbook, Nov. 2008.

Figure 4.37 Temporary Route (Code '8') Example

Source: FDOT RCI Field Handbook, Nov. 2008.

Item 20: Alternative_Route_Name (Alternative Route Name)

Description: A familiar, non-numeric designation for a route.

Use: For tracking information by specific route; used in conjunction with Data Items 18 and 19 (Route Signing and Route Qualifier).

Extent: Optional for principal arterial, minor arterial, and NHS sections where this situation exists.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	FE	FE	FE	FE	FE			
Urban	FE	FE	FE	FE	FE			

FE = Full Extent

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: No entry required. Available for State Use.

Value_Text: Optional. Enter the alternative route name.

Value_Date: No entry required. Available for State Use.

Guidance: Examples for this Data item would be the "Pacific Coast Highway" (in California), and the "Garden State Parkway" (in New Jersey).

Item 21: AADT (Annual Average Daily Traffic)

Description: Annual Average Daily Traffic.

Use: For apportionment, administrative, legislative, analytical, and national highway database purposes.

Extent: All Federal-aid highways including ramps located within grade-separated interchanges.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R		
Urban	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	FE+R	

FE + R = Full Extent & Ramps

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter a value that represents the AADT for the current data year.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Metadata: See Chapter 3 for a description of the metadata reporting requirements for this Data Item.

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

This Data Item shall also be reported for all ramp sections contained within grade separated interchanges

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

AADTs for the NHS, Interstate, 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.

If average weekday, average weekly, or average monthly traffic is calculated or available, it shall be adjusted to represent the annual average daily traffic (AADT). AADT is an average daily value that represents all days of the reporting year.

AADT guidance for ramps:

AADT values representing the current data year are required for ramps contained within grade separated interchanges on all Federal-aid highways. To the extent possible, the same procedures used to develop AADTs on non-ramp sections should also be used to develop AADT for data. At a minimum, 48-hour ramp traffic counts 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 be used to gather traffic data on ramps. States are encouraged to use adjustment factors that have been developed based either on entrance or exit travel patterns, or on the functional system of the ramp. The procedure should be applied consistently statewide.

Additional guidance on how this data is to be developed and reported is contained in Chapter 5.

Item 22: AADT_Single_Unit (Single-Unit Truck and Bus AADT)

Description: Annual Average Daily Traffic for single-unit trucks and buses.

Use: For investment requirements modeling to estimate pavement deterioration and operating speeds, in the cost allocation pavement model, the truck size and weight analysis process, freight analysis, and other scenario based analysis.

Extent: All NHS and Sample Panel sections; optional for all other non-NHS sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE	FE	SP	SP	SP	SP		
Urban	FE	FE	SP	SP	SP	SP	SP	

FE = Full Extent SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

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: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Metadata: See Chapter 3 for a description of the AADT metadata reporting requirements related to this Data Item.

Guidance: For two-way facilities, provide the bidirectional Single-unit Truck and Bus AADT; for one-way roadways, and ramps, 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 *Traffic Monitoring Guide (TMG)*. Single-unit trucks and buses are defined as vehicle classes 4 through 7 (buses through four-or-more axle, single-unit trucks).

AADT values shall be updated annually to represent current year data.

Section specific measured values are requested based on traffic counts taken on a minimum three-year cycle. 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 can be used.

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 *Traffic Monitoring Guide*.

Item 23: Pct_Peak_Single (Percent Peak Single-Unit Trucks and Buses)

Description: Peak hour single-unit truck and bus volume as a percentage of total AADT.

Use: For investment requirements modeling to calculate capacity and peak volumes.

Extent: All Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the peak hour single-unit truck and bus volume as a percentage of the applicable roadway section's AADT rounded to the nearest thousandth of a percent (0.001%). This percent shall not be rounded to the nearest whole percent or to zero percent if minimal vehicles exist.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: Code this item based on vehicle classification data from traffic monitoring programs for vehicle classes 4 through 7 (as defined in the *Traffic Monitoring Guide*), based on traffic counts taken on a three-year cycle, at a minimum.

The Percent Peak Single-Unit Trucks and Buses value is calculated by dividing the number of single-unit trucks and buses during the hour with the highest total volume (i.e. the peak hour) by the AADT (i.e. the total daily traffic). Note that this data item is based on the truck traffic during the peak traffic hour and not the hour with the most truck traffic.

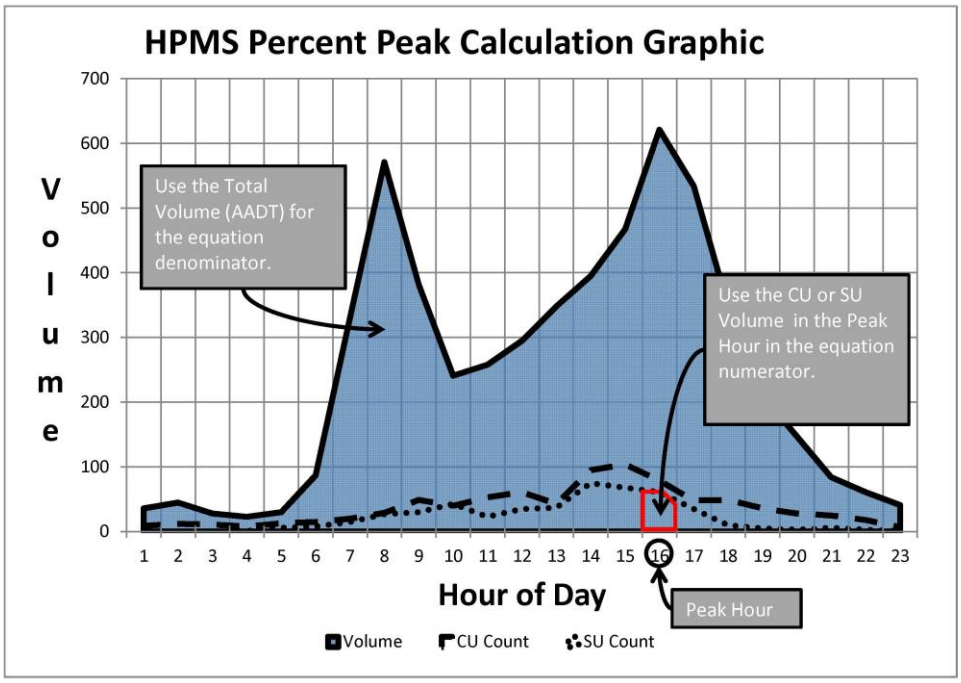
If actual measured values are not available, then an estimate shall be made based on the most readily available information. The most credible method would be to use other site specific measured values from sites located on the same route. Other methods may include: assigning site specific measured values to other samples that are located on similar facilities with similar traffic characteristics in the same geographic area and in the same volume group; or assigning measured values from samples in the same functional system and in the same area type (i.e., rural, small urban, urbanized).

Statewide or functional system-wide values shall not be used. Peak hour values may be different than daily averages which must be taken into consideration.

Supplemental methods and sources may be particularly useful in urban areas. These include turning movement studies, origin and destination studies, license plate surveys, design estimates and projections, and MPO data obtained for other purposes. Short term visual observation of truck travel can also be helpful when developing an estimate.

Note that this data represents the truck traffic during the peak traffic hour, not the 30th highest hourly volume for a given calendar year or the hour which has the peak truck traffic (see Figure 4.38).

Figure 4.38 Peak Hour Truck Traffic vs. AADT



Code this data item in accordance with the limits for which Data Item #22 is reported.

The following examples illustrate the % Peak Single-Unit (SU) Trucks calculation:

Example #1

AADT = 150,000 vehicles
SU AADT = 12,100 SU trucks (classes 4-7)
Peak hour SU Trucks = 1,550 SU trucks (classes 4-7)
% Peak SU Trucks = (Peak hour SU trucks/AADT)*100 =

(1,550 SU trucks/150,000)*100 = 1.0333%

**When reported in HPMS, this % Peak SU value would be reported as 1.033%.*

Example #2

AADT = 2,050 vehicles
SU AADT = 85 SU trucks (classes 4-7)
Peak hour SU Trucks = 8 SU trucks (classes 4-7)
% Peak SU Trucks = (Peak hour SU trucks/AADT)*100

(8 SU trucks/2,050)*100 = 0.39024%

**When reported in HPMS, this % Peak SU value would be reported as 0.390%.*

Item 24: AADT_Combination (Combination Truck AADT)

Description: Annual Average Daily Traffic for Combination Trucks.

Use: For investment requirements modeling to estimate pavement deterioration and operating speeds, in the cost allocation pavement model, the truck size and weight analysis process, and freight analysis.

Extent: All NHS and Sample Panel sections; optional for all other non-NHS sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE	FE	SP	SP	SP	SP		
Urban	FE	FE	SP	SP	SP	SP	SP	

FE = Full Extent SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

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: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Metadata: See Chapter 3 for a description of the AADT metadata reporting requirements related to this Data Item.

Guidance: For two-way facilities, provide the bidirectional Combination Truck AADT; for one-way roadways, and ramps, 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. Actual vehicle classification counts shall be adjusted to represent average conditions as recommended in the *Traffic Monitoring Guide (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).

AADT values shall be updated annually to represent current year data.

Section specific measured values are requested based on traffic counts taken on a three-year cycle, at a minimum. 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 *Traffic Monitoring Guide.*

Item 25: Pct_Peak_Combination (Percent Peak Combination Trucks)

Description: Peak hour combination truck volume as a percentage of total AADT.

Use: For investment requirements modeling to calculate capacity and peak volumes.

Extent: All Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the peak hour combination truck volume as a percentage of the applicable roadway section's AADT rounded to the nearest thousandth of a percent (0.001%). This percent shall not be rounded to the nearest whole percent or to zero percent if minimal vehicles exist.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: Code this item based on vehicle classification data from traffic monitoring programs for vehicle classes 8 through 13 (as defined in the TMG) based on traffic counts taken on a three year cycle, as a minimum. Code this data item in accordance with the limits for which Data Item #24 is reported.

The Percent Peak Combination Truck value is calculated by dividing the number of combination trucks during the hour with the highest total volume (i.e. the peak hour) by the AADT (i.e. the total daily traffic). Note that this data item is based on the truck traffic during the peak traffic hour and not the hour with the most truck traffic.

If actual measured values are not available, then an estimate shall be made based on the most readily available information. The most credible method would be to use other site specific measured values from sites located on the same route. Other methods may include: assigning site specific measured values to other samples that are located on similar facilities with similar traffic characteristics in the same geographic area and in the same volume group; or assigning measured values from samples in the same functional system and in the same area type (i.e., rural, small urban, urbanized).

Statewide or functional system-wide values shall not be used. Peak hour values may be different than daily averages which must be taken into consideration.

Supplemental methods and sources may be particularly useful in urban areas. These include turning movement studies, origin and destination studies, license plate surveys, design estimates and projections, and MPO data obtained for other purposes. Short term visual observation of truck travel can also be helpful when developing an estimate.

Note that this data represents the truck traffic during the peak traffic hour, not the 30th highest hourly volume for a given calendar year or the hour which has the peak truck traffic (see Figure 4.38).

The following examples illustrate the % Peak Combination-Unit (CU) Trucks calculation:

Example #1

AADT = 15,000 vehicles
CU AADT = 2,800 CU trucks (classes 8-13)
Peak hour CU Trucks = 215 CU trucks (classes 8-13)
% Peak CU Trucks = (Peak hour CU Trucks/AADT)*100 =

(215 CU Trucks/15,000)*100 = 1.433%

**When reported in HPMS, this % Peak CU value would be reported as 1.433%.*

Example #2

AADT = 70,240 vehicles
CU AADT = 22,750 CU Trucks (classes 8-13)
Peak hour CU Trucks = 1,528 CU Trucks (classes 8-13)
% Peak CU Trucks = (Peak hour CU Trucks/AADT)*100

(1,528 CU Trucks/70,240)*100 = 2.175%

**When reported in HPMS, this % Peak CU value would be reported as 2.175%.*

Item 26: K_Factor (K-factor)

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

Use: For investment requirements modeling to calculate capacity and estimate needed capacity improvements, in the cost allocation pavement model, and for other analysis purposes, including delay estimation.

Extent: All Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the K-factor to the nearest percent.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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 is reported.

Item 27: Dir_Factor (Directional Factor)

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

Use: For investment requirements modeling to calculate capacity and estimate needed capacity improvements, in congestion, delay, and other analyses, and in the cost allocation pavement model.

Extent: All Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

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

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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 is reported.

Item 28: Future_AADT (Future AADT)

Description: Forecasted AADT.

Use: For investment requirements modeling to estimate deficiencies and future improvement needs, in the cost allocation pavement model and in other analytical studies.

Extent: All Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter a value that represents the forecasted AADT.

Value_Text:	No entry required. Available for State Use.
Value_Date:	Four-digit year for which the Future AADT has been forecasted.

Guidance: For two-way facilities, provide the bidirectional Future AADT; for one-way roadways, and ramps, 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 is reported.

Item 29: **Signal_Type** (Signal Type)

Description: The predominant type of signal system on a sample section.

Use: For the investment requirements modeling process to calculate capacity and estimate delay.

Extent: All Sample Panel sections located in urban areas; optional for all other urban sections beyond the limits of the Sample Panel and rural Sample Panel sections.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP*	SP*	SP*	SP*	SP*	SP*		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections SP* = Sample Panel Sections (optional)

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the code that best describes the predominant type of signal system for the direction of travel (in the inventory direction). Signal information may be coded for rural sections on an optional basis.

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

Code	Description
5	No signal systems exist.

Value_Text:	No entry required. Available for State Use.
Value_Date:	No entry required. Available for State Use.

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.

Examples of Types of Signals:

Figure 4.39: Uncoordinated Fixed Time (Code '1') Example

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

Figure 4.40: 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.

Figure 4.41: Coordinated Progressive (Code '3') Example

These signals usually occur in high-traffic urban or urbanized areas, in close proximity to other signals (as shown in Figure 4.41), and are usually timed or coordinated with adjoining signals. This type of signal allows for a more constant free flow of traffic.

Item 30: Pct_Green_Time (Percent Green Time)

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

Use: For investment requirements modeling to calculate capacity and in congestion analyses.

Extent: All Sample Panel sections located in urban areas; optional for all other urban sections beyond the limits of the Sample Panel and rural Sample Panel sections.

Functional System		1	2	3	4	5	6	7
	NHS	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP*	SP*	SP*	SP*	SP*	SP*		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections SP* = Sample Panel Sections (optional)

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the percent green time in effect during the peak period (max peak period preferred) for through traffic at signalized intersections, for the inventoried direction of travel.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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 percent green time at that location; otherwise code this Data Item for 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.

Item 31: Number_Signals (Number of Signalized Intersections)

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

Use: For investment requirements modeling to calculate capacity and estimate delay.

Extent: All Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

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

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: Only signals which cycle through a complete sequence of signalization (i.e., red, yellow (amber), 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 Panel section 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 4.42:

- 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.

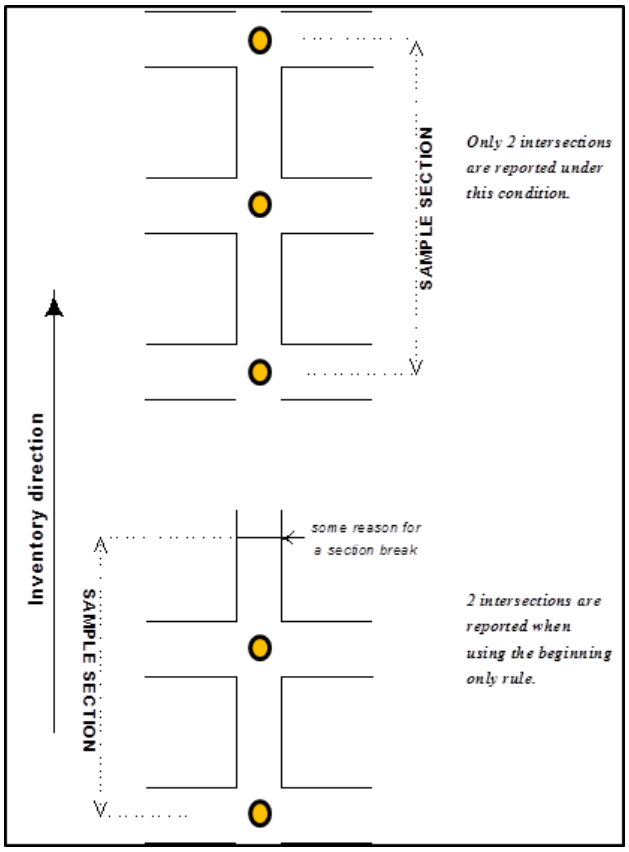
Roundabouts (see Figure 4.20) shall be coded under Data Item 33 (At-Grade/Other) intersections.

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

An Example of the Beginning or Ending Intersection Rule:

In the upper portion of Figure 4.42, 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 4.42, 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 4.42 Intersection Count Example



Item 32: Stop_Signs (Number of Stop Sign-Controlled Intersections)

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

Use: For investment requirements modeling to calculate capacity and estimate delay.

Extent: All Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:	
Value_Numeric:	Code the number of at-grade intersections where stop signs are present, controlling traffic in the inventory direction.
Value_Text:	No entry required. Available for State Use.
Value_Date:	No entry required. Available for State Use.

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 Panel section 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 4.44:

- 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 (see Figure 4.20) 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.

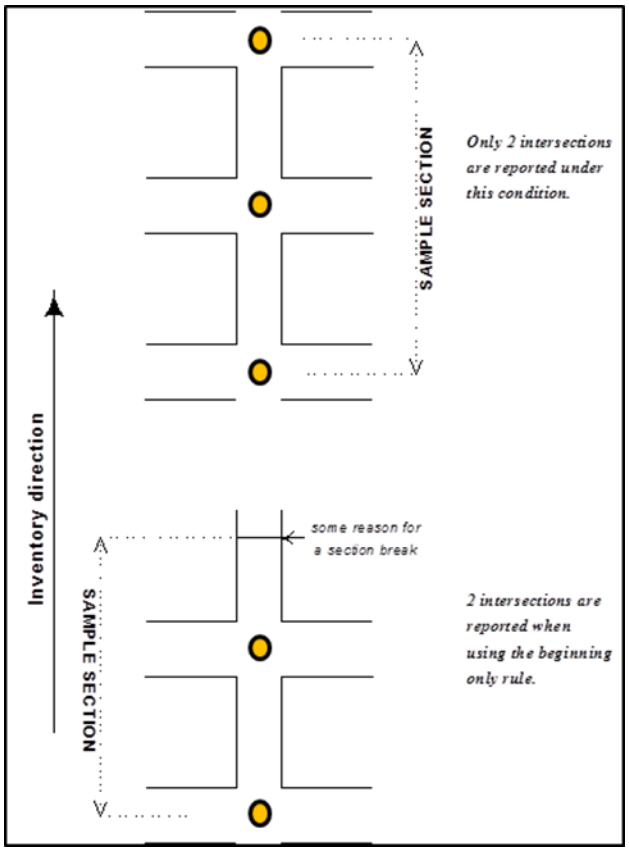
Figure 4.43 Stop Sign Controlled Intersection

Source: MnDOT, Dec. 2012.

An Example of the Beginning or Ending Intersection Rule:

In the upper portion of Figure 4.44, 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 4.44, 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 4.44 Intersection Count Example



Item 33: At_Grade_Other (Number of Intersections, Type – Other)

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

Use: For investment requirements modeling to calculate capacity and estimate delay.

Extent: All Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:	
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.
Value_Text:	No entry required. Available for State Use.
Value_Date:	No entry required. Available for State Use.

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 (see Figure 4.20) shall be considered as an "at-grade/other" type of traffic control devices.

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 Panel section 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 4.46:

- 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.

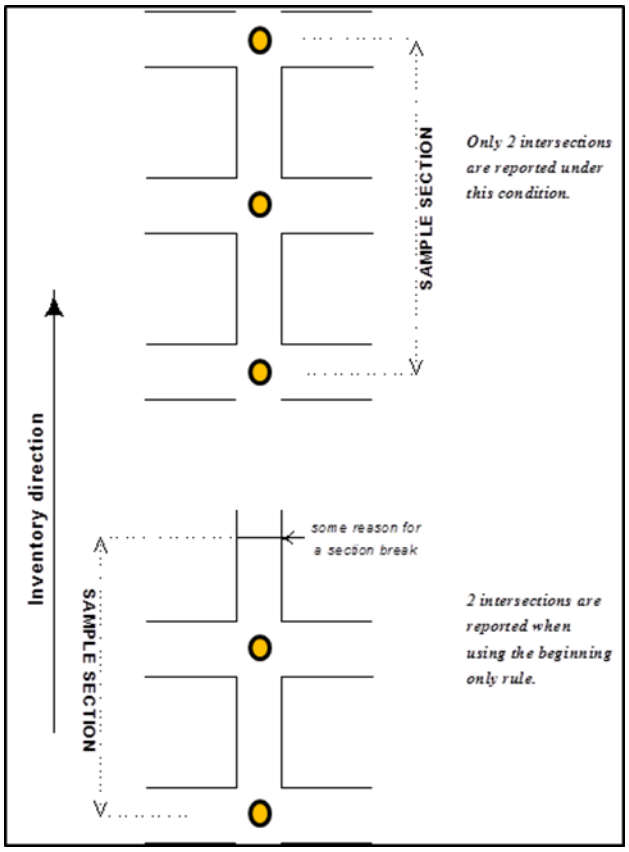
Figure 4.45 At-Grade Other Example

Source: Puckett Pages

An Example of the Beginning or Ending Intersection Rule:

In the upper portion of Figure 4.46, 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 4.46, 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 4.46: Intersection Count Example



Item 34: Lane_Width (Lane Width)

Description: The measure of existing lane width.

Use: For investment requirements modeling to calculate capacity, estimate needed improvements, and compute a safety index, for cost allocation pavement models.

Extent: All Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:	
Value_Numeric:	Enter the predominant through-lane width to the nearest whole foot.
Value_Text:	No entry required. Available for State Use.
Value_Date:	No entry required. Available for State Use.

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).

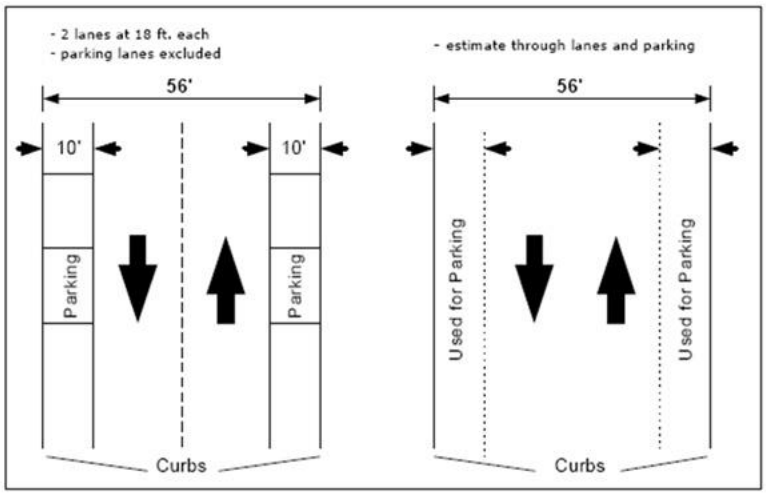
Where there is no delineation between the through-traffic lane and the shoulder or parking lane, or where there is no centerline, estimate a reasonable split between the actual width used by traffic and the shoulder or parking lane based on State/local design guides.

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 4.47, 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 4.47: An Example for Measuring Lane Width



Item 35: Median_Type (Median Type)

Description: The type of median.

Use: For investment requirements modeling to calculate capacity and estimate type of design and for national highway data base purposes.

Extent: All Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Code the type of median using the following codes (Codes '5' through '7' are optional and shall be used if the data is available.):

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.

These definitions are summarized from AASHTO *Policy on Geometric Design of Highways and Streets* 2004.
* Codes 5, 6, and 7 are optional.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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 4.48: An Example of Median Type = 2, Unprotected

Source: TxDOT, Transportation Planning and Programming Division.

Item 36: Median_Width (Median Width)

Description: The existing median width.

Use: For investment requirements modeling to calculate capacity and estimate type of design and for national highway data base purposes.

Extent: All Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

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.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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

The edge of through lane is determined by paint stripping, 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 4.49: An Example for Measuring Median Width

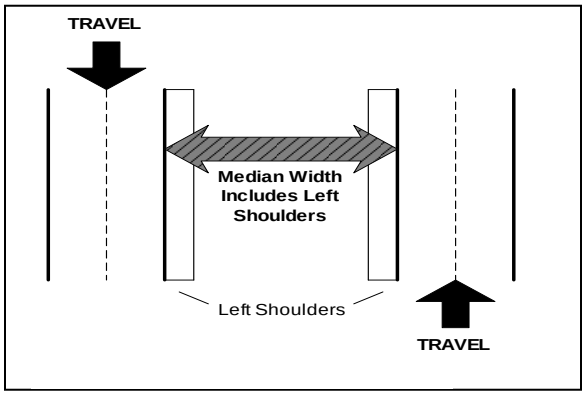


Figure 4.50: Median Width Measurement

Source: FDOT RCI Field Handbook, Nov. 2008.

Item 37: Shoulder_Type (Shoulder Type)

Description: The type of shoulder.

Use: For investment requirements modeling to estimate needed improvements.

Extent: All Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the code for the type of shoulder on the section.

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 a part of the width is earth)
6	Earth shoulder exists
7	Barrier curb exists; no shoulder in front of curb

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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.

If there is a shoulder in front of a barrier curb, code this Data Item and Data Item 38 (Shoulder Width); do not code the area behind a barrier curb as a shoulder.

Disregard mountable curbs for HPMS reporting purposes. If there is a shoulder either in front of or behind a mountable 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 or a curb on the other side, code this Data Item, Data Item 38 (Shoulder Width), and Data Item 40 (Peak Parking) accordingly. A shoulder cannot exist between a traffic lane and a parking lane.

Shoulder Type Examples:

Figure 4.51: Bituminous (Code '2')

Figure 4.52: Stabilized (Code '4')

Figure 4.53: Combination (Code '5')

Figure 4.54: Earth (Code '6')

Figure 4.55: Barrier Curb / No Shoulder (Code '7')

Item 38: Shoulder_Width_R (Right Shoulder Width)

Description: The existing right shoulder width.

Use: For investment requirements modeling to calculate capacity and estimate needed improvements.

Extent: All Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the width of the right shoulder to the nearest whole foot.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: Do not include parking or bicycle lanes in the shoulder width as further illustrated in Figures 4.58-4.60.

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.

Examples of Measuring Shoulder Width:

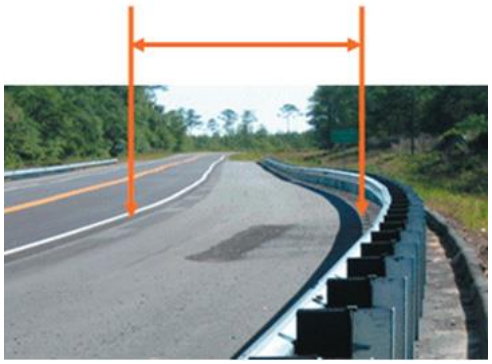
Figure 4.56: Earth Shoulder Measurement

Earth Shoulder: Measure from the white stripe to the break point of the shoulder.

Figure 4.57: Bituminous Shoulder Measurement

Bituminous Shoulder: Measure from the white stripe to the edge of the paved area.

Figure 4.58: Measuring Shoulders with Guardrails



Guardrail Present on Shoulder: Measure from the edge of through lane to the face of the guardrail.

Figure 4.59: Measuring Shoulders with Parking/Bike Lanes

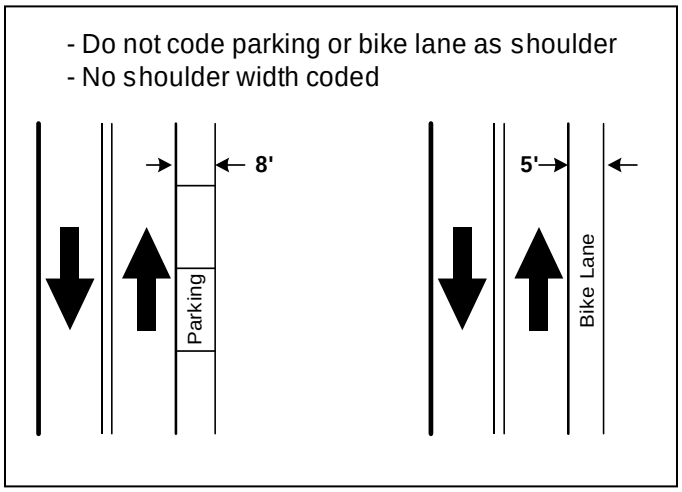


Figure 4.60: Measuring Shoulders with Parking and Bike Lanes

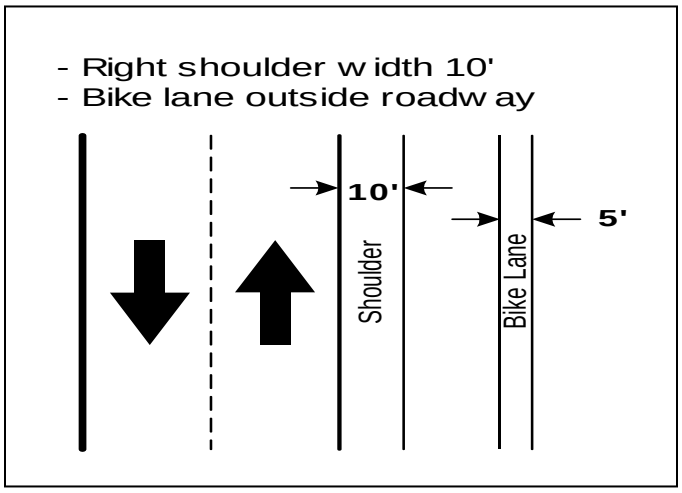
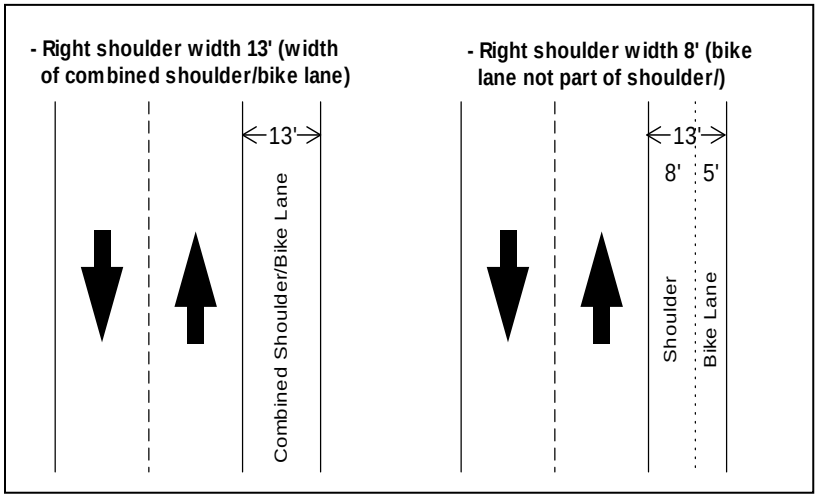


Figure 4.61: Measuring Shoulders with Combined Parking/Bike Lanes



Item 39: Shoulder_Width_L (Left Shoulder Width)

Description: The existing left shoulder width.

Use: For investment requirements modeling to calculate capacity and estimate needed improvements.

Extent: All Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the width of the left (median) shoulder to the nearest whole foot. Left shoulders shall only be coded for divided highway sections.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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 lane to the left-most edge of the inside shoulder.

Item 40: Peak_Parking (Peak Parking)

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

Use: For investment requirements modeling to calculate capacity.

Extent: All Sample Panel sections located in urban areas, optional for all other urban sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural								
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

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.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: Code this Data Item to reflect the permitted use, even if the section 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.'

Figure 4.62: Parking on One Side (Code '1') Example

Source: FDOT RCI Field Handbook, Nov. 2008.

Figure 4.63: Parking on Both Sides (Code '2') Example

Source: FDOT RCI Field Handbook, Nov. 2008.

Figure 4.64: No parking allowed (Code '3') Example

Source: TxDOT, Transportation Planning and Programming Division

Item 41: Widening_Obstacle (Widening Obstacle)

Description: Obstacles that prevent widening of the existing roadway for additional through lanes.

Use: For administrative, legislative, analytical, and national highway database purposes.

Extent: All Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: No entry required. Available for State Use.

Value_Text: Code all conditions that apply in either direction on either side of the section and leave blank for unreported data using the following codes:

Code	Definition	Description
X	No obstacles	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 on obstacle for all urban areas and should be evaluated relative to the conditions in the area where the section 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 section 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.

Value_Date: No entry required. Available for State Use.

Guidance: 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”).

Code “X” cannot be used with other codes (e.g. “XE”)

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 section.

If Data Item 42 (Widening Potential) is coded ‘8’ lanes or less, then this data item shall be coded “A” through “G”.

Figure 4.65: Cemetery (Code "E") Obstacle Example

Source: PennDOT.

Figure 4.66: Major Rail Line (Code "B") Obstacle Example

Source: TxDOT, Transportation Planning and Programming Division.

Item 42: Widening_Potential (Widening Potential)

Description: The number of through lanes that could be potentially added.

Use: For investment requirements modeling to estimate needed capacity improvements

Extent: All Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Code the number of lanes (0-9) for which it is feasible to widen the existing road, in both directions. Code a '9,' if it is possible to add nine or more lanes.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: Code this item based on how feasible it is to widen the existing road based on the presence of obstacles as identified in Data Item 41 (Widening 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 sections or corridors with limited Widening Potential is assumed to be significantly more costly than other more routine capacity improvements.

Figure 4.67: Widening Potential of 9 lanes (Max)

Source: PennDOT.

Figure 4.68: No Widening Potential

Source: PennDOT.

Item 43: Curves_A through Curves_F (Curve Classification)

Description: Curve classification data.

Use: For investment requirements modeling to calculate horizontal alignment adequacy and estimate running speed and operating costs.

Extent: All paved principal arterial and rural minor arterial Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural		SP	SP	SP	SP			
Urban		SP	SP	SP				

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the total length of the segments that apply to each individual curve class, using the degree of curvature ranges listed in the table below. Each Sample Panel section 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)
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

Value_Text:	No entry required. Available for State Use.
Value_Date:	No entry required. Available for State Use.

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 segment is coded as a separate curve; segments 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
	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 Sections dataset as depicted below:

2009|45|SCXXX|0|5.69|CURVES_A|5.69|1.75|||

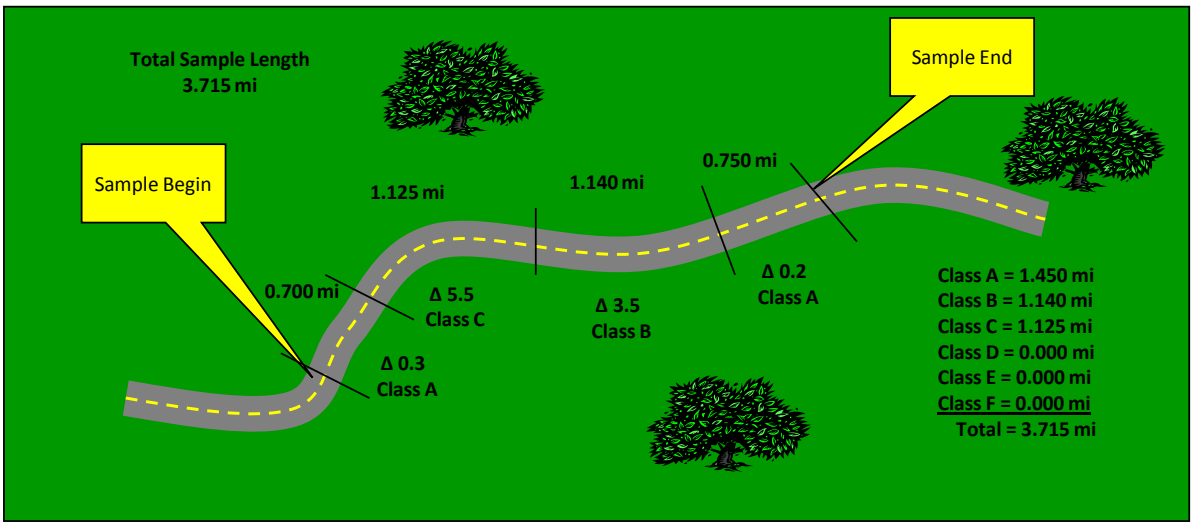
2009|45|SCXXX|0|5.69|CURVES_B|5.69|1.25|||

2009|45|SCXXX|0| 5.69|CURVES_C|5.69|1.87|||

2009|45|SCXXX|0| 5.69|CURVES_E|5.69|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 4.69 Curve Classification Example



Source: TxDOT, Transportation Planning and Programming Division

Item 44: Terrain_Type (Terrain Type)

Description: The type of terrain.

Use: For investment requirements modeling to calculate capacity and estimate needed capacity improvements and in the truck size and weight analysis process.

Extent: All principal arterial, minor arterial, and major collector Sample Panel sections located in rural areas, optional for all other rural sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural		SP	SP	SP	SP	SP		
Urban								

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the code that best describes the terrain according to the following table:

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.

Value_Text:	No entry required. Available for State Use.
Value_Date:	No entry required. Available for State Use.

Guidance: When coding this Data Item, consider the terrain of roadway sections that extend beyond the Sample Panel section limits, rather than solely the grade characteristics associated with the Sample Panel section. The extended roadway section 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 Panel section may be the same.

Figure 4.70 Level Terrain (Code '1') Example

Source: PennDOT.

Figure 4.71 Rolling Terrain (Code '2') Example

Source: PennDOT.

Figure 4.72 Mountainous Terrain (Code '3') Example

Source: PennDOT.

Item 45: Grades_A through Grades_F (Grade Classification)

Description: Grade classification data.

Use: For investment requirements modeling to calculate vertical alignment adequacy and estimate running speed and operating costs and in the truck size and weight analysis process.

Extent: All paved interstate, other freeway and expressway, other principal arterial, and rural minor arterial Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural		SP	SP	SP	SP			
Urban		SP	SP	SP				

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:	
Value_Numeric:	Enter the total length of the segments that apply to each individual grade class, using the percent grade ranges listed in the table 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
B	0.5 – 2.4
C	2.5 – 4.4
D	4.5 – 6.4
E	6.5 – 8.4
F	8.5 or greater

Value_Text:	No entry required. Available for State Use.
Value_Date:	No entry required. Available for State Use.

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

Each grade and flat segment is to be coded as a separate segment; segments 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 4.73 Grade Classification Example

Source: TxDOT, Transportation Planning and Programming Division.

Item 46: Pct_Pass_Sight (Percent Passing Sight Distance)

Description: The percent of a Sample Panel section meeting the sight distance requirement for passing.

Use: For investment requirements modeling to calculate capacity and estimate running speed and for truck size and weight analysis purposes.

Extent: All rural, paved two-lane Sample Panel sections; optional for all other rural sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban								

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the percent of the section length that is striped for passing.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: This data item shall be reported for sample sections where passing is permitted in the inventory direction.

When there is a discernable directional difference in permitted passing per the roadway striping, code for the more restrictive direction (i.e., the direction that produces the lower value).

Item 47: IRI (International Roughness Index)

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.

Use: For investment requirements modeling to estimate pavement deterioration, section deficiencies, and necessary improvements, in cost allocation studies, in pavement condition trends, and for other analysis purposes including NHS performance. Also, for performance measure calculation for pavement condition on the NHS.

Extent: All NHS and principal arterial sections, and rural minor arterial Sample Panel sections; optional for urban minor arterial, major collector, and minor collector Sample Panel sections and rural major collector Sample Panel sections.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE	FE	FE	FE	SP	SP*		
Urban	FE	FE	FE	FE	SP*	SP*	SP*	

FE = Full Extent SP = Sample Panel Sections SP* = Sample Panel Sections (optional)

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Code IRI to the nearest inch per mile.

Value_Text: No entry required if the Value_Numeric field has been populated with a newly measured value for a NHS section. If the Value_Numeric has not been populated with a newly measured value, then one of the following codes shall be provided:

Code	Description
A	Construction – Roadway was under construction
B	Closure – Roadway was closed to traffic
C	Disaster – Roadway was located in an area declared as a disaster zone
D	Deterioration – Roadway is too deteriorated to measure and is already designated as "Poor"

Value_Date: Report the month and year in MM/YYYY format, excluding leading zeroes) for when the data was collected. A default date may be used if the exact date of collection is unknown.

Guidance: 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, 2014, 34th/2014 Edition, AASHTO, 1-56051-606-4. 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; 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; 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', '10' and '11'.
- Shall not be estimated from PSR (Item 48).
- Estimating conditions from data samples of the full extent of the mainline will not be permitted.

Existing IRI values should continue to be reported until they are replaced by new measured values.

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) section, a PSR value for that section is not required, as a paved Sample Panel section 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 per guidance in Chapter 3, Section 3.3 and Table 3.5. NOTE: 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 (as specified in the Metadata; see Chapter 3, Sec. 3.3, Tables 3.18 and 3.19):

- Data Item 2 (Urban Code)
- 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)
- Data Item 70 (Directional Through Lanes)

Metadata: See Chapter 3 for a description of the metadata reporting requirements for this Data Item.

Item 48: PSR (Present Serviceability Rating)

Description: Present Serviceability Rating (PSR) for pavement condition.

Use: For investment requirements modeling to estimate pavement deterioration, section deficiencies, and needed improvements, in cost allocation studies, in pavement condition trends, and for other analysis purposes including NHS performance. Also, for performance measure calculation for pavement condition on the NHS.

Extent: NHS, urban minor arterial, major collector, and minor collector Sample Panel sections and rural major collector Sample Panel sections where IRI is not reported.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE*	FE*				SP*		
Urban	FE*	FE*			SP*	SP*	SP*	

FE* = Full Extent (optional) SP* = Sample Panel Sections (optional)

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Code a PSR or equivalent to the nearest tenth.

Value_Text: No entry required for non-NHS sections. If the Value_Numeric field has been populated for a NHS section, then this field shall be used to identify the reason as to why this data was unable to be collected on a NHS section. See the following list of eligible codes:

Code	Description
A	Posted speed limit is less than 40 mph

Value_Date: No entry required. Available for State Use.

Guidance: For the sections on the NHS where posted speed limit is less than 40 mph, PSR can 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;
- reported for milepoint limits (i.e., sections) that are consistent with those reported for Data Item 47 (IRI); and
- 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 pavements on the non-Interstate NHS (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., Sample Panel sections located on non-Principal Arterial System (PAS) roadways), PSR can 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;
- 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).

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 4.4 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 4.4. Estimates to the nearest tenth within the applicable range shall be made (e.g., 2.3 as opposed to 2.323).

Table 4.4: 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.
3.0 – 4.0	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.
2.0 – 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.
1.0 – 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 sections, for which dual carriageway GIS network representation is required per guidance in Chapter 3, Section 3.3 and Table 3.5. NOTE: 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 (as specified in the Metadata; see Chapter 3, Sec. 3.3, Tables 3.18 and 3.19):

- Data Item 2 (Urban Code)
- Data Item 4 (Structure Type)
- Data Item 17 (Route Number)
- Data Item 47 (IRI)
- Data Item 49 (Surface Type)
- Data Item 50 (Rutting)
- Data Item 51 (Faulting)
- Data Item 52 (Cracking Percent)
- Data Item 70 (Directional Through Lanes)

Item 49: Surface_Type (Surface Type)

Description: Surface type on a given section.

Use: For investment requirements modeling to estimate pavement deterioration and loading history, for the cost allocation pavement model, for the national highway database, and pavement condition performance metric rating determination.

Extent: All NHS and Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE	FE	SP	SP	SP	SP		
Urban	FE	FE	SP	SP	SP	SP	SP	

FE = Full Extent SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

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 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_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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 except in a couple of States.

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 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. Additional information can be found in Section 5.4

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 extremely rare.

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 per guidance in Chapter 3, Section 3.3 and Table 3.5. NOTE: 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 (as specified in the Metadata; see Chapter 3, Sec. 3.3, Tables 3.18 and 3.19):

- Data Item 2 (Urban Code)
- Data Item 4 (Structure Type)
- Data Item 17 (Route Number)
- Data Item 47 (IRI)
- Data Item 48 (PSR)
- Data Item 50 (Rutting)
- Data Item 51 (Faulting)
- Data Item 52 (Cracking Percent)
- Data Item 70 (Directional Through Lanes)

Table 4.5: 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					

Item 50: Rutting (Rutting)

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.

Use: For pavement modeling purposes and pavement condition performance metric rating.

Extent: All NHS and Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	FE	FE	SP	SP	SP	SP		
Urban	FE	FE	SP	SP	SP	SP	SP	

FE= Full Extent SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Code the average rutting for the section 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 ruts are not present.

Value_Text: No entry required if the Value_Numeric field has been populated for a NHS section. Otherwise, this field shall be used to identify the reason as to why this data was unable to be collected on a NHS section. See the following list of eligible codes:

Code	Description
A	Construction – Roadway was under construction
B	Closure – Roadway was closed to traffic
C	Disaster – Roadway was located in an area declared as a disaster zone
D	Deterioration – Roadway is too deteriorated to measure and is already designated as "Poor"

Value_Date: Report the month and year (either in MM/YYYY format, excluding leading zeroes) for when the data was collected. A default date may be used if the exact date of collection is unknown.

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 R48-10 (2013), Standard Practice for Determining Rut Depth in Pavements with the following modifications:

- Transverse profiles shall be measured with no less than 5 profile points.
- Transverse profiles shall be measured in the inventory direction of the highway
- The summary interval for rut measurement shall be the length of the section, nominally 0.1 mile and aligned with other surface measurements.
- Maximum longitudinal spacing between transverse profiles shall be not more than 12 inches.
- Calculation of rut depth shall follow the method described in section 5 of Standard R48-10 and averaged over each wheelpath. The average of the two wheelpaths in the summary interval is to be reported.

- Or data collection conforming to AASHTO Standards PP70-14, Standard Practice for Collection the Transverse Pavement Profile and PP69-14 Standard 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 PP69 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; 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).

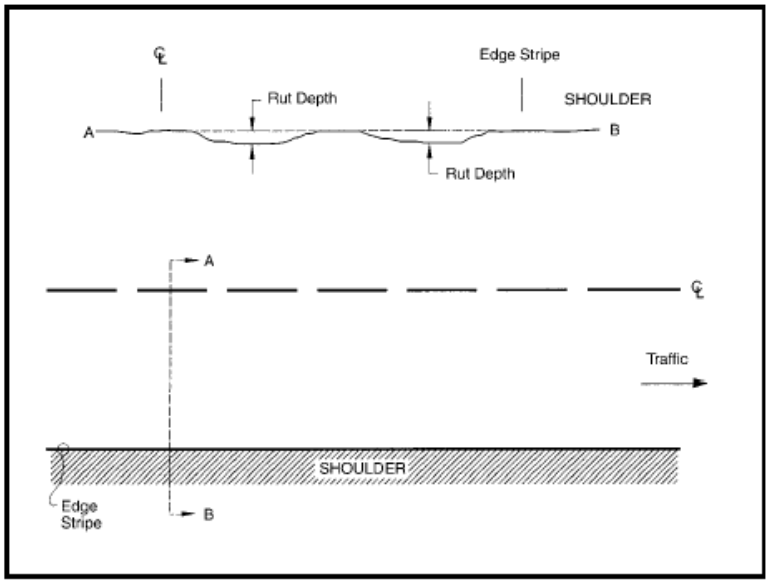
- For the sections on the non-Interstate System NHS, measured rutting values shall be:
    - collected for the full extent of the mainline highway;
    - in the rightmost through lane or one consistent lane for all data if the rightmost through lane carries traffic that is not representative of the remainder 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; 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 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 highway sections, for which dual carriageway GIS network representation is required per guidance in Chapter 3, Section 3.3 and Table 3.5. NOTE: 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 (as specified in the Metadata; see Chapter 3, Sec. 3.3, Tables 3.18 and 3.19):

- Data Item 2 (Urban Code)
- Data Item 4 (Structure Type)
- Data Item 17 (Route Number)
- Data Item 47 (IRI)
- Data Item 48 (PSR)
- Data Item 49 (Surface Type)
- Data Item 51 (Faulting)
- Data Item 52 (Cracking Percent)
- 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 4.74 Rutting



Source: LTPP Distress and Identification Manual, June 2003

Figure 4.75 Rutting Example

Source: TxDOT, Construction Division.

Metadata: See Chapter 3 for a description of the metadata reporting requirements for this Data Item.

Item 51: **Faulting** (Faulting)

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', '10', and '11'). It may be constructed of either reinforced or unreinforced (plain) concrete.

Use: For pavement modeling purposes and pavement condition performance metric rating.

Extent: All NHS and Sample Panel sections, optional for all other sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	FE	FE	SP	SP	SP	SP		
Urban	FE	FE	SP	SP	SP	SP	SP	

FE = Full Extent SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Report the average/mean absolute faulting of all joints in a section 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: No entry required if the Value_Numeric field has been populated for a NHS section. Otherwise, this field shall be used to identify the reason as to why this data was unable to be collected on a NHS section. See the following list of eligible codes:

Code	Description
A	Construction – Roadway was under construction
B	Closure – Roadway was closed to traffic
C	Disaster – Roadway was located in an area declared as a disaster zone
D	Deterioration – Roadway is too deteriorated to measure and is already designated as “Poor”

Value_Date: Report the month and year (either in MM/YYYY format, excluding leading zeroes) for when the data was collected. A default date may be used if the exact date of collection is unknown.

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 R36-13, 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 the 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 the right wheel path.

  - Faulting is to be reported as the average absolute faulting of the right wheelpath 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; 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; 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', '10' and '11'.
- 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.

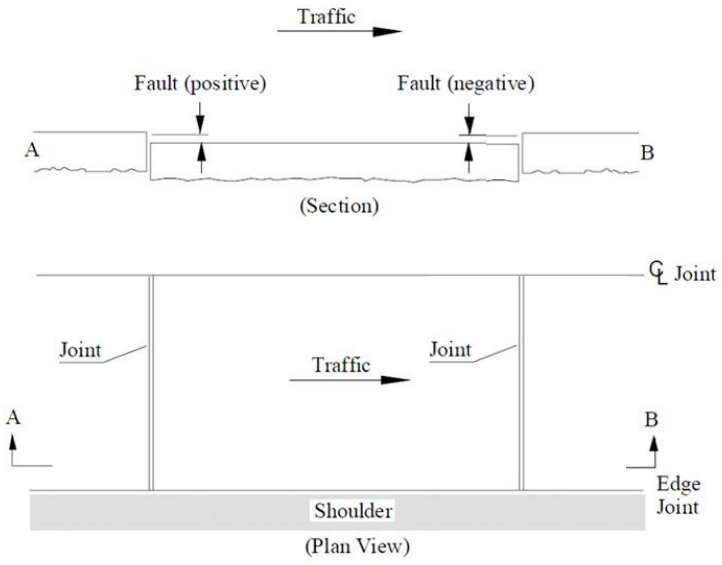
Every joint shall be measured in the right wheel-path over a section and the average absolute faulting reported.

For LRS purposes, this Data Item can be reported independently for both directions of travel associated with divided highway sections, for which dual carriageway GIS network representation is required per guidance in Chapter 3, Section 3.3 and Table 3.5. NOTE: 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 (as specified in the Metadata; see Chapter 3, Sec. 3.3, Tables 3.18 and 3.19):

- Data Item 2 (Urban Code)
- Data Item 4 (Structure Type)
- Data Item 17 (Route Number)
- Data Item 47 (IRI)
- Data Item 48 (PSR)
- Data Item 49 (Surface Type)
- Data Item 50 (Rutting)
- Data Item 52 (Cracking Percent)
- 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 4.76: Faulting



Source: LTPP Distress and Identification Manual, June 2003

Figure 4.77: Faulting Example

Source: TxDOT, Construction Division.

Metadata: See Chapter 3 for a description of the metadata reporting requirements for this Data Item.

Item 52: Cracking_Percent (Cracking Percent)

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 pavements (Item 49 codes '2', '6', '7', and '8'), Cracking Percent is the percentage of the total area exhibiting visible fatigue type cracking for all severity levels in the wheelpath in each section.
- For Jointed Concrete Pavements (Item 49 codes '3', '4', '9', '10', and '11'), 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.

Use: For pavement modeling purposes and pavement condition performance metric rating.

Extent: All NHS and Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	FE	FE	SP	SP	SP	SP		
Urban	FE	FE	SP	SP	SP	SP	SP	

FE = Full Extent SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

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 for roadway sections where cracks are not present.

Value_Text: No entry required if the Value_Numeric field has been populated for a NHS section. Otherwise, this field shall be used to identify the reason as to why this data was unable to be collected on a NHS section. See the following list of eligible codes:

Code	Description
A	Construction – Roadway was under construction
B	Closure – Roadway was closed to traffic
C	Disaster – Roadway was located in an area declared as a disaster zone
D	Deterioration – Roadway is too deteriorated to measure and is already designated as "Poor"

Value_Date: Report the month and year (either in MM/YYYY format, excluding leading zeroes) for when the data was collected. A default date may be used if the exact date of collection is unknown.

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 R55-10, Quantifying Cracks in Asphalt Pavement Surfaces, PP67-14, Quantifying Cracks in Asphalt Pavement Surfaces from Collected Images Utilizing Automated Methods, and PP68-14, 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', '10', and '11'):

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 4.85). For case 2 in Figure 4.85, 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; 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; 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', '10', and '11'), 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 highway sections, for which dual carriageway GIS network representation is required per guidance in Chapter 3, Section 3.3 and Table 3.5. NOTE: 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 (as specified in the Metadata; see Chapter 3, Sec. 3.3, Tables 3.18 and 3.19):

- Data Item 2 (Urban Code)
- Data Item 4 (Structure Type)
- Data Item 17 (Route Number)
- Data Item 47 (IRI)
- Data Item 48 (PSR)
- Data Item 49 (Surface Type)
- Data Item 50 (Rutting)
- Data Item 51 (Faulting)
- 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.

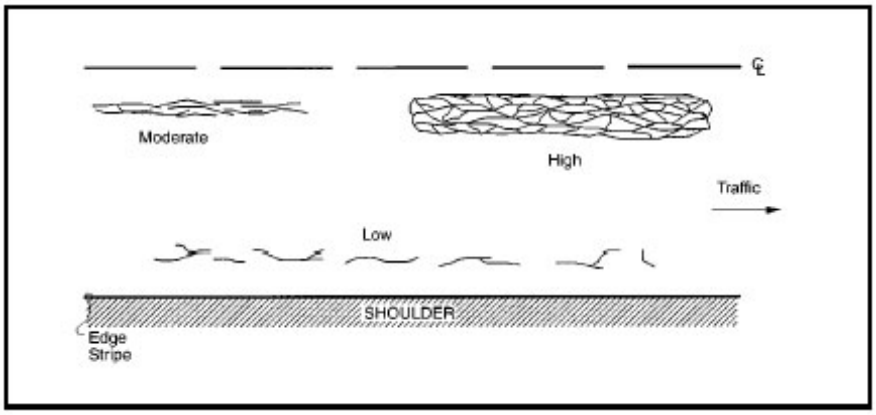
For jointed PCC pavements as an example, if a 0.1 mile section has 4 slabs of 33 having some transverse cracking, you would report 12% slab cracking.

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

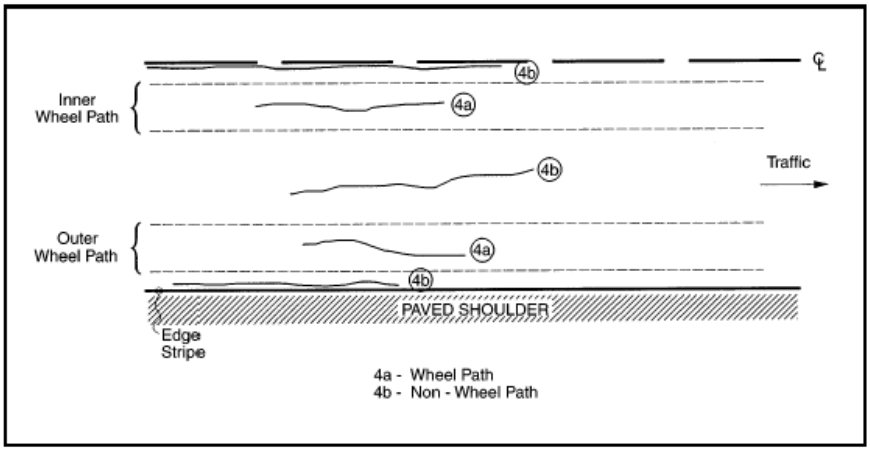
48 sf / 6336 sf = 0.8 percent cracking, may be reported as 1 percent.

Figure 4.78: AC Fatigue Type Cracking



Source: LTPP Distress and Identification Manual, May 2014

Figure 4.79: AC Longitudinal Cracking (Inside and Outside of Wheel path)



Source: LTPP Distress and Identification Manual, May 2014

Figure 4.80: AC Moderate Severity Longitudinal Cracking (Wheel path)

Source: LTPP Distress and Identification Manual, May 2014

Figure 4.81: AC Chicken Wire/Alligator Fatigue Type Cracking in Wheel path

Source: LTPP Distress and Identification Manual, May 2014

Figure 4.82: AC Low Severity Fatigue Type Cracking

Source: LTPP Distress and Identification Manual, May 2014

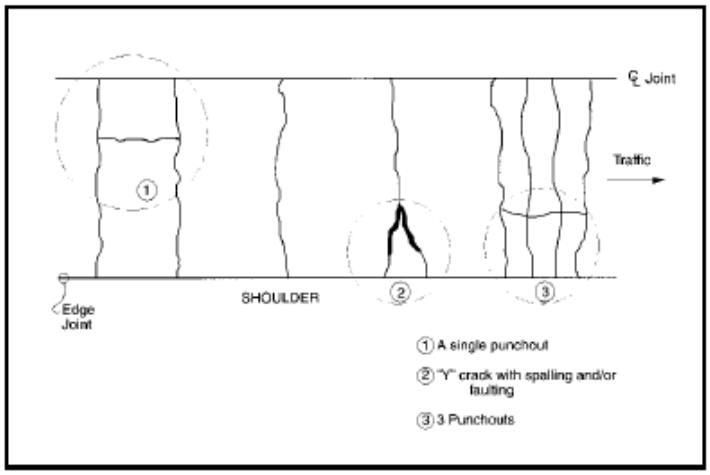
Figure 4.83: AC Moderate Severity Fatigue Type Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 4.84: AC High Severity Fatigue Type Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 4.85: CRCP Fatigue Type Cracking (Punchouts)

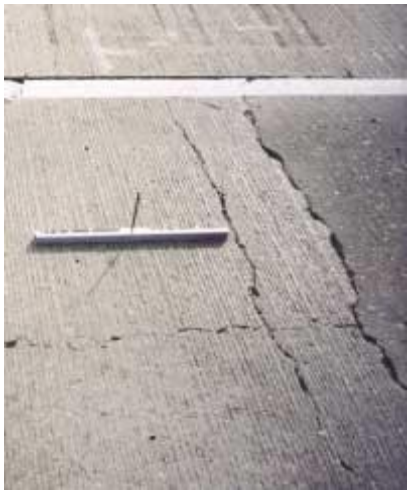


Source: LTPP Distress and Identification Manual, May 2014

Figure 4.86: Low Severity CRCP Punchout Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 4.87: Moderate Severity CRCP Punchout Cracking

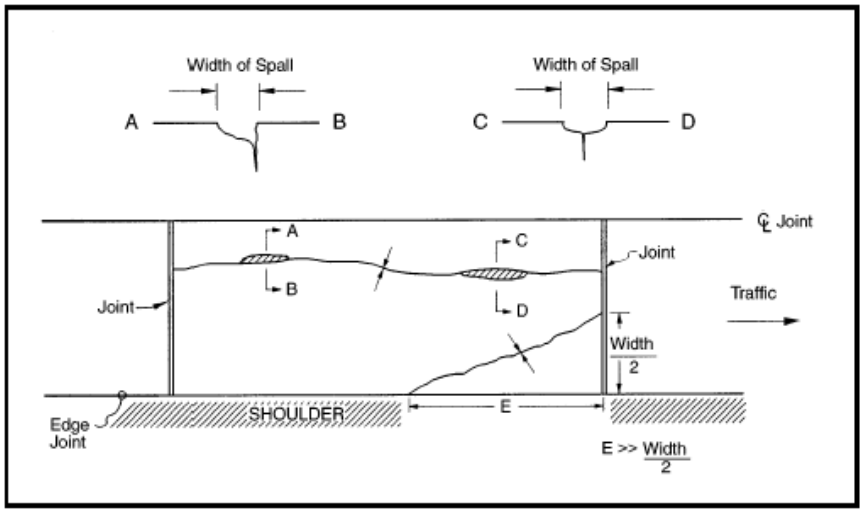


Source: LTPP Distress and Identification Manual, May 2014

Figure 4.88: High Severity CRCP Punchout Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 4.89: JCP Longitudinal Cracking



Source: LTPP Distress and Identification Manual, May 2014

Figure 4.90: JCP Low Severity Longitudinal Cracking

Source: LTPP Distress and Identification Manual, May 2014

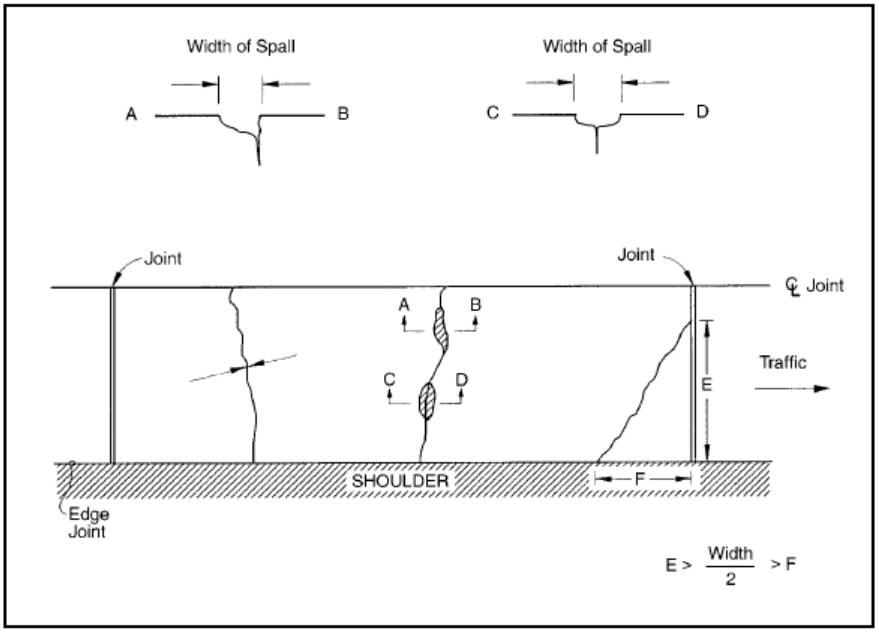
Figure 4.91: JCP Moderate Severity Longitudinal Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 4.92: JCP High Severity Longitudinal Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 4.93: JCP Transverse Cracking



Source: LTPP Distress and Identification Manual, May 2014

Figure 4.94: JCP Moderate Severity Transverse Cracking

Source: LTPP Distress and Identification Manual, May 2014

Figure 4.95: JCP High Severity Transverse Cracking

Source: LTPP Distress and Identification Manual, May 2014

Metadata: See Chapter 3 for a description of the metadata reporting requirements for this Data Item.

Item 54: Year_Last_Improv (Year of Last Improvement)

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

Use: For the cost allocation pavement model.

Extent: All paved Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: No entry required. Available for State Use.

Value_Text: No entry required. Available for State Use.

Value_Date: Enter the year (in YYYY format) for when the last surface improvement was completed.

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.

Figure 4.96: Resurfaced Roadway

Source: FDOT RCI Field Handbook, Nov. 2008.

Item 55: Year_Last_Construction (Year of Last Construction)

Description: The year in which the roadway was constructed or reconstructed.

Use: For pavement modeling purposes.

Extent: All paved Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: No entry required. Available for State Use.

Value_Text: No entry required. Available for State Use.

Value_Date: Enter the year (in YYYY format) for when the roadway was last constructed or reconstructed.

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), even if the existing pavement was rubblized prior to placing the new pavement surface.

Item 56: Last_Overlay_Thickness (Last Overlay Thickness)

Description: Thickness of the most recent pavement overlay.

Use: For pavement modeling purposes.

Extent: All paved Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Code the actual measured value to the nearest 0.5 inch.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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

Values can also be obtained from construction plans for use in the Table.

An overlay is more than 0.5 inch.

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.

Item 57: Thickness_Rigid (Thickness Rigid)

Description: Thickness of rigid pavement.

Use: For investment requirements modeling to estimate pavement deterioration and loading history and in the cost allocation pavement model.

Extent: All paved Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:	
Value_Numeric:	Code the actual measured value to the nearest 0.5 inch.
Value_Text:	No entry required. Available for State Use.
Value_Date:	No entry required. Available for State Use.

Guidance: The thickness shall reflect the last improvement on the 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 for use in the Table.

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 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 unbounded 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.

Item 58: Thickness_Flexible (Thickness Flexible)

Description: Thickness of the flexible pavement.

Use: For investment requirements modeling to estimate pavement deterioration and loading history and in the cost allocation pavement model.

Extent: All paved Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

Functional System		**1**	**2**	**3**	**4**	**5**	**6**	**7**
	NHS	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:	
Value_Numeric:	Code the actual measured value to the nearest 0.5 inch.
Value_Text:	No entry required. Available for State Use.

Value_Date:	No entry required. Available for State Use.

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

Values can also be obtained from construction plans for use in the Table.

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.

Item 59: Base_Type (Base Type)

Description: The base pavement type.

Use: For pavement modeling purposes.

Extent: All paved Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

Functional System		**1**	**2**	**3**	**4**	**5**	**6**	**7**
	NHS	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:
Value_Numeric: Supply the appropriate code using the following codes:

Code	Description	Definitions
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

Code	Description	Definitions
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

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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.

Item 60: Base_Thickness (Base Thickness)

Description: The thickness of the base pavement.

Use: For pavement modeling purposes.

Extent: All paved Sample Panel sections; optional for all other sections beyond limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Code the actual measured value to the nearest inch.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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 for use in the Table.

Item 61: Climate_Zone (Climate Zone)

Description: Climate zone as defined by the 4 LTPP climate zone descriptions.

Use: For cost allocation pavement model purposes.

Extent: All paved Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the applicable Long Term Pavement Performance (LTPP) climate zone code:

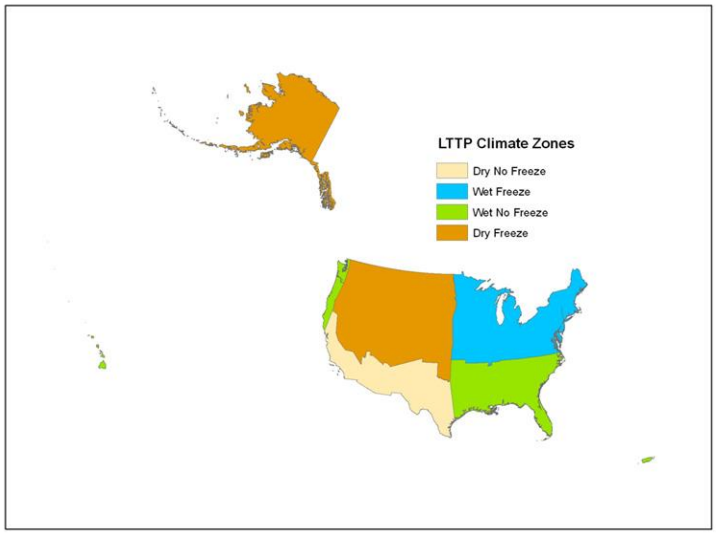
Code	Description
1	Wet-Freeze
2	Wet-Non-freeze
3	Dry-Freeze
4	Dry-Non-freeze

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: This data item will be populated by FHWA using the map shown in Figure 4.97, if the States do not provide this information.

Figure 4.97: LTPP Climate Zone Map



Item 62: Soil_Type (Soil Type)

Description: Soil type as defined by AASHTO soil classes.

Use: For pavement modeling purposes.

Extent: All paved Sample Panel sections; optional for all other sections beyond the limits of the Sample Panel.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

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 mm sieve) (AASHTO Soil Class A-4 through A-7)

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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

Item 63: County_Code (County Code)

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

Use: For identifying the County for which the data is being reported.

Extent: All Public highways as Identified in 23 U.S.C 101.a(27).

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE	FE	FE	FE	FE	FE	FE	FE
Urban	FE	FE	FE	FE	FE	FE	FE	FE

FE = Full Extent

Coding Requirements for Fields 8, 9, and 10:

Value_Numeric: Enter the three-digit County FIPS code.

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

Guidance: The official (three-digit) codes are defined in the National Institute of Standards and Technology (NIST) FIPS Publication 6-4.

See Appendix J for codes to be used for Alaska, District of Columbia (DC), and Puerto Rico.

Item 64: NHS (National Highway System)

Description: A Roadway that is a component of the National Highway System (NHS).

Use: For analysis and mapping of NHS information and for defining extent for performance metric rating determination.

Extent: All roadways that are designated NHS routes (as of December 31st of the applicable data year), excluding ramps.

	1	2	3	4	5	6	7
Functional System	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE**	FE**	FE**	FE**	FE**	FE**	FE**
Urban	FE**	FE**	FE**	FE**	FE**	FE**	FE**

FE** = Full Extent wherever data item is applicable SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:

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

Code	Description
1	Non Connector NHS

Code	Description
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

Value_Text:	No entry required. Available for State Use.
Value_Date:	Required. The Month and Year that the NHS section was officially approved.

Guidance: Code this data item for roadway segments that reside on an official NHS route.

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

For LRS purposes, this Data Item shall be reported independently for both directions of travel associated with divided highway sections, for which dual carriageway GIS network representation is required per guidance in Chapter 3, Section 3.3 and Table 3.5.

The States shall provide their NHS data to FHWA as part of their annual submittal until directed otherwise by the FHWA Office of Highway Policy Information.

Provided that FHWA assumes the role of maintaining these datasets in the future, 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., and FHWA regulations.

Item 65: STRAHNET_Type (Strategic Highway Network)

Description: Roadway section that is a component of the Strategic Highway Network (STRAHNET).

Use: For analysis and mapping of STRAHNET information.

Extent: All roadways that are designated STRAHNET routes.

	1	2	3	4	5	6	7
Functional System	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE**	FE**	FE**	FE**	FE**	FE**	FE**
Urban	FE**	FE**	FE**	FE**	FE**	FE**	FE**

FE** = Full Extent wherever data item is applicable

Coding Requirements for Fields 8, 9, and 10:

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).

Value_Date: Optional. The Month and Year that the STRAHNET section was officially approved.

Guidance: Code this data item for roadway segments that reside on an official STRAHNET route.

The States shall provide their STRAHNET data to FHWA as part of their annual submittal until directed otherwise by the FHWA Office of Highway Policy Information.

Provided that FHWA assumes the role of maintaining these datasets in the future, 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., and FHWA regulations.

Item 66: Truck (National Truck Network)

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

Use: For analysis and mapping of NN information.

Extent: All roadways that are designated NN routes.

	1	2	3	4	5	6	7
Functional System	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE**	FE**	FE**	FE**	FE**	FE**	FE**
Urban	FE**	FE**	FE**	FE**	FE**	FE**	FE**

FE** = Full Extent wherever data item is applicable

Coding Requirements for Fields 8, 9, and 10:

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)

Value_Text:	No entry required. Available for State Use.
Value_Date:	Optional. The Month and Year that the National Truck Network section was officially approved.

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

The States shall provide their NN data to FHWA as part of their annual submittal until directed otherwise by the FHWA Office of Highway Policy Information.

Provided that FHWA assumes the role of maintaining these datasets in the future, 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., and FHWA regulations.

Item 67: Future_Facility (Future National Highway System)

Description: An unbuilt roadway (or section) of the National Highway System (NHS), including intermodal connectors.

Use: For analysis and mapping of future NHS information.

Extent: All roadways that are designated future NHS routes.

	1	2	3	4	5	6	7
Functional System	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE**	FE**	FE**	FE**	FE**	FE**	FE**
Urban	FE**	FE**	FE**	FE**	FE**	FE**	FE**

FE** = Full Extent wherever data item is applicable

Coding Requirements for Fields 8, 9, and 10:	
Value_Numeric:	Code as follows future NHS facilities as follows:

Code	Description
1	Un-built NHS section

Value_Text:	No entry required. Available for State Use.
Value_Date:	Optional. The Month and Year that the Future NHS section was officially approved.

Guidance: Code this data item for roadway segments that may ultimately reside (i.e. awaiting FHWA approval) on an official NHS route.

The States shall provide their future NHS data to FHWA as part of their annual submittal until directed otherwise by the FHWA Office of Highway Policy Information.

Provided that FHWA assumes the role of maintaining these datasets in the future, 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., and FHWA regulations.

Item 68: Maintenance_Operations (Maintenance and Operations)

Description: The legal entity that maintains and operates a roadway.

Use: For administrative, legislative, analytical, and national highway database purposes.

Extent: All roadways that are toll facilities, whether public or privately-owned / operated; optional for all other sections.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	FE**	FE**	FE**	FE**	FE**	FE**	FE**	FE**
Urban	FE**	FE**	FE**	FE**	FE**	FE**	FE**	FE**

FE** = Full Extent wherever data item is applicable

Coding Requirements for Fields 8, 9, and 10:

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

Code	Description	Code	Description
50	Indian Tribe Nation		

Value_Text:	Optional. Enter secondary operator information, if applicable.
Value_Date:	No entry required. Available for State Use.

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" maintained means one of the 50 States, the District of Columbia, or the Commonwealth of Puerto Rico 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 Data Field 9 (*Value_Text*) for this item.

Item 69: Capacity (Capacity)

Description: The capacity of the roadway as estimated by the State DOT or local agency.

Use: For investment requirements modeling to calculate capacity, the cost allocation pavement model, and congestion, delay and other analyses.

Extent: All Sample Panel sections.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

SP = Sample Panel Sections

Coding Requirements for Fields 8, 9, and 10:	
Data Item Value:	Enter the estimated capacity for a given roadway
Value_Text:	No entry required. Available for State Use.
Value_Date:	No entry required. Available for State Use.

Guidance: This item should be estimated based on procedures consistent with the *Highway Capacity Manual* (HCM). If this data item is not coded (i.e., not provided by the State DOT), FHWA will calculate this information per HCM-based procedures. For reference purposes, FHWA will provide capacity calculation documentation and HPMS software-based procedures upon request.

The capacity of a roadway facility is the maximum reasonable hourly rate at which vehicles can be expected to transverse a point or a uniform section of lane or roadway during a given time period under prevailing roadway, traffic, and control conditions. Reasonable expectancy is that the stated capacity can be achieved repeatedly. The (HCM) provides procedures, formulas, graphics, and tables in assessing roadway capacity.

All urban and rural capacity for freeways and other multilane facilities is for the peak direction. If a rural facility has 2 or 3 lanes with one-way operation, it is considered to be a multilane facility for determining capacity. The capacity for rural facilities with 2 or 3 lanes and two-way operation is for both directions.

Item 70: Dir_Through_Lanes (Directional Through Lanes)

Description: The number of lanes designated for through-traffic, for a given direction of travel on a divided highway section.

Use: For querying and analysis of pavement performance metrics for Transportation Performance Management (TPM) purposes.

Extent: All divided Interstate highway sections, where pavement distresses have been reported independently for the inventory and non-inventory directions of travel.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural		FE*						
Urban		FE*						

FE* = Full Extent (*See 'NOTE' below)

***NOTE:** 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 divided highway sections (see Chapter 2 - Sec. 2.7, Chapter. 3 - Sec. 3.3 ("Metadata" discussion), and Sec. 4.3 discussion for additional information).

Coding Requirements for Fields 8, 9, and 10:

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

Value_Text: No entry required. Available for State Use.

Value_Date: No entry required. Available for State Use.

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
- Shoulders

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.

This data shall be collected and reported on an annual cycle for all required sections.

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 per guidance in Chapter 3, Section 3.3 and Table 3.5. NOTE: This data item is required to be reported for both the inventory and non-inventory directional approaches associated with all divided Interstate roadway sections where the following pavement data items have been reported in the same manner (as specified in the Metadata; see Chapter 3, Sec. 3.3, Tables 3.18 and 3.19):

- Data Item 47 (IRI)
- Data Item 48 (PSR)
- Data Item 49 (Surface Type)
- Data Item 50 (Rutting)
- Data Item 51 (Faulting)
- Data Item 52 (Cracking Percent)

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 and requirements for these data items and Directional Through Lanes is described in Table 4.6.

Table 4.6: Travel Lane-related Data 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.	Full Extent for divided 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.	Full Extent for all Federal-aid system roadway sections, including ramps.	Off-peak	Varies depending on the selected pavement distress reporting method (see Chapter 2 - Sec. 2.7, Chapter. 3 - Sec. 3.3 (“Metadata” discussion)), and Chapter 4 - Sec. 4.4 (“Data Item 7” discussion) for guidance).
Managed Lanes	The maximum number of lanes designated for managed lane operations.	Full Extent for 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.

4.5 Sample Panel Identification Data Reporting Requirements

This section describes the data fields required for reporting the location of the Sample Panel Sections within the State's Table of Potential Samples (T.O.P.S.). Detailed Information on the sampling procedures associated with the T.O.P.S. is contained in Chapter 6.

Fields Required for Sample Panel Identification Reporting Purposes

The fields of information listed in Table 4.7 are to be submitted as part of the Sample Panel Identification dataset which will be stored in the Sections Catalog (discussed in Chapter 3).

Field Number is the number assigned to each data field for reference purposes.

- **Field Name** specifies the type of information that should be reported for each field.

Table 4.7: HPMS Sample Panel Identification File Structure

	Field Number	Field Name
Sample Panel Section	1	Year_Record
	2	State_Code
	3	Route_ID
	4	Begin_Point
	5	End_Point
	6	Section_Length
	7	Sample_ID
	8	Comments (Optional)

The next section describes the detailed specifications for the fields identified in Table 4.7, in terms of their Descriptions, Usage, Data Formats, Coding instructions, and Guidance (where applicable) for each Field.

Field 1: Year_Record

Description: The calendar year for which the data is applicable.

Use: For identifying the representative year of the data.

Data Type: Numeric (Integer)

Coding: Enter the four digits for the calendar year that the data represents.

Guidance: N/A

Field 2: State_Code

Description: The State Federal Information Processing Standard (FIPS) code.

Use: For identifying the State for which the data is being reported.

Data Type: Numeric (Integer)

Coding: Enter up to two digits for the State FIPS code. See Appendix C for a complete list of FIPS codes.

Guidance: N/A

Field 3: Route_ID

Description: The unique identifier for a given roadway (i.e., route).

Use: For identifying the specific route for which the data is being reported.

Data Type: Text

Coding: Enter an alphanumeric sequence consisting of no more than 120 characters.

Guidance: The Route ID is to be developed per the States' preference. However, this ID shall be consistent with the Route ID schema that is contained in the State's LRS network attribute data.

Field 4: Begin_Point

Description: The point of origin for a given section of road.

Use: For identifying the beginning point of a section for spatial referencing purposes.

Data Type: Numeric (Decimal (8,3))

Coding: Enter a decimal value to the nearest thousandth of a mile.

Guidance: N/A

Field 5: End_Point

Description: The terminus point for a given section of road.

Use: For identifying the ending point of a section for spatial referencing purposes.

Data Type: Numeric (Decimal (8,3))

Coding: Enter a decimal value to the nearest thousandth of a mile.

Guidance: N/A

Field 6: Section_Length

Description: The true length (i.e., measured length) for a given section of road.

Use: For analysis and comparison of various data items for apportionment, administrative, legislative, analytical, and national highway database purposes.

Data Type: Numeric (Decimal (8,3))

Coding: Code the length in decimal format to the nearest thousandth of a mile.

Guidance: Refer to guidance provided in Section 4.2 for Data Field No. 7 in the Sections dataset.

Field 7: Sample_ID

Description: A unique identifier for the section.

Use: For identifying a section that is within the defined limits of the Sample Panel.

Data Type: Text

Coding: Enter an alphanumeric sequence consisting of no more than 12 characters.

Guidance: N/A

Field 11: Comments (Optional)

Description: Additional information for State use (formerly referred to as the ‘‘State Control Field’’).

Use: For storing supplemental information provided by the States which is used to manage their various databases.

Data Type: Text

Coding: This item can be coded as variable text up to 100 characters, in accordance with the State’s needs.

Guidance: The information provided in this field **is not required** by FHWA.

4.6 FHWA-Coded Items

Within the scope of the Sections data in HPMS, there are data items that either are currently coded by FHWA, or will be at some point in the future. For reference purposes, Table 4.7 lists these items. FHWA will assign default codes to the items shown with a single asterisk (*) if the States do not provide this information. In addition, the items shown with a double asterisk (**) will be coded by FHWA (at some point in the future) based on updates that are provided by the States to FHWA's Office of Planning. Only FHWA-approved updates will be used to code Data Items 64-67.

Table 4.7 FHWA Coded Items

	Item Number	Data Item
FHWA Coded Items	61	Climate Zone*
	62	Soil Type*
	64	National Highway System (NHS)**
	65	STRAHNET**
	66	National Truck Network**
	67	Future Facility**

The next section provides the detailed specifications for the data items identified in Table 4.7.

Item61: Climate Zone

Description: Climate zone as defined by the 4 LTPP climate zone descriptions.

Use: For the cost allocation pavement model.

Coding: This will be coded according to the four FHWA Long Term Pavement Performance (LTPP) climate zone descriptions as follows:

Code	Description
1	Wet-Freeze
2	Wet-Non Freeze
3	Dry-Freeze
4	Dry-Non Freeze

Item 62: Soil Type

Description: Soil type as defined by AASHTO soil classes.

Use: For pavement modeling purposes.

Coding: This will be coded AASHTO soil class data.

Item 64: NHS

Description: The FHWA-approved NHS, including intermodal connectors, and the month and year it was approved

Use: For establishing the official National Highway System.

Coding: This item will be coded for all sections that either are located on the NHS or function as NHS connectors to -intermodal facilities, using one of the following codes:

Code	Description	
1	Not NHS Connector	A designated NHS Route
2	NHS Connector to	Airport
3		Port Facility
4		Amtrak Station
5		Rail/Truck Terminal
6		Inter City Bus Terminal
7		Public Transportation or Multimodal Passenger Terminal
8		Pipeline Terminal
9		Ferry Terminal

Item 65: STRAHNET

Description: The Strategic Highway Network (used for Department of Defense purposes).

Use: For identifying the STRAHNET system.

Coding: This item will be coded using the following codes:

Code	Description
1	Regular STRAHNET
2	Connector

Item 66: National Truck Network

Description: Highway sections that comprise the National Truck Network as defined by 23 CFR 658, Appendix A.

Use: For freight modeling and analysis.

Coding: This item will be coded using the following codes:

Code	Description
1	Section is on the National Truck Network
2	Other State designated truck routes

Item 67: Future Facility

Description: The pending (planned/un-built) NHS, including intermodal connectors.

Use: For identifying the National Highway System.

Coding: This item will be coded using the following code:

Code	Description
1	This is an un-built NHS section

4.7 Software-Calculated Items

In addition to the items that will be coded by FHWA, there is a limited group of data items that will be calculated by the HPMS software once the data has been submitted. These items and the extent for which they will be calculated are listed in Table 4.8 below.

Table 4.8: Software Calculated Items

	Data Item	Extent	
Software Calculated Items	Volume Group	FE	
	Expansion Factor		SP
	Horizontal Alignment Adequacy		SP*
	Vertical Alignment Adequacy		SP*
	Weighted Design Speed		SP
	Computed Capacity		SP
	Volume/Service Flow Ratio		SP
SP = All Sample Panel Sections (as defined by HPMS) SP* = Some Sample Panel Sections, see Data Item details			

The next section provides the detailed specifications for the data items identified in Table 4.8.

Item Name: Volume Group

Description: A value that is associated with a defined range of values, used to classify an AADT value.

Use: For apportionment, administrative, legislative, analytical, and national highway database purposes.

Extent: All Federal-aid highways.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	FE	FE	FE	FE	FE	FE		
Urban	FE	FE	FE	FE	FE	FE	FE	

FE = Full Extent SP = Sample Panel Sections

Coding: This item will be coded based on the reported AADT, using the following codes:

Code	Description
1	Under 500
2	500 – 1,999
3	2,000 – 4,999
4	5,000 – 9,999
5	10,000 – 19,999

Code	Description
6	20,000 – 34,999
7	35,000 – 54,999
8	55,000 – 84,999
9	85,000 – 124,999
10	125,000 – 174,999
11	175,000 – 249,999
12	250,000 and more

Item Name: Expansion Factor

Description: The ratio of the total length in a volume group to the total sampled volume group length.

Use: For expanding sampled data to represent the Full Extent from which the sample is drawn.

Extent: All Sample Panel sections.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

FE = Full Extent SP = Sample Panel Sections

Coding: This item will be calculated and coded using the volume group information in Data Item 1 (Volume Group).

Calculation: Expansion Factor = $\frac{\text{Total length in the Volume Group}}{\text{Sampled length in the Volume Group}}$

If the expansion factor for a volume group exceeds 100.000, select additional Sample Panel sections from the Full Extent volume group until the expansion factor is reduced to a maximum of 100.000. If there are fewer than three samples in a volume group (minimum requirement) and additional sections are available, select additional samples from the Full Extent volume group.

Chapter 6 contains a description of the standard sample selection and maintenance scheme.

Item Name: Horizontal Alignment Adequacy

Description: The adequacy of horizontal alignment when curve data are not reported.

Use: For investment requirements modeling to estimate horizontal alignment deficiencies and for the truck size and weight analyses.

Extent: All rural paved Sample Panel sections, unless Data Item 43 (Curves) is coded for the section.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural		SP	SP	SP	SP			
Urban								

FE=Full Extent SP = Sample Panel Sections

Coding: This item will be calculated and coded using the following codes:

Code	Description
0	Curve data are reported or this item is not required for the section.
1	All curves meet appropriate design standards for the type of roadway.
2	Some curves are below appropriate design standards but all curves can be safely and comfortably negotiated at the prevailing speed limit on the section. The speed limit was not established by the design speed of curves.
3	Infrequent curves with design speeds less than the prevailing speed limit on the section. Infrequent curves may have reduced speed limits for safety purposes.
4	Several curves uncomfortable or unsafe when traveled at the prevailing speed limit on the section or the speed limit on the section is severely restricted due to the design speed of curves.

Item Name: Vertical Alignment Adequacy

Description: The adequacy of vertical alignment when grade data are not reported.

Use: For investment requirements modeling to estimate vertical alignment deficiencies.

Extent: All rural paved Sample Panel sections unless Data Item 45 (Grades) is coded.

Functional System		1	2	3	4	5	6	7
	NHS	IH	OFE	OPA	MiA	MaC	MiC	Local
Rural		SP	SP	SP	SP			
Urban								

FE = Full Extent SP = Sample Panel Sections

Coding: This item will be calculated and coded using the following codes:

Code	Description	
0	Grade data are reported or not required	
1	All meet design standards	All grades (rate and length) and vertical curves meet minimum design standards appropriate for the terrain.
2	Some meet design standards	Some grades (rate and length) and vertical curves are below appropriate design standards for new construction; all grades and vertical curves provide sufficient sight distance for safe travel and do not substantially affect the speed of trucks.

Code	Description	
3	Infrequent grades	Infrequent grades and vertical curves that impair sight distance or affect the speed of trucks (when truck climbing lanes are not provided).
4	Frequent grades	Frequent grades and vertical curves that impair sight distance or severely affect the speed of trucks; truck climbing lanes are not provided.

Item Name: Weighted Design Speed

Description: The design speed weighted by the length of individual horizontal curves and tangents on a section.

Use: For investment requirements modeling to calculate capacity and estimate needed capacity improvements.

Extent: All Sample Panel sections.

		1	2	3	4	5	6	7
Functional System	**NHS**	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

FE = Full Extent SP = Sample Panel Sections

Coding: When curve data are not provided, a default value based upon functional system and facility type will be used, as shown in the following table:

	Functional System Code											
	Rural						Urban					
Roadway Type	**1**	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**
Multilane Divided	70	70	70	70	65		70	70	70	60	55	55
Multilane Undivided	70	70	70	70	60		70	70	70	55	45	45
2/3 Lane	70	70	70	65	60		70	65	65	55	45	45

Item Name: Computed Capacity

Description: The capacity of the roadway as estimated by the HPMS software provided that the State has not reported this information.

Use: For investment requirements modeling to calculate capacity, the cost allocation pavement model, and congestion, delay, and other analyses.

Extent: Sample Panel sections for which capacity data has not been reported by the State.

Functional System		1	2	3	4	5	6	7
	NHS	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

FE = Full Extent SP = Sample Panel Sections

Coding: The capacity of a roadway facility is the maximum reasonable hourly rate at which vehicles can be expected to transverse a point or a uniform section of lane or roadway during a given time period under prevailing roadway, traffic, and control conditions. Reasonable expectancy is that the stated capacity can be achieved repeatedly. The *Highway Capacity Manual* provides procedures, formulas, graphics, and tables in assessing roadway capacity.

This item will be computed and coded based on procedures used in the HPMS software which are consistent with the *Highway Capacity Manual* (HCM).

All urban and rural capacity for freeways and other multilane facilities is for the peak direction (ensuring capacity from reversible lanes is included). If a rural facility has 2 or 3 lanes with one-way operation, it is considered to be a multilane facility for determining capacity. The capacity for rural facilities with 2 or 3 lanes and two-way operation is for both directions.

The Computed Capacity is only for sample sections which lack State-provided Capacity (Data Item 69) in order to ensure complete data. State-provided capacities are superior estimates because the State has access to more detailed information than is available through HPMS.

Item Name: Volume/Service Flow Ratio (V/SF)

Description: A computed value reflecting peak hour congestion.

Use: For investment requirements modeling to estimate needed capacity improvements, in the national highway database, and for congestion, delay, and other data analyses.

Extent: All Sample Panel sections.

Functional System		1	2	3	4	5	6	7
	NHS	**IH**	**OFE**	**OPA**	**MiA**	**MaC**	**MiC**	**Local**
Rural	SP	SP	SP	SP	SP	SP		
Urban	SP	SP	SP	SP	SP	SP	SP	

FE = Full Extent SP = Sample Panel Sections

Coding: States are not able to override this value, but are encouraged to verify data items that affect this calculation.

If the volume to service ratio is 1.40 or higher, the measurement and coding of items that affect peak capacity should be inspected.

Items that affect capacity (listed from most to least critical) are:

1. AADT
2. K-factor
3. D-factor
4. Peak Lanes
5. Through Lanes (primarily for rural 2 and 3-lane roads)
6. Median Type
7. Median Width (< or >= 4 ft.)
8. Percent Green Time

Less significant items that affect capacity are:

1. Lane Width
2. Shoulder Width (< or >= 6 ft.)
3. Peak Percent Combination Trucks
4. Peak Percent Single-Unit Trucks
5. Left-Turn Lanes
6. Right-Turn Lanes
7. Peak Parking

Chapter 5 GUIDANCE ON SPECIAL TOPICS

5.1 Overview

The purpose of this chapter is to provide additional guidance on the reporting of Functional System, and Traffic data. This information is a supplement to the data item requirements discussed in Chapter 4.

5.2 Functional Classification System Descriptions and Groupings

FHWA focuses scarce national resources on the most important roads and highways in the Nation for condition and performance improvement purposes. This practice has been in existence on a national level since the 1960s. In order to ensure that the State Departments of Transportation (DOTs) have information needed to support this effort, FHWA disseminates Functional Classification guidance documentation on a periodic basis. The most recent comprehensive Functional Classification Guidance Document was published in 2013 and can be accessed online at: http://www.fhwa.dot.gov/policyinformation/hpms/hfcccp.cfm. This document should be used by the State DOTs as guidance for the purpose of updating and maintaining their respective FC Systems.

Functional classification is the process by which streets and highways are grouped into classes, or systems according to several factors that contribute to the overall importance of a given roadway to a region or area. All streets and highways are grouped into one of seven classes, depending on the character of the roadway and the degree of land access that they allow. The seven functional classes are represented by a one-digit code and are used to represent a specific classification of road regardless of whether it is located in an urban or rural area. These classifications are as follows:

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

The Role of Urban Areas in Roadway Functional Classification

The U.S. Census-based Urban Area (UA) Boundaries are also an important part of the FC system. The aforementioned FC codes and Census-defined UA Boundary codes (see full list of valid UA codes in Appendix I) must be reported for all Federal-aid roadways. Although an urban or rural designation does not dictate the functional classification of a roadway, it may inform classification designation. Because road usage and design typically adapt to changes in urban growth patterns, the urban boundary modification process commensurate with the Decennial Census is a good time to assess functional classification throughout the State.

Traditionally, the Census Bureau releases new Urban Area Boundaries two years after the initial Decennial Census as a byproduct of that effort. Since these boundaries are developed primarily through automated methods, they are often coarse and irregular, generally not reflective of transportation facilitates. While a State may choose to use the unadjusted original Census boundaries as part of the overall FC program, it is advisable to adjust these polygons to efficiently account for the highway system. FHWA guidance for procedures and best practices regarding Functional Classification and Urban Boundary delineation can be found in the *Highway Functional Classification Criteria, Concepts and Procedures, 2013 Edition* document.

See Chapter 4, Sec. 4.4 for specifications and requirements pertaining to the reporting of the 'Functional System' and 'Urban Code' data items. Spatial Analysis should be used by the States to relate the FC code to the UA code for HPMS reporting purposes.

5.3 Traffic Monitoring Procedures

Introduction

Traffic monitoring data are a key component of the HPMS. They are some of the most analyzed and used data elements and must be of high quality to accurately represent conditions in all States. Traffic data are used for a variety of work program objectives which include the following:

- Apportionment of various Federal-aid highway and safety-related funds;
- Analysis and presentation of data for the *Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance* report to Congress;
- Freight analysis including corridor, commodity, economic productivity size and weight, and others
- Clean Air Act travel data requirements for non-attainment areas;
- U.S. DOT performance measures such as vehicle crash rates, pavement condition, and congestion;
- Various FHWA national performance measures
- Analysis of vehicle types for freight movements and safety; and
- Technical support to policy and legislation development and implementation.

Traffic monitoring data are also key inputs for the development and maintenance of the HPMS data set. Traffic data drive the HPMS sample stratification and selection process by assigning roadway sections into volume groups and for statistical analysis to develop the sample panel as further discussed in Chapter 6. The validity of the entire HPMS sample panel and the development of the sample expansion procedure depends on the proper maintenance of a comprehensive traffic monitoring program.

A State traffic monitoring program that is developed following the guidance contained in the *Traffic Monitoring Guide* (TMG) will provide data that meets the needs of HPMS. The *AASHTO Guidelines for Traffic Data Programs (AASHTO Guide)* provides another reference for developing and maintaining a State Traffic Data Program. Since HPMS is a key driver for State's traffic monitoring programs, States should use a combination of guidance from the TMG, *HPMS Field Manual*, and other sources such as the *AASHTO Guide* to develop their traffic program.

The traffic data reported in HPMS must be the same data the State uses for their own purposes as contained in their traffic monitoring system. Using the same data provides assurance that it was collected and processed following the State's traffic monitoring program and not processed independently for HPMS. If the same data

are used, then products from the HPMS data submittal are approximately the same as the State's traffic data products such as VMT. In summary, the specific travel data needs for HPMS can be accommodated with minor adjustments and implementation of good practices as presented in the TMG and in the *AASHTO Traffic Data Guidelines*.

This section provides specific guidance for traffic monitoring procedures to meet the HPMS requirements and builds on the recommendations provided in the TMG. It is important to recognize that this *Field Manual* refers to traffic data in several sections: Sections 3.3, 4.3, etc. Stakeholders involved in collecting, analyzing and reporting on traffic data for HPMS should refer to this section as well as other references to traffic monitoring throughout the *Field Manual*. Stakeholders are encouraged to get familiar with FHWA's Traffic Monitoring Guide to establish a comprehensive traffic monitoring program.

This section is presented in three parts:

(1) General, high level requirements for the traffic monitoring program,

(2) Volume Group Assignments for HPMS, and

(3) More detailed traffic monitoring program guidelines.

State Traffic Monitoring Data Program

General Requirements

State maintenance of a comprehensive traffic monitoring data program to provide quality, timely, and complete traffic volume and vehicle classification data is important for meeting HPMS requirements. This section describes the fundamental macro-level requirements of a State Traffic Data Program for HPMS. Specific guidance is contained in the TMG and readers are encouraged to refer to the TMG for more detail.

While traffic data are collected at points on the highway system, HPMS is oriented toward roadway sections. So an initial step is for the State to segment their roadways into sections with consistent traffic. As highways evolve and traffic patterns change, these traffic monitoring sections may need to be revised. An advantage of the new HPMS data model is that States may submit section-level data for these traffic monitoring sections independent of other HPMS section-specific data.

Count Cycles and Coverage

A State should have minimum count cycles and coverage as follows:

Minimum 3-year count cycle – The State's traffic monitoring program shall cover all NHS and Principal Arterial System (PAS) roadway sections (i.e., Interstates, Other Freeways and Expressways, and Other Principal Arterials) on a three-year cycle or better; at least one-third of these roadway sections should be counted each year. The remaining two-thirds counts must be estimated based on a documented process in accordance with the TMG and the *Field Manual*. The State shall cover all roads on these systems, not just State-owned roads, so data provided by MPOs, cities, or counties should be included in the count cycle.

Minimum 6-year count cycle – The State shall also have a traffic count program on a six-year cycle or better for all non-NHS lower functional system roadway sections (i.e., minor arterials, major collectors, and urban minor collectors). Traffic data for ramps, as defined in Chapter 4, are also to be collected on a six-year cycle or better.

All traffic data for HPMS shall be based on a minimum of 48 hours of continuous monitoring for volume and vehicle classification, which is referred to as short term monitoring. States are permitted to perform counting durations shorter than 48 hours for roadway functional classes Arterial and Interstate. For functional classes of collector and local roadways, if a State has a duration of monitoring that is less than 48 hours, they must be able to demonstrate no loss in quality of data based on documented statistical analysis provided to FHWA's Office of Highway Policy Information via FHWA's Division Office located in their respective States.

The program should provide for a sufficient number of Continuous Count Station (CCS) volume and continuous vehicle classification (CVC) stations to permit factoring of short term counts for estimates of annual average daily traffic (AADT). If there are insufficient CCSs for statistical accuracy in a factor group, use of statewide factors is encouraged. Hour of day, day of week, monthly (seasonal), axle correction, and annual adjustment factors are the only factors to be used as necessary to keep all AADTs current to the year for which they are being reported.

The HPMS traffic data needs should be conveyed to the traffic monitoring office within the State in a timely manner that allow enough time to develop and schedule the State's comprehensive traffic monitoring program. Areas of the State selected for counting in a program year should be selected on a random basis. Highways with high variability should be counted more often than those with low variability, and highways with high traffic volume should be counted more extensively than those with low volume. To make the most of available resources, an area traffic count plan may consider using cluster count techniques whereby several counts are taken in the same general area. Counts scheduled and obtained under other programs may be incorporated into the count plan to avoid duplication of monitoring sites.

Sources of Data

Continuous Count Stations provide 24/7 monitoring of existing traffic conditions around the State. Travel on freeways, expressways and other multilane facilities can be monitored by route. Travel can also be monitored by area through statewide, or MPO freeway management or travel surveillance programs, which are often referred to as Intelligent Transportation System (ITS) deployments. Other highway functional systems, both State and off-State, can be monitored by geographic area, such as by county or highway district. Traffic information in a comprehensive count program should be compiled from all available sources -- State, MPO, ITS, city, and county.

Coordination and cooperation with local governments to implement a comprehensive count program is highly desirable; however, the State ultimately maintains responsibility for ensuring that these data meet minimum collection and quality requirements. To meet these responsibilities, the State should have a comprehensive quality assurance program that includes data collection, the conversion of traffic counts into current year AADT values, routine equipment testing provisions, and routine traffic count calibration procedures.

The following list of standards from ASTM International provides detailed guidance on traffic monitoring techniques and technologies:

E17.52 Traffic Monitoring Committee

- E 1318-09 Standard Specification for Highway Weigh-in-Motion (WIM) Systems with User Requirements and Test Methods
- E 1957-04 Standard Practice for Using Pneumatic Tubing for Roadway Traffic Counters and Classifiers
- E 2300-09 Standard Specification for Highway Traffic Monitoring Devices

- E 2415-05 Standard Practice for Installing Piezoelectric Highway Traffic Sensors
- E 2467-05 Standard Practice for Developing Axle Count Adjustment Factors
- E 2532-09 Standard Test Methods for Evaluating Performance of Highway Traffic Monitoring Devices
- E 2561-07a Standard Practice for the Installation of Inductive Loop Detectors
- E 2259-03a Standard Guide for Archiving and Retrieving ITS-Generated Data
- E 2665-08 Standard Specification for Archiving ITS-Generated Traffic Monitoring Data
- E2667-09 Standard Practice for Intersection Turning Movement Traffic Data
- E2759-10 Standard Practice for Highway Traffic Monitoring Truth-in-Data

AADT Calculation

The development of roadway section-based AADT estimates from traffic monitoring data using continuous or short term volume, vehicle classification, or truck weight data must include the use of adjustment factors if the data does not cover all months. The AADT estimates reported to the HPMS for all roadway sections not counted during the current year must be updated to current year AADT estimates by use of annual (growth) adjustment factors.

The rounding of AADTs is acceptable for HPMS following the scheme recommended by the *AASHTO Guide* but is not encouraged unless it is common practice for the State to round all traffic data in their traffic monitoring database and the practice is applied to all traffic data consistently. This applies to the reporting of volume and vehicle classification data. Rounding should be performed after all adjustments to the raw count have been made and should not be performed when calculating percent single unit and combination trucks. Low volume counts must not be rounded to report zero as a volume or as a percent since this will not accurately represent the presence of minimal volumes and will also show no change in trends. Zeros should only be reported when the actual count is zero.

Work performed in 2015 by Battelle Memorial Institute through a FHWA led Pool Funded research effort and reported in *Assessing Roadway Traffic Count Duration and Frequency Impacts on Annual Average Daily Traffic Estimation* (Krile, et. al.), FHWA-PL-16-008, has shown that there are two limitations with the traditional AASHTO method. One limitation is that the above equation uses only complete days of data. This means that the loss of one hour of data due to errors in the data collection process results in the loss of a full day of data from the AADT computation, reducing the accuracy of the resulting AADT estimate. The second limitation is that the averaging process used in the AASHTO method produces a small amount of bias in the resulting AADT estimate by slightly under-valuing both weekday traffic and traffic occurring in months with 31 days in comparison to months with fewer days.

As a result, FHWA is proposing an alternative modified formulation for computing AADT. This computation is performed in two steps. The first step computes monthly average daily traffic from the available hourly (or other temporal period) count records. The formula will work equally well with any temporal interval data, such as the 5-minute or 1-minute data frequently recorded by ITS-based traffic management systems. The second step then computes AADT from the twelve available monthly values. These two mathematical steps are as follows:

$$MADT_m = \frac{\sum_{j=1}^{7} w_{jm} \sum_{h=1}^{24} \left[\frac{1}{n_{hjm}} \sum_{i=1}^{n_{hjm}} VOL_{ihjm} \right]}{\sum_{j=1}^{7} w_{jm}}$$

and

$$AADT = \frac{\sum_{m=1}^{12} d_m * MADT_{HP_m}}{\sum_{m=1}^{12} d_m}$$

Where:

AADT = *average annual daily traffic*

$MADT_m$ = *monthly average daily traffic for month m*

VOL_{ihjm}= total traffic volume for *i*th occurrence of the *h*th hour of day within *j*th day of week during the *m*th month

i = occurrence of a particular hour of day within a particular day of the week in a particular month (*i*=1,…n_{hjm}) for which traffic volume is available

h = hour of the day (*h*=1,2,…24) – or other temporal interval

j = day of the week (*j*=1,2,…7)

m = month (*m*=1,…12)

n_{hjm} = the number of times the *h*th hour of day within the *jth* day of week during the *mth* month has available traffic volume (n_{hjm} ranges from 1 to 5 depending on hour of day, day of week, month, and data availability)

w_{jm} = the weighting for the number of times the *jth* day of week occurs during the *mth* month (either 4 of 5); the sum of the weights in the denominator is the number of calendar days in the month (i.e., 28, 29, 30, or 31)

d_m = the weighting for the number of days (i.e., 28, 29, 30, or 31) for the *m*th month in the particular year

While States and all in the transportation community can continue to use the traditional AASHTO method. FHWA is encouraging the adoption of the new formula which better reflects reality.

Volume Group Assignments

The State's comprehensive traffic count program should be used to develop traffic volume group assignments for all roadway sections in a program that adequately monitors both high and low volume roads, including those off the State system. To facilitate this process, count station locations should be selected to represent expected AADT volume group breakpoints for the volume ranges of all required samples. This may require locating count stations at one per several miles in rural areas and more closely in urban areas. If there are homogeneous traffic sections as determined by prior counts or engineering judgment, more than one section may be represented by a single traffic count station as long as traffic does not vary more than 10%. Selection of count locations should be based on previous count experience on the section or adjacent sections, recent land use developments, and the existence of uncounted sections along the route.

Traffic Monitoring Program Elements

A detailed discussion of recommended procedures for developing, collecting, and processing travel monitoring data is contained in the *Traffic Monitoring Guide* (TMG). However, a general discussion of some elements of a typical traffic monitoring program and their applicability to the HPMS follows.

Count Cycle

A minimum of one-third of all NHS and Principal Arterial System (PAS) roadway sections (i.e., Interstates, Other Freeways and Expressways, and Other Principal Arterials) shall be counted each year; all other monitoring should be on a minimum six-year cycle. The roadway sections to be counted should be randomly selected from each sample stratum (volume group), with minor adjustments as necessary for strata with numbers of sections not divisible by three or having less than three samples. A single count may be used for several sections between adjacent interchanges on controlled access facilities.

Continuous Counts

Continuous Count Station (CCS) are used to provide 24/7 traffic count coverage for every day of the year at a limited number of locations using automated procedures. CCS data are also used to develop hourly, day-of-week, axle correction, monthly (seasonal), and annual adjustment factors which are then used to factor short term counts to an AADT. Analytical procedures to determine the appropriate level of effort and to develop the needed traffic estimates are described in the TMG.

Continuous count data are essential for converting short term counts to AADT. The State's documentation of its continuous count program should identify the number of continuous counters on the rural and urban portions of the PAS/NHS system and the rest of the highway network. The process used to develop adjustment factors and their application should be thoroughly documented as well. Whenever possible, the State should have at least one continuous counter on each major PAS/NHS highway route. At a minimum, each continuous counter should have at least one full day of data for each day of the week for each month provided the State has an adequate automatic edit process based on the historic trend. If the new FHWA AADT method is utilized, at a minimum, each continuous counter should have at least one full time increment of data for each day of the week for each month of the year.

Short Term Counts

Short term counts cover lesser time periods than CCSs, 48-hour counts (two full 24-hour days) are required for all HPMS Full Extent and sample data including those off the State highway system except otherwise noted. Where axle correction factors are needed to adjust raw counts, they should be derived from facility-specific vehicle classification or weigh-in–motion (WIM) data obtained on the same route or on a similar route with similar traffic in the same area. Factors that purport to account for suspected machine error in high traffic volume situations shall not be applied to traffic counts used for HPMS purposes, including volume group assignment. In high volume situations and on controlled access facilities, it may be more appropriate to use continuous or short term ramp counts in conjunction with strategic mainline monitoring than to use short term counts on all mainline locations (see "ramp balancing" in the TMG for details).

Ramp Counts

Traffic counts are required on all Federal-aid highways including ramps associated with grade-separated interchanges. Ramp counts are important because many bottlenecks occur at major interchanges around the

country and large amounts of Federal funds are expended to address these congestion issues. A minimum of one count every six years is required for ramps.

The same procedures used to develop AADTs on all HPMS roadway sections should be used to develop ramp AADTs. It is important that this volume data be an AADT for comparison to other AADTs and for reasonable trend analysis. States are encouraged to use adjustment factors developed based on either entrance or exit travel patterns or the functional class of the ramp, and to use this procedure consistently statewide. For example, the factors used for the mainline road with subordinate flow may be appropriate for use on the ramp. In other cases, the factors from intersecting roads connected to the ramp may be more appropriate for use. Good judgment and experience should be applied regarding factor use. As a minimum, 48-hour ramp counts should be adjusted with axle correction factors as needed.

Ramp counts should be available from freeway monitoring programs that continuously monitor travel on ramps and mainline facilities. Ramp balancing programs implemented by States on ramp locations and on high volume roadways could also be used to provide AADTs. In the case where no ramp counts are available, a State may use traffic matrix estimation. The State's traffic modeling office may compute ramp traffic estimates as part of their modeling process.

Vehicle Classification

Data reported in the HPMS should reflect the use of continuous vehicle classification equipment to accurately report truck data, vehicle classification summaries, and develop monthly (seasonal), day of week and hour of day vehicle classification adjustment factors. Summary vehicle classification data reporting requirements are outlined in Chapter 3. Percent peak truck data (see Data Items 23 and 25), and truck AADT data (see Data Items 22 and 24) must be reported for each HPMS sample section as discussed in Chapter 4. Vehicle classification information must be reported in the summary travel data as discussed in Chapter 2.

The State's vehicle classification program shall include:

- Data representative of all functional systems, both on and off the State system.
- Monitoring sessions for at least 48 hours to account for the changes in vehicle mix from day to day. Data for less than 24 continuous hours is not acceptable. At locations where vehicle class is not consistent throughout the week, such as on weekends, counts longer than 48 hours may be necessary to determine appropriate days to counts and to accurately represent average vehicle class data.
- Monitoring frequency shall be at a minimum, over a three-year cycle with one-third of the counts per year for all NHS and Principal Arterial System (PAS) roadway sections (i.e., Interstates, Other Freeways and Expressways, and Other Principal Arterials). All other locations should be monitored on no longer than a six-year cycle.
- Data reported in HPMS shall represent data for the reporting year. Prior year classification counts shall be adjusted with annual adjustment factors to represent current year data and to accurately develop percent trucks and truck travel trends.
- Monitoring activities should include all lanes in both directions.
- The Axle Class Algorithm used should be consistent among different equipment and vendors, and should be checked annually to ensure that it is working properly for all vehicle types.

Axle correction factors are to be developed based on data that represents all months (seasons) of the year. They should be applied to all counts that are based on axle sensors. The factor groups could be the same as for

other adjustment factors or can be for each functional class and are to be updated each year based on that year's vehicle classification data.

Vehicle classification programs shall be set up following the guidance in the TMG for monitoring homogenous roadway sections with one monitoring location. The limits of a homogenous traffic section for one vehicle class may differ from the limits of a different vehicle class.

Vehicle classification data used to report truck (both SU and CU) AADTs for HPMS shall be adjusted to represent average conditions for the entire year following the recommendations in the TMG. Adjustments to vehicle classification data should be based on factors developed using data from a permanent continuous vehicle classification (CVC) monitoring program established following the guidance in the TMG. As States fully develop and implement vehicle classification programs to provide sufficient and accurate data to develop adjustment factors, this should be an integral component of a comprehensive traffic monitoring program. States that do not have a complete program are still required to adjust raw count data using interim procedures they have developed. These interim procedures could focus on using data from traffic volume programs to develop adjustment factors if considered reasonable to represent truck travel patterns until more specific vehicle classification data becomes available.

The goal of developing a comprehensive vehicle classification program to provide truck AADTs based on truck characteristics is of utmost importance since various studies have concluded that truck travel oftentimes varies considerably from total traffic patterns and has different trends statewide and by functional class. All other vehicle types are also important and should receive the attention they deserve. Motorcycles in particular are a small percent of travel but have significant safety issues that require attention for estimating their travel exposure.

Vehicle Miles of Travel (VMT)

Estimates of Daily Vehicle Miles of Travel (DVMT) are developed by direct computation for all Federal-aid highways. Moreover, this information is generated via the HPMS software by taking the product of AADT and length (in miles) for all sections, and summing the section-specific results to the desired HPMS aggregation level (e.g., functional system, urban area, etc.). A comprehensive traffic monitoring program, good traffic volume procedures and practices, a well-distributed HPMS sample, and appropriate AADT estimation techniques will result in highly reliable DVMT estimates.

Specific HPMS requirements for reporting VMT can be found in Section 3.3 of this manual. Examples of good state practices for estimating VMT on non-Federal-aid highways are:

- Current traffic growth rate on collectors or higher systems;
- Limited sample of short term traffic counts;
- Combination of sample and estimated counts; and
- Area-wide average daily traffic based on documented methods.

One method which is not recommended is to use the residual of the statewide total VMT minus the Federal-aid highway system VMT because this obscures all other traffic data collected. Another discouraged method is the use of fixed percent of traffic growth (e.g. zero or one percent).

The monthly Traffic Volume Trends report is published by the FHWA based on a sample of traffic data from CCSs in the States. Annual VMT growth rates by functional system derived from these reports are used to validate

HPMS traffic data. The goal is that all traffic information published by the FHWA and the States is valid and consistent.

Chapter 6 SAMPLING

6.1 Overview

The purpose of this chapter is to address the selection and maintenance of the HPMS Sample Panel, and to explain how the geospatial component of the HPMS data model supports these processes. The data reported in HPMS for sampled roadway sections are a source of the condition, use, and operational information pertaining to the nation's roadways. For analysis purposes, Sample Panel data are expanded to represent the Full Extent of roadways in the HPMS. This data is ultimately used for monitoring trends and impacts in performance data over time, and for analyses in support of national budgeting for highway improvements through the *Conditions and Performance (C&P)* report to Congress. Therefore, the selection and maintenance of adequate, up-to-date HPMS samples is a high priority, annual requirement.

This chapter also discusses the AADT and Volume Group Ranges and their impact on the sample selection process, and the sample size estimation procedures and methods used to determine sample adequacy. Chapters 3 and 4 described the HPMS Data Model, and the specific requirements for the Full Extent and Sample Panel data. The following section describes the Table of Potential Samples (TOPS) (see Appendix B, Glossary), and explains how it is to be used for sample selection purposes.

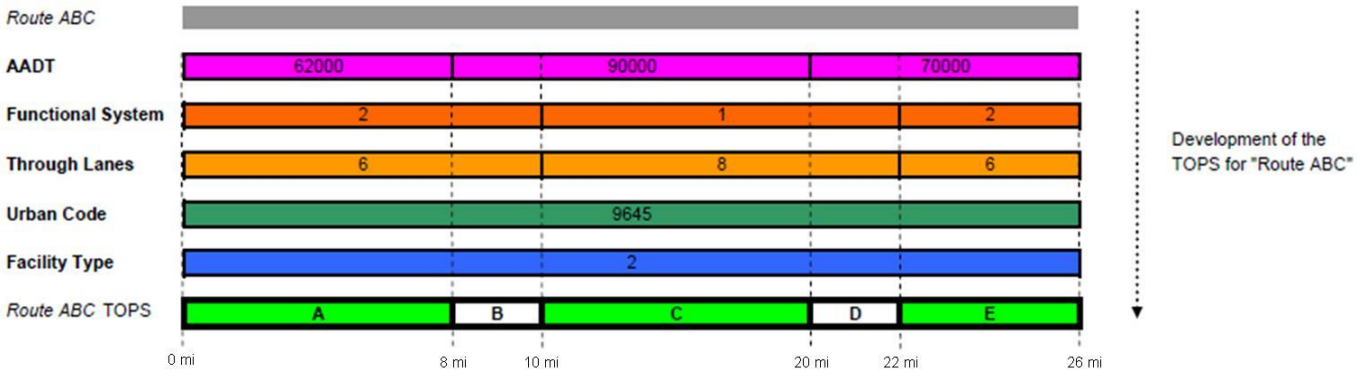
6.2 Sampling Framework

Statistically speaking, a *universe* is a population from which a sample is taken. A population can be any set of *sampling units*, such as objects that can be observed or people who can be surveyed. A *sampling frame* is a list of all of the sampling units in a universe. The universe for HPMS is all public roads. A sampling unit in HPMS is a particular kind of highway section and the Table of Potential Samples (TOPS) is the sampling frame. An HPMS sample panel is a selection of sections from the TOPS stratified by a defined set of traffic volume groups. Stratification is done to improve the precision of the estimates without significantly increasing the sample size.

The TOPS includes all Federal-aid highways, which are highways on the National Highway System (NHS) and all other public roads not classified as local roads or rural minor collectors. Some data items in HPMS are reported for all Federal-aid highways; these are called Full Extent data items. However, road sections used for Full Extent data items do not need to align with the TOPS. It is important to note that once the sample panel is chosen, then the State must provide data for every sampled data item in the sample panel.

The TOPS is developed based on the geospatial intersection of five key data items (AADT, Functional System, Urban Code, Through Lanes, and Facility Type) where their respective values are homogenous (i.e. unchanged) for defined extents along a given route. Figure 6.1 shows the development of TOPS sections for a given route ("Route ABC") based on the aforementioned homogenous data items. Once the TOPS has been established, samples are selected at random from the TOPS (e.g. Sections A, B, and C in Figure 6.1).

Figure 6.1 TOPS Development Process



For HPMS purposes, there are three types of data items: (1) those that are required to be reported for the Full Extent of the Federal-aid highways (with possible additions and exceptions), (2) those that are required to be reported for only on the HPMS Sample Panel (with possible exceptions), and (3) those that are required to be reported on a Full Extent basis for some highway systems and on a Sample Panel basis for other highway systems. These data item types are referred to as **Full Extent, Sample Panel,** and **Partial Extent**, respectively.

The following list uses the terms "extent" and "coverage" to illustrate the difference between Full Extent and Sample Panel data as it pertains to each of the listed data elements. The term "extent" describes the types of roadways for which the data item is to be collected. The term "coverage" describes the highway sections for which the data item must be reported. The minimum coverage for each data item is Full Extent, Sample Panel, or Partial Extent:

Data Element	Extent	Coverage
AADT	Federal-aid highways and ramps	Full Extent
Access Control	Principal arterials and sample sections	Partial Extent
Ownership	Federal-aid highways	Full Extent
Route Signing	Federal-aid highways except urban collectors	Full Extent
Peak Lanes	Federal-aid highways	Sample Panel
Terrain Type	Rural Federal-aid highways	Sample Panel
Signal Type	Urban Federal-aid highways	Sample Panel

An HPMS section record represents a single data item and its corresponding value for a "section" of road. However, with few exceptions, it is not necessary that the section record have the same begin and end points matching a section in the TOPS, provided that the required coverage is accounted for. The section records that are reported for the following data items must have begin and end points that align with the limits of a TOPS section:

- Number of Signalized Intersections (Data Item 31)
- Number of Stop Sign-Controlled Intersections (Data Item 32)

- Number of At-Grade-Other Intersections (Data Item 33)
- Curve Classification (Data Item 43)
- Grade Classification (Data Item 45)

Upon upload of the States' Section data, the HPMS software will subsequently generate the TOPS. The TOPS will then be used for sample selection purposes and to validate the Sample Panel attributes. Also, 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.

6.3 AADT Volume Group Ranges and Precision Levels

Since travel patterns within a State are dynamic and tend to vary by area type (e.g. rural, small urban, and urbanized areas), the HPMS sample selection process also changes to accommodate this fluctuation in travel patterns.

HPMS uses 12 volume groups for stratification purposes. The stratification process used for AADT data produces estimates of greater accuracy for the sample data items, when a smaller number of samples at the functional system (summation) level.

The AADT volume groups for rural, small urban, and urbanized areas, are the same for all sampled functional systems. The sampled functional systems include: Interstates, Other Freeways and Expressways, Other Principal Arterials, Minor Arterials, Major Collectors, and Urban Minor Collectors. The volume group ranges to be used for stratification purposes are listed in Table 6.1.

Table 6.1 Volume Group/AADT Ranges

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

There is a direct correlation between functional system and a *precision level* as shown in Table 6.2.

The term precision level is defined as "the degree of accuracy resulting from the use of a statistical sample". For example, if a sample is designed at the 90-10 confidence interval and precision rate, the resultant sample estimate will be within ±10 percent of the true value, 90 percent of the time.

There are precision levels defined, for the purposes of HPMS, which apply to each Functional System listed in Table 6.2. A statistical formula is used to determine the estimated required number of samples needed to meet the target precision level, within each volume group for a given Functional System. This formula is discussed in Section 6.4.

The size of the HPMS sample is based on three components: (1) the variability (i.e. coefficient of variance) of AADT within a volume group, (2) the functional system confidence interval and precision level, and (3) the number of TOPS sections in a volume group, available for sampling.

Sample size requirements by functional system will vary from State to State according to the total number of TOPS sections, the number of predetermined volume groups, the validity of the State's AADT data, and the desired precision level. The HPMS sample size requirements are more stringent for the principal arterial systems, where a higher level of precision is needed due to their national significance.

Typically, the State-wide summation of individual urbanized functional system data element estimates will result in an overall precision level of at least 80-10 (or 70-15 for States having three or more urbanized areas with population < 200,000).

Higher precision is necessary to obtain comparable urban and rural precision levels, on a State-wide basis, and to obtain precision levels that can adequately accommodate desired levels of accuracy for estimates of proportionate values as well as average and aggregate values. That is, although the HPMS sample is designed to measure AADT, the same samples are used to estimate the proportionate values for other types of data such as pavement condition. The level of accuracy for estimated proportions is closely related to sample size. Therefore, precision levels have been set high enough to produce reasonable proportionate estimates at the functional system level. It is important to remember that the absence of Sample Panel data, where it is required to be reported, will degrade the sample precision.

The required precision levels are listed in Table 6.2.

Table 6.2 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*
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.

6.4 Sample Size Estimation Procedures

This section describes how the sample size estimates for each stratum, with a desired confidence level, can be derived using an estimation formula and/or the HPMS software. The formula and each of its input variables are described below.

Sample Size Estimation formula:

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

Where:

n = Required sample size

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

Table 6.3 Confidence Level

Confidence Level	Value of Z	Z Squared
90 Percent	1.645	2.706
80 Percent	1.282	1.644
70 Percent	1.040	1.082

C = AADT coefficient of variation from a State's AADT data

d = Desired precision rate (from Table 6.2)

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

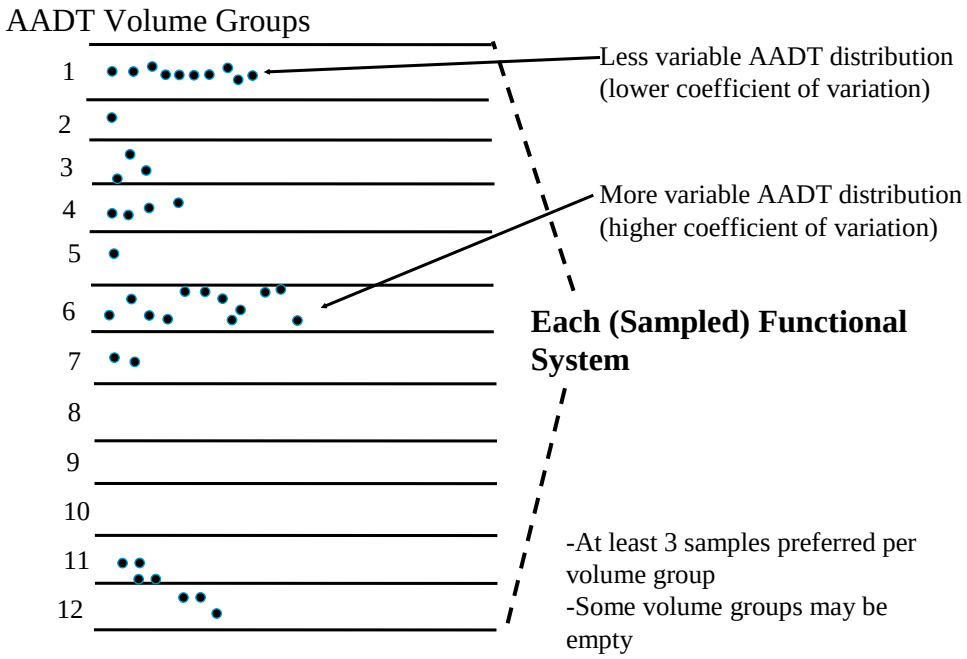
For example, the sample size for a stratum with a desired precision rate of +/–5 percent and a 90 percent confidence level, an AADT coefficient of variation of 0.40, and 300 available TOPS sections for sampling, is estimated by:

$$n = \frac{\left(\frac{(1.645)^2 (0.4)^2}{(0.05)^2}\right)}{1+\left(\frac{1}{300}\right)\left(\left(\frac{(1.645)^2 (0.4)^2}{(0.05)^2}\right)-1\right)} = \frac{173.18}{1+\left(\frac{172.18}{300}\right)} = 110 \text{ required samples}$$

Figure 6.2 illustrates the potential degrees of variability of AADT data by volume group with respect to each sampled functional system. Each dot represents an AADT record in the Sample Panel. In this example, less variation in the AADT distribution for samples (as shown in volume group 1) produces a lower coefficient of

variation, while more variation in the AADT distribution (as shown in volume group 6) produces a higher coefficient of variation. Note that empty volume groups may exist across functional systems, (e.g. volume groups 8, 9, and 10). However, if three samples or fewer exist in a given volume group, then all three must be used for sampling purposes (minimum requirement).

Figure 6.2 AADT Volume Groups



The critical point in this process is the value designation of *C,* the AADT coefficient of variation. The procedures presented in this discussion require an estimation of AADT coefficients of variation based on the latest State data. This approach ensures that the results are up to date, based on the latest information, and are tailored to the specific State.

Estimates of the AADT coefficients of variation for a particular State can be derived from its existing HPMS data using standard statistical software packages. Note, the coefficients of variation will be generated via the HPMS software, which uses a State's Full Extent data as inputs to standard statistical procedures, and produces reports that enable the State to analyze and review the HPMS Sample Panel.

The HPMS software is also capable of identifying the location potential sample sections using a GIS-based spatial analysis procedure. The TOPS will be created via the software, which will then be made available to the States (via the HPMS software) for sample selection purposes. Furthermore, the software uses the TOPS to calculate and determine the number of samples required in each volume group. There are a number of advantages to leveraging the GIS component of the data model for sampling purposes, which are explained in more detail in the next section on Sample Adequacy and Maintenance.

6.5 Sample Adequacy and Maintenance

Each HPMS 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.

In general:

- 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 assure that yearly and cyclical updates, field reviews, traffic counts, etc., are performed on the appropriate roadway sections.

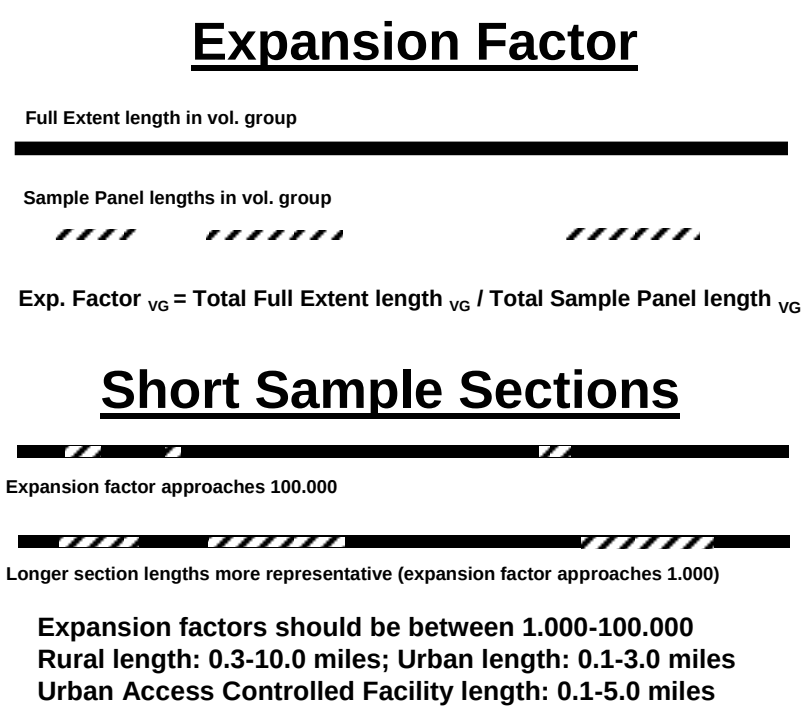
Sample adequacy and maintenance is a process that should be integrated as part of the routine data management activities of the State throughout the year. Once the State has uploaded HPMS data, the HPMS software will produce the TOPS and this information will be available to the States (as discussed in Section 6.2). The States will need to then review their sample framework to determine the necessary adjustments and add new sample sections as needed, prior to the next HPMS submittal cycle. Some of the guidelines recommended by FHWA for the States to adhere to include the following:

- Provide a 5-10 percent sample surplus per volume group, if possible.
- 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 if there are < 3 samples in a volume group.
- Maintain a maximum expansion factor of 100.000 (see explanation below).

The purpose of the HPMS Sample Panel is to provide an expandable base for rural, small urban and urbanized area data in each State, stratified by functional system and traffic volume group. An expansion factor is calculated for each volume stratum within each functional system. This is accomplished by dividing the total miles in the stratum by the miles included in that stratum's sample. States are encouraged to not exceed a maximum expansion factor of 100.000; otherwise, it is possible that the TOPS would be too sparse for adequate representation. States must avoid having no sample in a traffic volume group with mileage in the State, because that traffic volume group cannot be expanded and the mileage is missing.

Figure 6.3 illustrates the Expansion Factor calculation, using the Full Extent and Sample Panel lengths, and the effect of excessively short Sample Panel lengths.

Figure 6.3 Expansion Factor



As shown in the top part of Figure 6.3, the total Full Extent length in each stratum is a known value based on the AADT volume group identifier. Expansion factors are calculated by the HPMS software for each sample section. The expansion factor allows sample data to be expanded to represent entire functional systems for rural, small urban and urbanized areas. The lower part of the figure illustrates that if there is a prevalence of short Sample Panel sections in a given volume group, the net effect is an expansion factor that will approach or exceed 100.000. Note that a prevalence of longer Sample Panel sections in a volume group will thus have the effect of lowering the expansion factor towards or equaling 1.000.

Sampling Rural and Small Urban Areas

Both rural and small urban area data are to be sampled on a statewide basis, and stratified only by functional system and volume group. The volume group for each roadway section in the sampling frame will be identified in the HPMS software, according to Table 6.1. The number of sections to be included in the sample is determined using the calculation procedure described in Section 6.4. A minimum of three sample sections is required for each volume group. If less than three TOPS sections exist in a volume group; it is recommended that they all be sampled, which will result in an expansion factor of 1.000. Sections should be selected randomly within each volume group for a given functional system, until the required number of samples is reached.

Sampling Individual Urbanized Areas

Urbanized area data are sampled on an individual area basis stratified by functional system and volume group. Each State must individually sample urbanized areas regardless of population size. The volume group for each roadway section and the required precision levels in the sampling frame must be identified according to Table 6.1 and Table 6.2, respectively, before sample selection can begin.

The number of sections to be included in the sample is determined using the calculation procedure described in Section 6.4. As with rural and small urban areas, sections should be selected randomly within each volume group for a given functional system, until the required number of samples is reached.

Each State must sample its portion of a multi-State urbanized area individually; an individual sampling approach must be applied to all parts of multi-State urbanized areas if expanded estimates are needed for the entire urbanized area.

Sample Maintenance

An HPMS sample adequacy review should be performed annually as part of a State's sample maintenance activities. The review should be completed shortly after the annual submittal of the HPMS dataset to address any potential deficiencies, prior to the next annual submittal. This permits the data provider to assess the adequacy of the sample framework (i.e. TOPS), which allows enough time for changes to be made in preparation for the next reporting cycle. Timing of the State's HPMS data processing is an important issue since sampling is dependent to a certain degree upon up-to-date traffic and functional classification data. There should be a number of considerations when reviewing HPMS sample adequacy. These considerations should include not only the assessment of the number of samples per volume group, but also a check for potential sample biases.

When conducting a sampling review, the State should also check for biases that may have been inadvertently introduced into the sample. As a result, sample bias may have been introduced in areas such as samples on State versus non-State-owned roads, sub-area biases by highway district, county, or non-random selection of adjacent roadway sections as new samples. Some of these biases may be disclosed by comparing the number of miles sampled. For example, the percent of State-owned miles sampled could be compared with the percent of non-State-owned miles sampled. Others may require a more detailed examination of the sample and its distribution. For instance, are samples clustered in groups on the same facility? A periodic review of the sample provides an opportunity to identify if any of these problems exist. As further changes are made to the HPMS sample, any biased sample selection procedures should be eliminated to improve sample randomness.

Need for Sample Panel Adjustments

There are any numbers of occurrences that may result in a need to reconsider the suitability of the existing Sample Panel. Some of the more common reasons for considering Sample Panel adjustments include:

- The decennial census of population is likely to require changes in the HPMS sample frame. The sampling basis may need to change because the numbers of small urban areas and individual urbanized areas may change, and/or the FHWA approved, adjusted Census urban boundaries of existing urban areas may be altered.

- The addition of new areas and the expansion of current urban boundaries are likely to require the functional reclassification of roadways within the new boundaries. This will in turn likely require transferring Sample Panel sections from one area's Sample Panel to another and randomly selecting additional samples to satisfy urban area requirements. Also, the loss of samples caused by movement from rural to small urban or from rural or small urban to urbanized areas may cause a deficiency in the rural or small urban area Sample Panels.

- Changes in the existing functional system length and HPMS Sample Panels are likely to result from functional reclassification, non-Census-related changes in urban boundaries, or the addition of newly constructed roadways.

- Migration of sections among and between volume groups may also result in a need to change HPMS Sample Panels. Each volume group contained within in a functional system is a separate sampling framework. Typically, there should be only minor changes in Sample Panel section and Full Extent length assignments to specific volume groups as a result of traffic increases or decreases within a period of three years. Full Extent AADT information for each roadway section must be kept up-to-date, so that the correct volume group reassignments can be made.

A thorough sample adequacy review, conducted annually, provides an opportunity to update the HPMS Sample Panels when necessary to meet the changed conditions reflected above.

Making Sample Panel Adjustments

Sample Panel adjustments should be made as necessary upon completion of a sample adequacy review. Use of an annual cycle will minimize the burden of completing this task. The following general procedures should be considered when adjusting Sample Panels:

- Check roadway sections that have moved from rural areas into new or expanded urban/urbanized areas or out of condensed urban areas into rural areas. Use appropriate sampling criteria and good engineering judgment to determine the extent of change warranted.
- Transfer rural, urban, or urbanized sample sections that have moved from one area type to another.

When small urban or urbanized areas decrease in size, changes to small urban or rural Sample Panels will occur. Therefore, Sample Panel sections affected by such changes should be assigned correctly in the new panel.

Advantages of Using Geospatial Data for Sample Selection Purposes

Geospatial data can be used as reference information for the purpose of making adjustments to the Sample Panel. States can overlay existing rural and urban geospatial boundary data on the routes spatial data to identify potential sample sections located in a given area. The States will then have the option to code rural/ urban area information for their section data based on the boundary data. However, the States will need to ensure that this data is accurate before using it for coding purposes. Alternatively, the States can manually code this information for their section data.

The ability of the HPMS software to generate the TOPS should reduce the amount of time that the States are required to spend selecting new samples. Additionally, the software calculates the number of samples needed in each volume group, using the formula defined in Section 6.4.

The following provides an outline of the steps involved in the preparation of the Sample Panel:

1 - States will check each of the following data items to ensure that they are properly coded in the Sections dataset for FHWA sample adequacy analysis purposes:

Functional System

Urban Code

Facility Type

Through Lanes

AADT

2 - States will use the TOPS (HPMS software generated) for review and analysis, and the selection of new samples.

3 - The HPMS software will calculate the Volume Groups and will determine the number of samples required in each volume group, using the formula discussed in Section 6.4.

4 - Additional calculations will be performed by the HPMS software and reports will be generated for review by the States.

Selecting Additional Samples

The selection of additional sample sections for a given volume group is straightforward for most Sample Panel updates. The TOPS is generated by the HPMS software. Therefore, the number of existing sample sections can be compared to the required number of samples as determined from the Sample Size Estimation formula, and additional samples can be selected as needed. Again, maintaining accurate AADTs requires the States and other data providers to maintain comprehensive, high quality traffic count programs (see Chapter 5).

Sample Permanence

Sample sections transferred to other geographic areas become part of the Sample Panel for those areas. Samples may be dropped in cases where a roadway is truly abandoned and not relocated, where sample sections are reclassified to a minor collector (rural) or local functional systems, or where sample sections are dropped from use as a result of a sample reduction plan. When samples are deleted, the State must submit a list specifying the ID numbers for those samples, the reasons for the deletions, and the locations for where the deletions will occur. Significant deletions of samples should be approved by FHWA prior to actual deletion of the samples.

Deleting Samples

The Sample Panel has been in existence for some time, therefore the addition of samples and the re-assignment Sample Panel sections from one volume group to another are likely to have caused over-sampling in some volume groups. Significant over-sampling is not encouraged because of cost and efficiency impacts. Sample reductions should be considered a normal component of sample maintenance. Before proceeding with a sample reduction exercise, the State should prepare a sample reduction plan and provide it to the FHWA for evaluation. A sample reduction plan should take into account the following:

1 - All sampling criteria must be met. Sample size requirements are calculated using the Sample Size Estimation Procedures described in Section 6.4, and must be maintained for each standard sample functional system.

2 - AADT data must be updated annually to ensure the correct volume group assignment.

3 - Individual volume group reductions resulting in less than three sample sections in any volume group should not be considered. A minimum of three samples per volume group must be maintained.

4 - Random deletion of the samples within each over-sampled volume group is required. As noted above, it is recommended that a surplus of 5 to 10 percent of samples be maintained to absorb future AADT changes, etc.

5 - Trends of Sample Panel section migration among volume groups should be examined. Volume groups that continually lose samples may warrant retaining a few excess samples.

6 - An expansion factor maximum of 100.000 should be observed.

7 - A State using the HPMS database for other purposes may want to keep an over-sampled Sample Panel intact or consider using higher precision levels.

8 - The sample reduction process may require more effort than the apparent resulting benefit of maintaining fewer samples. However, a periodic review and adjustment of the sample is needed to maintain the overall viability of the HPMS sample program.

9 - A sample reduction should be considered as part of the annual sample review process.

Eliminating Excessively Short and Long Sample Sections

As part of sample maintenance activities, sample sections should be analyzed to see if they are excessively short in length. Short samples not meeting minimum length recommendations should be lengthened into longer sample sections if they have similar roadway characteristics and the following key data items are homogenous: Urban Code, Functional System, Facility Type, AADT, and Through Lanes. While it is assumed that the TOPS as generated by the HPMS software will produce candidate sample sections based on these items, it is still possible that the resulting lengths may not meet the minimum recommended. In these cases, the AADT should be examined from the perspective of the source data to see if it can be re-calculated based on an extended sample section length that meets length recommendations while maintaining the homogeneity of the other data items. A reduction in an excessive number of short samples may save the State financial and personnel resources, and will ultimately improve sample representation.

For sample sections that are excessively longer than the recommended sample section length, effort should be made to reduce the length of the sample sections by considering subdividing the HPMS software-generated TOPS section(s) in question into one or more sections, based on a homogenous data item that meets the recommended length. In this way, the software-generated TOPS section may be subdivided based on AADT as long as the resulting subdivided section meets the recommended length. However, if no data item changes in value over the excessively long section, there is no need to subdivide the section for HPMS purposes. For example, if a 20 mile rural section is selected from the software-generated TOPS, the section should be subdivided into 2 or more (each not to be less than the minimum length or exceed the maximum) sections based on a non-homogenously-required data item, such as pavement type, if possible.

Updating Expansion Factors

When updating Sample Panels, any change in sample length and/or the length of the sampling frame requires an update of the expansion factors related to affected volume groups. Expansion factors should be recalculated before the annual HPMS submittal to ensure that all changes to AADT data, whatever the cause, have been properly accommodated. Expansion factor recalculation is one of the final data preparation steps when using the HPMS software.

A Tabular Summary

Table 6.4 provides an overview of conditions which generally require making changes to HPMS Sample Panels. The table lists the changes triggered either directly or indirectly by Bureau of Census actions, and by changes unrelated to Census actions. It should be noted that the impact of the Census' actions may be minor in nature due to the simplification of the urban/rural area boundary coding process. Furthermore, the table outlines the "Causes" for potential Sample Panel change and the "Recommendations" for how to address the change.

Table 6.4 Sample Panel Change Cause/Recommendation

CAUSE	RECOMMENDATION
CENSUS-RELATED	
New Small Urban Areas (Rural to Small Urban)	Adjust all rural sample section 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 section 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 section 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.
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 Reassignment of Sections	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.
Expansion Factor	Recalculate expansion factor values for sample section records in the affected group.

Chapter 7 SOFTWARE WORKFLOW & SUBMITTAL PROCESS

7.1 Overview

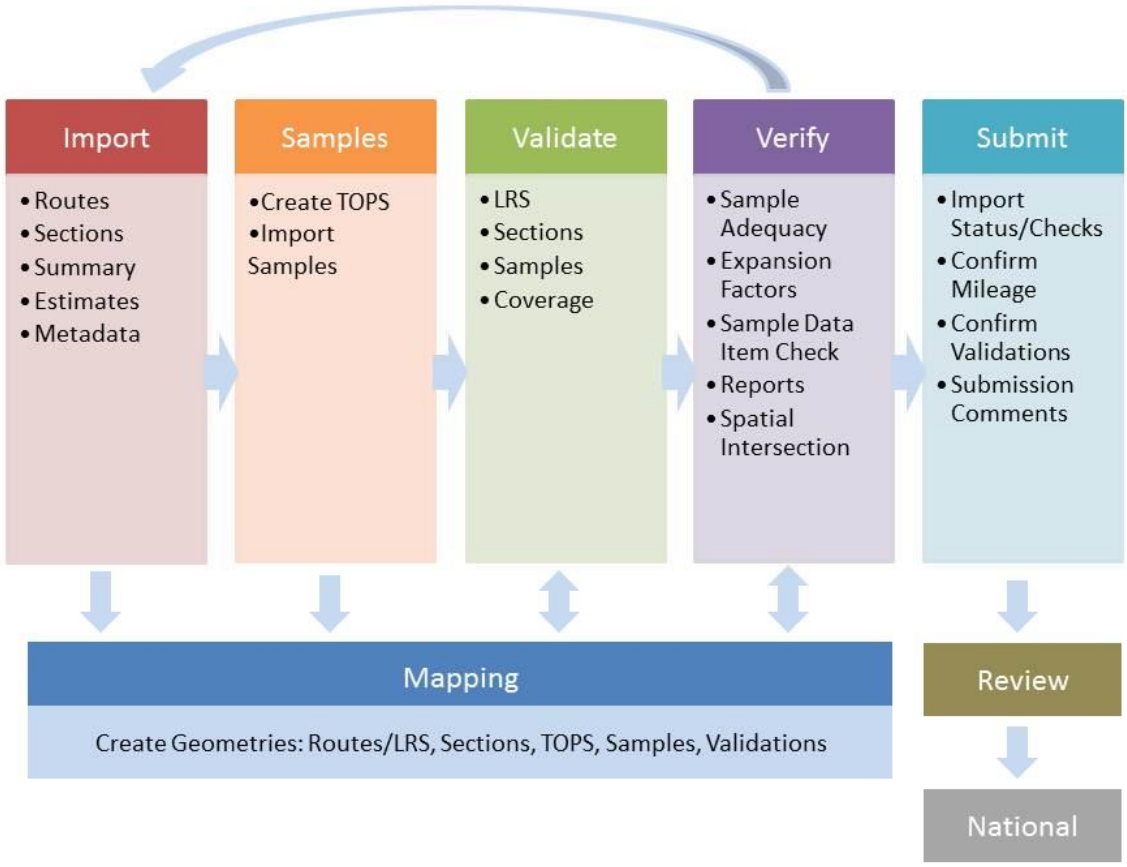
This chapter provides a macro-level overview of the HPMS software-related workflow that is associated with the preparation of the HPMS annual submittal. In addition, this chapter provides some basic examples of the types of validation checks that will be performed on the data by the HPMS software upon submittal. Finally, this chapter provides information on what the States should expect in terms of feedback, once their submittal has been validated and accepted by FHWA. For additional instructions regarding the use of the HPMS software, please consult the *HPMS Software Guide* which can be accessed via the FHWA HPMS website: http://www.fhwa.dot.gov/policyinformation/hpms.cfm.

7.2 Submittal Process

In general, the HPMS submittal process is applicable for all States. However, certain components of the submittal preparation may vary from State to State. For example, a State may or may not include the use of data from external sources such as Metropolitan Planning Organizations (MPOs). Therefore, each State establishes its own procedures for developing their HPMS submittal files. Ultimately, these procedures must result in the submittal of various types of roadway condition and performance attribute data in a character-separated value (CSV) file format. This must include data for all Federal-aid and National Highway System (NHS) routes, excluding those that are functionally classified as minor collector in rural areas or local in any area. Once the CSV file has been created, it must then be submitted via the HPMS software web application. States are required to obtain a User Profile Access Control System (UPACS) Login ID and Password in order to access the HPMS software (via UPACS). States should contact their respective FHWA Division Office to request access or contact the FHWA Office of Highway Policy Information UPACS Representative at 202-366-0175.

The submittal process involves a series of sequential steps, which includes a validation of the attribute data (i.e. Sections data) and Linear Reference System (LRS) network data, which occurs during the initial upload phase of the submittal process. The data is then further validated, for quality assurance/quality control purposes, after the data has been uploaded. A series of reports identifying all of the records in each file that failed validation will then be generated by the HPMS software and provided to the States via the HPMS software web application to be used for the purpose of resolving the remaining issues.

Figure 7.1 Software Workflow Diagram



The steps associated with the annual HPMS submittal (listed in no particular sequence) are discussed below:

1) Load **Routes** Data (Spatial file format in accordance with the HPMS Software User Guide)

   i. This step involves the loading of the LRS network (i.e. the Routes Dataset) using the Import Module in the HPMS software web application. The States have the option of submitting either a single LRS network dataset containing all of the routes in their respective network, or multiple datasets containing selected routes in their respective network. However, the States must provide a single range of measures (milepoints) for each individual route. This information will be used to generate mileage totals for the purpose of validating the Certified Mileage totals reported by the States.

   ii. Once the routes are loaded, a series of validation checks will be performed to ensure that the measures associated with the routes are logical. The system will only allow the routes that pass the validation checks to be submitted. The system will then generate a report listing all of the routes that will require attention before the system will allow them to be submitted. Upon re-loading of the revised routes, the software will confirm whether or not the routes pass validation and can ultimately be submitted.

2) Load **Sections** Data (CSV files)

   i. This step involves the loading of the Sections data (i.e. roadway attributes), using the Import Module in the HPMS software web application. The States have the option of submitting either a single CSV file containing their Sections data in its entirety, or multiple CSV files containing

certain data items within the scope of their Sections data. The following data items reported in the Sections data will be used to generate the Table of Potential Samples (T.O.P.S) as discussed in Chapter 6:

- Functional System
- Annual Average Daily Traffic (AADT)
- Facility Type
- Through Lanes
- Urban Code

ii. Once the CSV file(s) are loaded, a series of validation cross checks will be performed to ensure that the values/codes provided for the key attributes (i.e. data items) are logical. All of the validation cross checks must be addressed before the Sections data can ultimately be submitted.

3) Load Non-Sections Data (CSV files)
   a) Enter **Summary** data using the Import module in the HPMS software web application.
   b) Enter **Estimates** data using the Import module in the HPMS software web application.
   c) Enter **Metadata** using the Import module in the HPMS software web application.
4) Load **Sample Panel Identification Data** (CSV file)
5) Validate LRS, Sections, and Sample Data
6) Verify Sample Data Components
7) Submit the Data

7.3 Software Validations

The HPMS software web application will perform a series of validation checks on the States' Sections and LRS network (i.e. the Routes dataset) during the initial phase of the submittal process. Validation reports will be generated during this process, which will provide the States with a summary of the records and routes in the respective datasets that do not pass the validation checks. The States must then address the erroneous records and/or routes within their respective database(s) and re-submit them either individually, or as a batch re-submittal via the HPMS software web application.

The validation process checks records in the Sections dataset for various data items to ensure that the values/codes entered for those items are correctly formatted. The validation process also ensures that all required values/codes have been reported for those data items, and that the values/codes reported are logical in-terms of how they relate to other key data items. A list of the validation checks are contained within the *HPMS Software Guide*.

Additionally, the validation process will check each route in the LRS network to ensure that: (1) measures are present over the entire extent of each route, (2) measures are consistently increasing over the entire extent of the route (i.e. origin to terminus), and (3) measures fall within the range of values defined by the route's minimum and maximum measures. Other validation checks performed on the LRS network data are identified in the *HPMS Software Guide*.

7.4 Post-Submittal Expectations

Once the States' HPMS submittal has been accepted, FHWA will conduct a review of the submittal file for quality assurance/quality control (QA/QC) purposes. FHWA will then develop a summary of the anomalies that are discovered during the review process which will need to be addressed by the States either in the near-term, or in the next annual submittal. This information will then be communicated to the States via official FHWA correspondence which will specify any actions that must be taken pertaining to the current submittal and prior to the next submittal. The States must then prepare an official response to FHWA's correspondence and forward it to FHWA for the official record.

Appendix A. Acronyms

AADT	Annual Average Daily Traffic
AADTT	Annual Average Daily Truck Traffic
AASHTO	American Association of State Highway Transportation Officials
AC	Asphalt-Concrete
ASR	Alkali Silica Reactivity
ASTM	American Society of Testing and Materials
AVC	Automatic Vehicle Classification
CAA	Clean Air Act
CCS	Continuous Count Station
CFR	Code of Federal Regulations
Col	Collector
COP	Community of Practice
CRCP	Continuously Reinforced Concrete Pavement
CSV	Character Separated Value
CU	Combination-unit
C&P	Conditions & Performance
DOT	Department of Transportation
DVMT	Daily Vehicle-Miles of Travel
EPA	Environmental Protection Agency
ESRI	Environmental Systems Research Institute
ETL	Express Toll Lane
FC	Functional Classification
FE	Full Extent
FE + R	Full Extent including Ramps
FHWA	Federal Highway Administration

FIPS	Federal Information Processing Standards
GIS	Geographic Information System
GML	Geography Markup Language
GPRA	Government Performance and Results Act
HERS	Highway Economic Requirements System
HCM	Highway Capacity Manual
HMA	Hot Mix Asphalt
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
HPMS	Highway Performance Monitoring System
Int	Interstate
IRI	International Roughness Index
ITS	Intelligent Transportation Systems
JPCP	Jointed Plain Concrete Pavement
JRCP	Jointed Reinforced Concrete Pavement
Loc	Local
LRS	Linear Referencing System
LTPP	Long Term Pavement Performance
MA	Minor Arterial
MaC	Major Collector
MiC	Minor Collector
MPO	Metropolitan Planning Organization
MRI	Mean Roughness Index
NAAQS	National Ambient Air Quality Standards
NAD	North American Datum
NBI	National Bridge Inventory

NHS	National Highway System
NN	National Freight Network
OFE	Other Freeways and Expressways
OGC	Open Geospatial Consortium
OHPI	Office of Highway Policy Information
OMB	Office of Management & Budget
OPA	Other Principal Arterial
PAS	Principal Arterial System
PCC	Portland Cement Concrete
PCS	Portable Count Station
PK	Primary Key
PMS	Pavement Management System
PSR	Present Serviceability Rating
QA/QC	Quality Assurance/Quality Control
SHA	State Highway Agency/Administration
SHRP	Strategic Highway Research Program
SP	Sample Panel
SPR	State Planning and Research
STIP	State Transportation Improvement Plan
SU	Single-unit
STRAHNET	Strategic Highway Network
TEA-21	Transportation Equity Act for the 21st Century
TMG	Traffic Monitoring Guide
TOPS	Table of Potential Samples
UA	Urban/Urbanized Area
UK	Unique Key

UPACS	User Profile Access Control System
U.S.C.	United States Code
VMT	Vehicle Miles of Travel
VPI	Vertical Point of Intersection
WBT	Well Known Binary
WDS	Weighted Design Speed
WIM	Weigh-in-Motion
WKT	Well Known Text

Appendix B. Glossary

Adjusted Urban Area Boundary - A Census-defined urban area boundary that has been adjusted (expanded)by a State DOT and approved by FHWA to include additional territory per 23 CFR 470.105.

Aggregation Business Rule – Describes how the national HPMS database and software will aggregate data as the sample view is created. Typical rules include: weighted average, predominance, proportional, or summation.

Certification of Public Road Mileage – An annual document furnished by each State to FHWA certifying the total public road length in the State as of December 31st. This document is to be signed by the Governor of the State or by his/her designee and provided to FHWA by June 1st of the year following (23 CFR 460). For additional clarification, this glossary also contains the definition of a ‘‘public road’’.

Codes for Urban Areas – Urban area codes are discussed in Chapter 4 and listed in Appendix I. For multi-State urbanized areas, each State must report HPMS information for the portion of the FHWA-approved adjusted urbanized area within its State boundary. Codes for new urban areas will be issued following each Decennial Census.

Collection Cycle – The period for which the data are collected; typically annually or every 2 or 3 years. This is in contrast to the HPMS reporting cycle which is annual for all data.

Comment File – A text file that accompanies the HPMS data submittal to FHWA. It explains data issues, problems, deficiencies, unusual conditions, and any significant changes from the previous HPMS submittal. It should be provided as an electronic file attached to the HPMS submittal.

Divided Highway – A multi-lane facility with a curbed or positive barrier median, or a median that is at least 4 feet in width.

English Units – The term ‘‘English’’ refers to the United States legislative interpretation of U.S. customary units as defined in a document prepared by the National Institute of Standards and Technology (NIST), U.S. Department of Commerce, Special Publication 330. Commonly used English units in HPMS are miles, feet, and inches.

Extent – Spatial coverage for which the data are to be reported: functional system, NHS, Sample, paved etc.

Federal-aid highways – All NHS routes and other roads functionally classified as Interstate, Other Freeways & Expressways, Other Principal Arterials, Minor Arterials, Major Collectors, and Urban Minor Collectors.

Full Extent – A population comprised of all sections of a functional system of public roads, which serves as a statistical universe for HPMS sampling and census data collection

Full Extent Data – Data that are collected in a census of a whole population, which for HPMS means data collected on all sections of a functional system of public roads.

Functional Systems – Functional systems result from the grouping of highways by the character of service they provide. The functional systems designated by the States in accordance with 23 CFR 470 are used in the HPMS. Guidance criteria and procedures are provided in the most recent version of the FHWA publication Highway Functional Classification: Concepts, Criteria, and Procedures, available at: (http://www.fhwa.dot.gov/policyinformation/hpms/hfcccp.cfm

Geographic Information System (GIS) – A system for the management, display, and analysis of spatial information.

Geospatial Data – The HPMS geospatial data provide a linear referencing system for the full extent and sample panel data on selected highway functional systems. The represented functional systems include Interstate, Other Freeways & Expressways, Other Principal Arterials, Minor Arterials, Major Collectors, Urban Minor Collectors, and all National Highway System (NHS) routes and connectors. This permits the national HPMS database to be utilized and maintained in a GIS environment.

Highway – The term highway includes roads, streets, and parkways and all their appurtenances (23 U.S.C. 101).

Linear Referencing System (LRS) – A set of procedures for determining and retaining a record of specific points along a highway. Typical methods used are milepoint, milepost, reference point, and link-node.

Metadata – Describes how data are collected or converted for reporting; explains variations in data that do not warrant the establishment of a collection requirement (e.g., type of equipment used, sampling frequency etc.)

National Ambient Air Quality Standards (NAAQS) Non-attainment Area – Any geographic region of the United States which has been designated under Section 107 of the Clean Air Act (CAA) for any pollutant for which a national ambient air quality standard exists. The national HPMS database is used for travel tracking for air quality assurance purposes in non-attainment and maintenance areas as required by EPA under the 1990 Clean Air Amendments Act (Section 187) and the Transportation Conformity Rule, 40 CFR parts 51 and 93. More specifically, these data are used primarily for establishing regional transportation-related emissions for transportation conformity purposes. Estimated travel based on these data is used for calibration and validation of base-year network travel models when required for non-attainment or maintenance areas.

National Highway System (NHS) – The National Highway System is a network of nationally significant highways approved by Congress in the National Highway System Designation Act of 1995. It includes the Interstate System and various non-Interstate roads and connectors to major intermodal terminals. All NHS routes and connectors must be identified in the HPMS.

National Network – These are the routes designated for use by dimensioned commercial vehicles under the Surface Transportation Assistance Act (STAA) of 1982 as identified in 23 CFR 658, Appendix A. Nationally designated truck routes include the Interstate System (a few sections are exempted by Federal law in Minnesota, Virginia, and District of Columbia); non-Interstate routes specifically listed in 23 CFR, Appendix A, as amended, and the other non-Interstate existing Federal-aid Primary (FAP) routes as defined prior to June 1, 1991, that STAA-dimensioned commercial vehicles may legally operate on.

- Some States have allowed STAA-dimensioned commercial vehicles to operate on other State routes. These and other non-national truck network roads used between the STAA national network and terminals and facilities for food, fuel, repairs, and rest under the reasonable access rule are not nationally designated truck routes. These routes are not to be included.

PK – Primary Key – Used to indicate which fields of data within a table are to be used for establishing relationships with other tables in a database environment.

Population – Within HPMS, the term "population" refers to the census defined population, unless otherwise specified.

Public Road – A public road is any road or street owned and maintained by a public authority and open to public travel. [23 U.S.C. 101(a)] Under this definition, a ferryboat route is not a public road.

- The term ‘‘maintenance’’ means the preservation of the entire highway, including surfaces, shoulders, roadsides, structures, and such traffic-control devices as are necessary for safe and efficient utilization of the highway. [23 U.S.C. 101(a)]

- To be open to public travel, a road section must be 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. [23 CFR 460.2(c)]
- A public authority is defined as a Federal, State, county, town or township, Indian tribe, municipal or other local government, or instrumentality with authority to finance, build, operate, or maintain toll or toll-free facilities. [23 U.S.C. 101(a)]

Roadway – The portion of a highway intended for vehicular use.

Rural Areas – For purposes of HPMS, all areas of a State not included in the FHWA adjusted urban areas or Census defined urban areas.

Sample Panel – A collection of designated roadway sections within a system of public roads that is stable over time and is used to estimate attributes for the entire system.

Small Urban Areas – Small urban areas are defined by FHWA as areas with urban population of 5,000 to 49,999 (except in the case of cities in Maine and New Hampshire) outside of urbanized areas. As a minimum, a small urban area includes any area containing an urban population of at least 5,000 as designated by the Census. Designated boundaries of a small urban area can be adjusted by responsible State officials subject to approval by FHWA, per 23 CFR 470.105.

State (Codes) – The term "State" refers to any one of the 50 States, the District of Columbia, or the Commonwealth of Puerto Rico. The Federal Information Processing Standard Codes for States (FIPS PUB 5-2) are included in Appendix C.

Strategic Highway Network (STRAHNET) – The STRAHNET includes highways which are important to the United States strategic defense policy and which provide defense access, continuity, and emergency capabilities for the movement of personnel, materials, and equipment in both peacetime and war time.

Summary Data – These data consist of annual summary reports for certain data not included in the HPMS full extent and sample panel data set for the rural minor collector and local functional systems. These additional data are derived from State and local sources such as statewide highway databases, management systems, Intelligent Transportation Systems (ITS) and traffic monitoring systems, and data made available from local governments and MPOs.

Table of Potential Samples – A collection of roadway sections spanning the public road network that provides the sampling frame for selection of the Sample Panel.

Urban Areas – According to definitions in 23 U.S.C. 101(a), areas of population greater than 5,000 qualify as urban for transportation purposes. Urban areas include FHWA defined small urban areas (population of 5,000 – 49,999) and urbanized areas (population of 50,000 +).

Urban Clusters (UC) - A Census-designated urban area with at least 2,500 residents and no more than 49,999 residents. The FHWA uses small urban area to designate areas with a population of 5,000 to 49,999. Areas with a Census defined population of 2,500 – 4,999 are designated rural by FHWA.

Urbanized Areas (UZA)– Areas with a population of 50,000 or more, as designated by the Census. These boundaries can be adjusted per 23 CFR 470.105.

U.S. Territories – The U.S. Territories include American Samoa, Guam, the Commonwealth of the Northern Marianas, and the Virgin Islands of the United States. The Federal Information Processing Standard Codes (FIPS PUB 5-2) are included in Appendix C.

Non-Urbanized Area – Per 23 CFR 490.101, Non-Urbanized Area means any geographic area that is not an ''urbanized area'' under either 23 U.S.C. 101(a)(34) or 23 CFR 450.104. For purposes of HPMS, this includes any area with a US Census defined population of 50,000 or less.

Appendix C. Table of Federal Information Processing Standard (FIPS) Codes for States (FIPS PUB 5-2)

FIPS PUB 5-2, Federal Information Processing Standard Publication, 1987 May 28, U.S. Department of Commerce, National Bureau of Standards.

Code	Description	Code	Description
1	Alabama	32	Nevada
2	Alaska	33	New Hampshire
4	Arizona	34	New Jersey
5	Arkansas	35	New Mexico
6	California	36	New York
8	Colorado	37	North Carolina
9	Connecticut	38	North Dakota
10	Delaware	39	Ohio
11	District of Columbia	40	Oklahoma
12	Florida	41	Oregon
13	Georgia	42	Pennsylvania
15	Hawaii	44	Rhode Island
16	Idaho	45	South Carolina
17	Illinois	46	South Dakota
18	Indiana	47	Tennessee
19	Iowa	48	Texas
20	Kansas	49	Utah
21	Kentucky	50	Vermont
22	Louisiana	51	Virginia
23	Maine	53	Washington
24	Maryland	54	West Virginia
25	Massachusetts	55	Wisconsin
26	Michigan	56	Wyoming
27	Minnesota	60	American Samoa
28	Mississippi	66	Guam
29	Missouri	69	Northern Mariana Islands
30	Montana	72	Puerto Rico
31	Nebraska	78	Virgin Islands of the U.S.

Appendix D. Toll-ID Table

This table will be updated by FHWA as facilities are opened or closed.

State	HPMS Toll ID	Name of Toll Facility	New Facility
Alabama	1	Alabama River Parkway Bridge	
Alabama	2	Black Warrior Parkway Bridge	
Alabama	3	Emerald Mountain Expressway Bridge	
Alabama	4	Foley Beach Express	
Alabama	1001	Mobile Bay Ferry	
Alabama	1002	Gee's Bend Ferry	
Alaska	5	Whittier Tunnel	
Alaska	1003	Motor Vessel Leconte	
Alaska	1004	Motor Vessel Tustumena	
Alaska	1005	Motor Vessel Bob Ellis	
Alaska	1006	Motor Vessel Under Construction	
Alaska	1007	Motor Vessel Oral Freeman	
Alaska	1008	Motor Vessel Susitna	
Alaska	1009	Hovercraft Suna-X	
Alaska	1010	Motor Vessels Stikine/ Prince of Wales	
Alaska	1011	Motor Vessel Lituya	
Alaska	1012	Motor Vessel Fairweather	
Alaska	1013	Motor Vessel Chenega	
Alaska	1014	Motor Vessel Aurora	
Alaska	1015	Motor Vessel Taku	
Alaska	1016	Motor Vessel Matanuska	
Alaska	1017	Motor Vessel Kennicott	
Alaska	1018	Motor Vessel Columbia	
Alaska	1019	Motor Vessel Malaspina	
California	8	San Francisco-Oakland Bay Bridge	
California	9	Carquinez Bridge (2 Bridges)	
California	10	Martinez-Benicia Bridge	
California	11	Richmond-San Rafael Bridge	
California	12	Antioch (John A. Nedjedly) Bridge	
California	13	San Mateo-Hayward Bridge	
California	14	Dumbarton Bridge	
California	15	Golden Gate Bridge	
California	16	I-15 Value Pricing Project	

State	HPMS Toll ID	Name of Toll Facility	New Facility
California	17	Seventeen Mile Drive	
California	18	Route 91 Express Lanes	
California	19	Eastern Trans. Corridor (Routes 261, 241, & 133)	
California	20	Foothill Trans. Corridor (Route 241)	
California	21	San Joaquin Hills Trans. Corridor (Route 73)	
California	23	Route 125	
California	297	I-680 SMART Carpool Lanes	
California	298	I-880/SR 237 Express Connector	
California	313	I-110 Express Lanes	
California	338	I-10 Express Lanes, from Alameda St/Union Station to I-605 (14 miles), Los Angeles	*
California	1020	Balboa Island	
Colorado	24	HOV/Tolled Express Lanes	
Colorado	25	Northwest Parkway	
Colorado	26	E-470	
Colorado	299	Pikes Peak Toll Road	
Colorado	337	US 36 Bus Rapid Transit/HOV/Express Lanes	*
Connecticut	1021	Rocky Hill - Glastonbury	
Connecticut	1022	Chester - Hadlyme	
Connecticut	1023	Bridgeport - Port Jefferson	
Connecticut	1024	New London - Orient	
Connecticut	1025	New London - Fishers Island	
Connecticut	1026	New London - Block Island	
Delaware	27	Delaware Memorial Bridge	
Delaware	28	John F. Kennedy Memorial Highway (Delaware Turnpike)	
Delaware	29	SR-1	
Delaware	1027	Lewes - Cape May	
Florida	30	Sunshine Skyway Bridge (I-275)	
Florida	31	Card Sound Bridge	
Florida	32	Mid-Bay Bridge	
Florida	33	Pinellas Bayway System Bridge	
Florida	34	Pensacola Beach Bridge (Bob Sykes Bridge)	
Florida	36	Broad Causeway	
Florida	37	Rickenbacker Causeway (SR-913)	
Florida	40	Sanibel Causeway	
Florida	41	Cape Coral Bridge	
Florida	42	Midpoint Memorial Bridge	
Florida	43	Garcon Point Bridge	

State	HPMS Toll ID	Name of Toll Facility	New Facility
Florida	44	Alligator Alley (Everglades Parkway)	
Florida	45	East-West (Dolphin) Expressway	
Florida	46	Florida Turnpike - Mainline	
Florida	47	Beachline East (Central Florida Expressway)	
Florida	48	Beachline Expressway	
Florida	49	Beachline West	
Florida	50	Homestead Extension of Florida Turnpike (HEFT)	
Florida	51	South Dade (Don Shula) Expressway	
Florida	52	Lee Roy Selmon Crosstown Expressway	
Florida	53	Holland East-West Expressway	
Florida	54	Sawgrass Expressway (SR 869)	
Florida	55	Miami Airport Expressway	
Florida	56	Veterans Expressway (SR 589)	
Florida	57	Seminole Expressway	
Florida	58	Central Florida Greenway (SR-417)	
Florida	59	Daniel Webster - Western Beltway Part C	
Florida	60	Osceola Parkway	
Florida	61	Southern Connector Extension	
Florida	62	Gratigny Parkway	
Florida	63	Suncoast Parkway (SR 589)	
Florida	64	Polk Parkway (SR 570)	
Florida	300	Hammock Dunes Parkway	
Florida	301	Goldenrod Road	
Florida	302	I-95 HOT lanes (North-South Expressway)	
Florida	303	John Land - Apopka Expressway (SR 414)	
Florida	314	Venetian Causeway	
Florida	315	Snapper Creek Expressway	
Florida	318	Gasparilla Bridge	
Florida	339	I-4/Selmon connector	*
Florida	340	I-595 Express	*
Georgia	67	Georgia 400 Extension	
Illinois	69	Wabash Memorial Bridge	
Illinois	70	Frank E. Bauer Bridge	
Illinois	71	Fort Madison Bridge	
Illinois	72	Ronald Reagan Memorial Tollway	
Illinois	73	Veterans Memorial Tollway	
Illinois	74	Jane Addams Memorial Tollway	
Illinois	75	Chicago Skyway	

State	HPMS Toll ID	Name of Toll Facility	New Facility
Illinois	76	Tri-State Tollway	
Illinois	77	East-West Tollway (SR-56 Connector)	
Illinois	304	St. Francisville Bridge - Old Wabash Cannonball Railroad Bridge	
Illinois	1028	Calhoun Ferry Company	
Illinois	1029	John Balmann; Canton, MO	
Illinois	1030	Calhoun Ferry Company	
Illinois	1031	New Bourbon Regional Port Authority	
Illinois	1032	Grafton Ferry Boat Company	
Indiana	68	New Harmony Bridge	
Indiana	69	Wabash Memorial Bridge	
Indiana	78	Indiana East-West Toll Road	
Indiana	304	St. Francisville Bridge - Old Wabash Cannonball Railroad Bridge	
Iowa	70	Frank E. Bauer Bridge	
Iowa	71	Fort Madison Bridge	
Iowa	80	Bellevue Bridge	
Iowa	81	Decatur Bridge	
Iowa	82	Plattsmouth Bridge	
Iowa	1033	Cassville Village, WI	
Kansas	83	Kansas Turnpike	
Kentucky	1034	John and Bess Speer	
Kentucky	1035	Anderson Boat Co	
Kentucky	1036	Augusta Ferry Authority	
Louisiana	87	Lake Pontchartrain Causeway	
Louisiana	88	Greater New Orleans Mississippi River/Crescent City Connection Bridge	
Louisiana	89	Avery Island	
Louisiana	317	LA 1 Elevated Highway/Bridge Leeville to Port Fouchon	
Louisiana	1122	Algiers/Canal St (pedestrian only, no vehicles)	*
Louisiana	1123	Cameron	*
Louisiana	1124	Duty/Enterprise	*
Louisiana	1125	Lowers Algiers/Chalmette	*
Louisiana	1126	Plaquemine	*
Maine	90	Maine Turnpike	
Maine	1037	Margaret Chase Smith	
Maine	1038	Captain Henry Lee	
Maine	1039	Captain Henry Lee	
Maine	1040	Captain Neal Burgess	
Maine	1041	Captain Charles Philbrook	
Maine	1042	Governor Curtis	

State	HPMS Toll ID	Name of Toll Facility	New Facility
Maine	1043	North Haven	
Maine	1044	Everett Libby	
Maine	1045	Machigonne II	
Maine	1046	Maquoit II	
Maine	1047	Island Romance	
Maine	1048	Aucocisco III	
Maine	1049	Bay Mist	
Maine	1050	The 'Cat	
Maine	1051	The 'Cat	
Maryland	91	Harry W. Nice Memorial Bridge	
Maryland	92	Baltimore Harbor Tunnel (2 Tubes)	
Maryland	93	Fort McHenry Tunnel (4 Tubes)	
Maryland	94	Millard Tydings Bridge	
Maryland	95	Hatem Bridge	
Maryland	96	William Preston Lane, Jr. Bridge	
Maryland	97	Francis Scott Key Bridge	
Maryland	98	John F. Kennedy Memorial Highway - Express Toll Lanes (ETL)	
Maryland	99	Intercounty Connector (ICC) (MD 200)	
Maryland	1052	Captain Gilbert Clark	
Maryland	1053	Whites Ferry, Inc.	
Massachusetts	100	Ted Williams Tunnel	
Massachusetts	101	Callahan & Sumner Tunnels	
Massachusetts	102	Maurice J. Tobin Bridge	
Massachusetts	103	Massachusetts Turnpike	
Massachusetts	1054	Woods Hole	
Massachusetts	1055	Hyannis	
Michigan	104	Mackinac Bridge	
Michigan	105	Sault Ste. Marie Bridge	
Michigan	106	Blue Water Bridge	
Michigan	107	New Blue Water Bridge	
Michigan	108	Grosse Isle Bridge	
Michigan	109	Ambassador Bridge	
Michigan	110	Detroit-Windsor Tunnel	
Michigan	1056	Harson's Island	
Michigan	1057	St. Mary's River Ferry System	
Michigan	1058	St. Mary's River Ferry System	
Michigan	1059	St. Mary's River Ferry System	
Michigan	1060	Ironton	

State	HPMS Toll ID	Name of Toll Facility	New Facility
Michigan	1061	Charlevoix/Beaver Island	
Michigan	1062	Cheboygan	
Michigan	1063	Algonac	
Michigan	1064	Marine City	
Michigan	1065	Detroit Windsor Truck Ferry	
Michigan	1066	SS Badger (Ludington - Manitowoc)	
Michigan	1067	Lake Express	
Minnesota	111	12th/15th Avenue, N Bridge	
Minnesota	112	International Falls Bridge	
Minnesota	113	MNPass	
Missouri	114	Lake of the Ozark Com Bridge	
Missouri	1068	Akers	
Missouri	1069	Mississippi County Ferry	
Nebraska	80	Bellevue Bridge	
Nebraska	81	Decatur Bridge	
Nebraska	82	Plattsmouth Bridge	
Nevada	115	Valley of Fire Road	
New Hampshire	116	Cheshire Bridge	
New Hampshire	117	Blue Star Turnpikes	
New Hampshire	118	F. E. Everett Turnpike	
New Hampshire	119	Henry Bourque Highway (Route 3)	
New Hampshire	120	Spaulding Turnpike	
New Hampshire	121	Mt. Washington Summit Road	
New Jersey	27	Delaware Memorial Bridge	
New Jersey	122	George Washington Bridge	
New Jersey	123	Goethals Bridge	
New Jersey	124	Holland Tunnel (2 Tubes)	
New Jersey	125	Bayonne Bridge	
New Jersey	126	Outerbridge Crossing Bridge	
New Jersey	127	Lincoln Tunnel (3 Tubes)	
New Jersey	128	I-78 Toll Bridge	
New Jersey	129	Delaware Water Gap Bridge	
New Jersey	130	Ben Franklin Bridge	
New Jersey	131	Walt Whitman Bridge	
New Jersey	132	New Jersey and Pennsylvania Turnpike Bridge	

State	HPMS Toll ID	Name of Toll Facility	New Facility
New Jersey	133	Dingman's Ferry Bridge	
New Jersey	134	Tacony-Palmyra Bridge	
New Jersey	135	Burlington-Bristol Bridge	
New Jersey	136	Trenton-Morrisville Bridge	
New Jersey	137	Easton-Phillipsburg Bridge	
New Jersey	138	Portland-Columbia Bridge	
New Jersey	139	Milford-Montague Bridge	
New Jersey	140	New Hope-Lambertville Bridge	
New Jersey	141	Betsy Ross Bridge	
New Jersey	142	Commodore John Barry Bridge	
New Jersey	143	Margate Bridge	
New Jersey	144	Beesleys Point Bridge	
New Jersey	145	Townsends Inlet Bridge	
New Jersey	146	Grassy Sound Bridge	
New Jersey	147	Middle Thorofare Bridge	
New Jersey	148	Corson's Inlet Bridge	
New Jersey	150	Newark Bay Extension	
New Jersey	151	Pennsylvania Turnpike Extension	
New Jersey	152	New Jersey Turnpike (Main Line)	
New Jersey	153	New Jersey 495	
New Jersey	154	Garden State Parkway	
New Jersey	155	Atlantic City Expressway	
New Jersey	156	Ocean City-Longport Bridge	
New York	122	George Washington Bridge	
New York	123	Goethals Bridge	
New York	124	Holland Tunnel (2 Tubes)	
New York	125	Bayonne Bridge	
New York	126	Outerbridge Crossing Bridge	
New York	127	Lincoln Tunnel (3 Tubes)	
New York	157	South Grand Island Bridge	
New York	158	North Grand Island Bridge	
New York	159	Tappan Zee Bridge	
New York	160	Newburgh-Beacon Bridge	
New York	161	Triborough Bridge	
New York	162	Bronx-Whitestone Bridge	
New York	163	Throgs Neck Bridge	
New York	164	Verrazano-Narrows Bridge	
New York	165	Queens Midtown Tunnel (2 Tubes)	

State	HPMS Toll ID	Name of Toll Facility	New Facility
New York	166	Brooklyn Battery Tunnel	
New York	167	Thousand Islands Bridge	
New York	168	Lewston-Queenston Bridge	
New York	169	Castleton-on-Hudson Bridge	
New York	170	Kingston-Rhinecliff Bridge	
New York	171	Rip Van Winkle Bridge	
New York	172	Mid-Hudson Bridge	
New York	173	Bear Mountain Bridge	
New York	174	Atlantic Beach Bridge	
New York	175	Henry Hudson Bridge	
New York	176	Marine Parkway-Gil Hodges Memorial Bridge	
New York	177	Cross Bay Veterans Memorial Bridge	
New York	178	Peace Bridge	
New York	179	Ogdensburg-Prescott Bridge	
New York	180	Rainbow Bridge	
New York	181	Whirlpool Rapids Bridge	
New York	182	Seaway International Bridge (Cornwall-Massena)	
New York	183	Gov. Thomas E. Dewey Thruway (Main Line)	
New York	184	Berkshire Section	
New York	185	Niagara Section	
New York	186	New England Section	
New York	187	Gov. Thomas E. Dewey Thruway Berkshire Section	
New York	188	Gov. Thomas E. Dewey Thruway Gardenstate Parkway Connection	
New York	189	Whiteface Mountain Vet. Memorial Highway	
New York	190	Prospect Mountain Vet. Memorial Highway	
New York	1070	Shelter Island	
New York	1071	Shelter Island	
New York	1072	Port Kent	
New York	1073	Essex	
New York	1074	Cumberland Head	
New York	1075	Fort Ticonderoga	
New York	1076	Cape Vincent	
North Carolina	193	Triangle Expressway	
North Carolina	1077	Ocracoke - Swan Quarter	
North Carolina	1078	Cedar Island - Ocracoke	
North Carolina	1079	Currituck - Corolla	
North Carolina	1080	Southport Fort Fisher	
North Dakota	111	12th/15th Avenue, N Bridge	

State	HPMS Toll ID	Name of Toll Facility	New Facility
Ohio	195	Newell-East Liverpool Bridge	
Ohio	196	Ohio Turnpike	
Ohio	287	Parkersburg Memorial Bridge	
Ohio	1081	Miller Boat Line	
Ohio	1082	Kelly's Island Ferry	
Ohio	1083	M.V. Pelee Island	
Oklahoma	197	Turner Turnpike	
Oklahoma	198	Will Rogers Turnpike	
Oklahoma	199	H.E. Bailey Turnpike	
Oklahoma	200	Indian Nation Turnpike	
Oklahoma	201	Muskogee Turnpike	
Oklahoma	202	Cimarron Turnpike	
Oklahoma	203	John Kilpatrick Turnpike	
Oklahoma	204	Creek Turnpike	
Oklahoma	205	Chickasaw Turnpike	
Oklahoma	206	Cherokee Turnpike	
Oregon	207	Bridge of the Gods	
Oregon	284	Hood River Bridge	
Oregon	1084	Wheatland Ferry	
Oregon	1085	Buena Vista Ferry	
Oregon	1086	Canby Ferry	
Pennsylvania	128	I-78 Toll Bridge	
Pennsylvania	129	Delaware Water Gap Bridge	
Pennsylvania	130	Ben Franklin Bridge	
Pennsylvania	131	Walt Whitman Bridge	
Pennsylvania	132	New Jersey and Pennsylvania Turnpike Bridge	
Pennsylvania	133	Dingman's Ferry Bridge	
Pennsylvania	134	Tacony-Palmyra Bridge	
Pennsylvania	135	Burlington-Bristol Bridge	
Pennsylvania	136	Trenton-Morrisville Bridge	
Pennsylvania	137	Easton-Phillipsburg Bridge	
Pennsylvania	138	Portland-Columbia Bridge	
Pennsylvania	139	Milford-Montague Bridge	
Pennsylvania	140	New Hope-Lambertville Bridge	
Pennsylvania	141	Betsy Ross Bridge	
Pennsylvania	142	Commodore John Barry Bridge	
Pennsylvania	208	Pennsylvania Turnpike	
Pennsylvania	209	Pennsylvania Turnpike Eastern Extension	

State	HPMS Toll ID	Name of Toll Facility	New Facility
Pennsylvania	210	Pennsylvania Turnpike Northeastern Extension	
Pennsylvania	211	Pennsylvania Turnpike Western Extension	
Pennsylvania	212	Pennsylvania Turnpike Delaware River Extension	
Pennsylvania	213	Mosey Wood Toll Road	
Pennsylvania	214	Greensburg Bypass	
Pennsylvania	215	Beaver Valley Expressway	
Pennsylvania	216	Monvalley Expressway	
Pennsylvania	217	Mon-Fayette Expressway	
Pennsylvania	310	Calhoun Street Bridge	
Pennsylvania	311	Toll Road 576 (Southern Beltway)	
Pennsylvania	1088	Fredericktown	
Pennsylvania	1089	Millersburg	
Puerto Rico	289	Teodoro Moscoso Bridge	
Puerto Rico	290	Luis A. Ferre Expressway (PR-52)	
Puerto Rico	291	De Diego Expressway (PR-22)	
Puerto Rico	292	PR-53 Expressway: José Celso Barbosa	
Puerto Rico	293	PR-53 Expressway: José Dávila Mosanto	
Puerto Rico	294	Rafael Martínez Nadal Expressway (PR-20)	
Puerto Rico	295	Expreso Rio Hondo (PR-5)	
Puerto Rico	296	Roberto Sánchez Vilella Expressway (PR-66)	
Puerto Rico	1117	Fajardo - Vieques	
Puerto Rico	1118	Fajardo - Culebra	
Puerto Rico	1119	Vieques - Culebra	
Puerto Rico	1120	San Juan-Cataño	
Puerto Rico	1121	San Juan-Hato Rey	
Rhode Island	218	Newport Bridge	
Rhode Island	333	Sakonnet River Bridge-Managed by RI Turnpike and Bridge Authority (RITBA)	
Rhode Island	1090	Bristol	
Rhode Island	1091	Point Judith	
South Carolina	219	Southern Connector	
South Carolina	221	Cross Island Parkway (U.S. 278)	
Tennessee	1092	Cumberland City	
Tennessee	1093	Benton-Houston	
Tennessee	1094	Helms	
Texas	222	Addison Airport Tunnel	
Texas	223	Mountain Creek Lake Bridge	
Texas	224	Sam Houston Ship Channel Bridge	
Texas	225	San Luis-Vacek Pass Bridge	

State	HPMS Toll ID	Name of Toll Facility	New Facility
Texas	226	Gateway International Bridge	
Texas	227	B & M Bridge	
Texas	228	Free Trade Bridge	
Texas	229	Veterans International Bridge	
Texas	230	Weslaco-Progreso International Bridge	
Texas	231	Pharr-Reynosa Bridge	
Texas	232	McAllen-Hidalgo-Reynosa Bridge	
Texas	233	Rio Grande City-Camargo Bridge	
Texas	234	Roma-Ciudad Miguel Aleman Bridge	
Texas	235	Juarez-Lincoln Bridge	
Texas	236	Laredo International Bridge (Convent St.)	
Texas	237	World Trade Bridge	
Texas	238	Laredo-Columbia Solidarity Bridge	
Texas	239	Eagle Pass Bridge # 1	
Texas	240	Camino Real International Bridge	
Texas	241	Del Rio-Ciudad Acuna International Bridge	
Texas	242	Presidio Bridge	
Texas	243	Ysleta-Zaragosa Bridge	
Texas	244	Good Neighbor Bridge (Stanton St.)	
Texas	245	Paso Del Norte Bridge (Santa Fe St.)	
Texas	246	Katy I-10 QuickRide and U.S. 290	
Texas	247	Dallas North Tollway	
Texas	248	Sam Houston Tollway - East	
Texas	249	Sam Houston Tollway - West	
Texas	250	Sam Houston Tollway - SW Belt	
Texas	251	Sam Houston Tollway - SE Belt	
Texas	252	Hardy Toll Road	
Texas	253	Westpark Tollway	
Texas	254	President George Bush Turnpike	
Texas	255	Camino Colombia	
Texas	256	US 183-A	
Texas	257	Fort Bend Parkway Extension	
Texas	258	SH 45	
Texas	259	SH 45 SE	
Texas	260	SH 130	
Texas	261	Loop 49	
Texas	262	Sam Rayburn Tollway	
Texas	263	Loop 1	

State	HPMS Toll ID	Name of Toll Facility	New Facility
Texas	264	Central Texas Turnpike	
Texas	266	Harris County Beltway 8	
Texas	305	Lewisville Lake Bridge	
Texas	306	Donna International Bridge	
Texas	307	I-635 LBJ Managed Lanes, Dallas/Ft. Worth	
Texas	308	NTE - (I-820/SH 183 Managed Lanes - Ft. Worth)	
Texas	319	Anzalduas International	
Texas	320	Tornillo-Guadalupe	
Texas	321	Chisholm Trail Parkway	
Texas	322	Sam Huston Tollway- NE	
Texas	323	DFW Connector	
Texas	324	SH99 (Grand Parkway) - Segment I-2	
Texas	325	SH99 (Grand Parkway) - Segment E	
Texas	326	SH99 (Grand Parkway) - Segments F-1, F-2, and G	
Texas	327	SH 130 Seg 5/6	
Texas	328	Loop 375 (Cesar Chavez Managed Lanes)	
Texas	329	Tom Landry Expressway (I-30)	
Texas	330	SH 550	
Texas	331	Manor Expressway - Phase 1	
Texas	332	Manor Expressway - Phase 2	
Texas	341	IH 45 North (North Freeway) HOV/HOT Lane	*
Texas	342	IH 45 South (Gulf Freeway) HOV/HOT Lane	*
Texas	343	US 59 (Southwest Freeway) HOV/HOT lane	*
Texas	344	US 59 (Eastex Freeway) HOV/HOT lane	*
Texas	345	US 290 (Northwest Freeway) HOV/HOT lane	*
Texas	1095	Los Ebanos Ferry	
Utah	267	Express Lanes (Salt Lake City)	
Utah	268	Adams Avenue Parkway	
Utah	1096	Charles Hall	
Vermont	116	Cheshire Bridge	
Vermont	269	Equinox Sky Line Drive	
Vermont	270	Mt. Mansfield Toll Road	
Vermont	271	Burke Mountain Toll Road	
Virgin Islands	1116	Trans Services - St. John	
Virginia	91	Harry W. Nice Memorial Bridge	
Virginia	272	Boulevard (SR 161) Bridge	
Virginia	273	Jordan Bridge	
Virginia	274	Chesapeake Bay (US 13) Bridge-Tunnel	

State	HPMS Toll ID	Name of Toll Facility	New Facility
Virginia	275	George P. Coleman Bridge (U.S. 17)	
Virginia	276	Powhite Parkway Extension (Route 76)	
Virginia	277	Downtown Expressway (Route 195)	
Virginia	279	Washington-Dulles Access Toll Road/Route 267 (Hirst-Brault Expressway)	
Virginia	280	Dulles Greenway (Hirst-Brault Expressway)	
Virginia	281	Chesapeake Expressway (Route 168)	
Virginia	282	Pocahontas Parkway (Route 895)	
Virginia	312	I-495 HOT lanes	
Virginia	334	I-95 Stafford County MP 145.47 to MP 148.18 - Reversible Hot Lane	
Virginia	334	I-95 Prince William County MP 148.18 to MP 161.40 - Reversible Hot Lane	
Virginia	334	I-95 Fairfax County MP 161.40 to MP 169.66 - Reversible Hot Lane	
Virginia	334	I-395 Fairfax County MP 0 to MP 2.73 - HOV Reversible Lane	
Virginia	335	I-264 City of Norfolk MP 6.07 to MP 7.36 - downtown Tunnel & Approaches	
Virginia	336	U.S. Route 58 City of Norfolk - MP 488.54 to MP 490.05 - Midtown tunnel & approaches	
Washington	207	Bridge of the Gods	
Washington	284	Hood River Bridge	
Washington	285	Tacoma Narrows Bridge	
Washington	309	SR 167 - HOT Lanes	
Washington	316	Albert D. Rosellini Bridge	
Washington	1087	Puget Island Ferry	
Washington	1097	Seattle - Bainbridge Island	
Washington	1098	Seattle - Bremerton	
Washington	1099	Edmonds - Kingston	
Washington	1100	Port Townsend	
Washington	1101	Mukilteo - Clinton	
Washington	1102	Pt. Defiance - Tahlequah	
Washington	1103	Fauntleroy - Southworth	
Washington	1104	Fauntleroy - Vashon	
Washington	1105	Southworth - Vashon	
Washington	1106	Anacortes - San Juan Isles	
Washington	1107	Guemes Island	
Washington	1108	Lummi Island	
Washington	1109	Steilacoom	
Washington	1110	Wahkiakum Co. Public Works Ferry	
Washington	1111	Anacortes - Sidney	
Washington	1112	Port Angeles	
West Virginia	195	Newell-East Liverpool Bridge	

State	HPMS Toll ID	Name of Toll Facility	New Facility
West Virginia	217	Mon-Fayette Expressway	
West Virginia	287	Parkersburg Memorial Bridge	
West Virginia	288	West Virginia Turnpike	
West Virginia	1113	Sistersville	
Wisconsin	1114	Washington Island	
Wisconsin	1115	Bayfeld	

Toll IDs 1001-1126 denote ferry facilities
New Harmony Bridge (HPMS Toll ID #68) was closed on 5/2012
Sakonnet River Bridge (Toll ID #333) removed due to State legislative action

Appendix F. Metric-to-English Soft Conversion Procedures

The HPMS software requires the States' data to be submitted in English units. States that maintain their data in metric units are required to apply a soft conversion factor to their data for HPMS submittal purposes. A soft conversion is a computation which involves the application of a conversion factor to an initial value for the purpose of producing a converted value. The converted value must then be rounded in accordance with the requirements for the specific data field or data item, as applicable.

Table F-1 provides a list of factors to be used when performing a Metric-to-English soft conversion:

Table F.1 Metric-to-English Conversion Factors

Conversion Type	Conversion Factor
Kilometers to Miles	1 / 1.609344
Meters to Feet	1 / 0.3048
Meters per Kilometer to Inches per Mile	63.36
Millimeters to Inches	1 / 25.4
km/h to MPH	1 / 1.609344

The following shows an example of how this procedure would be applied for the purpose of converting units of meters to feet:

3.9624 meters * (1 feet / 0.3048 meters) = 13 feet

Appendix G. Sample View Export and Calculations

A Sample View will be created by the HPMS software to be exported as a Character Separated Value (CSV) file. The format of this file is identified below.

The Calculation Method for each data item's value falls into several categories generally based on the format of the data. These rules are applied when a Sample Panel section's limits are occupied by several sections, for the purpose of determining a single value for a particular data item. These calculation methods are as follows:

1. **No Calculation –** Value will be consistent with the value reported for a given section.
2. **Combination –** Calculated value will be based on a concatenation of multiple (text) values that fall within the limits of the section.
3. **Minimum Value –** Calculated value will be based on the lowest value in a range of values that fall within the limits of the section.
4. **Predominance –** Calculated value will be based on the most prevalent value that falls within the limits of the section.
5. **Weighted Averaging –** Calculated value will be based on an averaging of values that fall within the limits of the section, weighted by the length of the section.

The following table includes the name of the Data Item, the format of the value for each item, and the particular calculation method that is used for the Data Item.

Field Name	Format	Calculation Method
Year_Record	Date: YYYY	No Calculation
State_Code	Numeric(2,0)	No Calculation
Route_ID	Character(60)	No Calculation
Begin_Point	Numeric(6,3)	No Calculation
End_Point	Numeric(6,3)	No Calculation
Section_Length	Numeric(6,3)	End_Point – Begin_Point (where State reported value is 0)
F_System	Codes: 1-7	No Calculation
Urban_Code	Codes: 1-99999	No Calculation
Facility_Type	Codes: 1-6	No Calculation
Structure_Type	Codes: 1-3	No Calculation
Access_Control	Codes: 1-3	Predominance
Ownership	Codes: 1-80	Predominance
Through_Lanes	Numeric(2,0)	No Calculation
HOV_Type	Codes: 1-3	Predominance
HOV_Lanes	Numeric(2,0)	Predominance
Peak_Lanes	Numeric(2,0)	Predominance
Counter_Peak_Lanes	Numeric(2,0)	Predominance

Field Name	Format	Calculation Method
Turn_Lanes_R	Codes 1-6	Predominance
Turn_Lanes_L	Codes 1-6	Predominance
Speed_Limit	Numeric(2,0)	Predominance
Toll_Charged	Codes: 1-2	Predominance
Toll_Type	Codes: 1-3	Predominance
Route_Number	Character(8)	Predominance
Route_Signing	Codes: 1-10	Predominance
Route_Qualifier	Codes: 1-10	Predominance
AADT	Numeric(6,0)	No Calculation
AADT_Single_Unit	Numeric(6,0)	Weighted Averaging
Pct_Peak_Single	Numeric(2,0)	Weighted Averaging
AADT_Combination	Numeric(6,0)	Weighted Averaging
Pct_Peak_Combination	Numeric(2,0)	Weighted Averaging
K_Factor	Numeric(2,0)	Weighted Averaging
Dir_Factor	Numeric(2,0)	Weighted Averaging
Future_AADT	Numeric(6,0)	No Calculation
Future_AADT_Year	Date: YYYY	No Calculation
Signal_Type	Codes 1-5	Predominance
Pct_Green_Time	Numeric(2,0)	Weighted Averaging
Number_Signals	Numeric(2,0)	No Calculation
Stop_Signs	Numeric(2,0)	No Calculation
At_Grade_Other	Numeric(2,0)	No Calculation
Lane_Width	Numeric(2,0)	Predominance
Median_Type	Codes: 1-7	Predominance
Median_Width	Numeric(2,0)	Predominance
Shoulder_Type	Codes: 1-7	Predominance
Shoulder_Width_R	Numeric(2,0)	Predominance
Shoulder_Width_L	Numeric(2,0)	Predominance
Peak_Parking	Codes: 1-3	Predominance
Widening_Obstacle	Codes: X,A-G	Combination
Widening_Potential	Numeric(1,0)	Minimum Value
Curves_A	Numeric(6,3)	No Calculation
Curves_B	Numeric(6,3)	No Calculation
Curves_C	Numeric(6,3)	No Calculation
Curves_D	Numeric(6,3)	No Calculation
Curves_E	Numeric(6,3)	No Calculation
Curves_F	Numeric(6,3)	No Calculation
Terrain_Type	Codes: 1-3	Predominance
Grades_A	Numeric(6,3)	No Calculation
Grades_B	Numeric(6,3)	No Calculation

Field Name	Format	Calculation Method
Grades_C	Numeric(6,3)	No Calculation
Grades_D	Numeric(6,3)	No Calculation
Grades_E	Numeric(6,3)	No Calculation
Grades_F	Numeric(6,3)	No Calculation
Pct_Pass_Sight	Numeric(3,0)	Minimum Value
IRI	Numeric(3,0)	Weighted Averaging
PSR	Numeric(3,1)	Weighted Averaging
Surface_Type	Codes: 1-11	Predominance
Rutting	Numeric(3,1)	Weighted Averaging
Faulting	Numeric(3,1)	Weighted Averaging
Cracking_Percent	Numeric(3,1)	Weighted Averaging
Year_Last_Improv	Date: YYYY	Predominance
Year_Last_Construction	Date: YYYY	Predominance
Last_Overlay_Thickness	Numeric(3,1)	Predominance
Thickness_Rigid	Numeric(3,1)	Predominance
Thickness_Flexible	Numeric(3,1)	Predominance
Base_Type	Codes: 1-8	Predominance
Base_Thickness	Numeric(2,0)	Predominance
Climate_Zone	Codes: 1-4	Predominance
Soil_Type	Codes: 1-2	Predominance
County_Code	Numeric(5,0)	Predominance
NHS	Codes: 1-9	No Calculation
Future_Facility	Code: 1	No Calculation
STRAHNET_Type	Codes: 1-2	No Calculation
Truck	Codes: 1-2	No Calculation
Maintenance_Operations	Codes: 1-80	Predominance
Capacity	Numeric(6,0)	Weighted Averaging*
Directional Through Lanes	Numeric(2,0)	No Calculation
VSF	Numeric(3,1)	Capacity Calculation*
Computed Capacity	Numeric(6,0)	Capacity Calculation*
Design_Speed	Numeric(2,0)	Design Speed Calculation*
Vertical_Alignment	Codes: 0-4	Vertical Alignment Calculation*
Horizontal_Alignment	Codes: 0-4	Horizontal Alignment Calculation*
Volume_Group	Codes 1-12	No Calculation
Expansion_Factor	Numeric(3,2)	Sample Adequacy Calculation

*Values may be overridden by the States if found to not be representative of actual value.

Appendix H. HPMS Crosswalk Table

N/A = Not Applicable

Item No.	Item Name	HPMS 2000 Codes	HPMS 2010+ Codes
1	F_System (Formerly Item #17)	RURAL 1=Principal Arterial-Interstate. 2=Principal Arterial-Other. 6=Minor Arterial. 7=Major Collector. 8=Minor Collector. 9=Local. URBAN 11=Principal Arterial-Interstate. 12=Principal Arterial-Other. Freeways & Expressways. 14=Principal Arterial-Other. 16=Minor Arterial. 17=Collector. 19=Local.	1=Interstate. 2=Principal Arterial-Other Freeways & Expressways. 3=Principal Arterial-Other. 4=Minor Arterial. 5=Major Collector. 6=Minor Collector. 7=Local.
2	Urban_Code (Formerly Item #13 and #15)	1=Rural (pop. < 5K). 2=Small Urban (pop. 5K to 50K). 3=Small Urbanized (pop. 50K to 200K). 4=Large Urbanized (pop. > 200 K).	99999=Rural. 99998=Small Urban. *Use Census Urban Area Codes for Small and Large Urbanized areas.
3	Facility_Type (Formerly Item #27)	1=One-Way Roadway. 2=Two-Way Roadway. 3=One-Way Structure. 4=Two-Way Structure.	1= One-Way Roadway. 2=Two-Way Roadway. 4=Ramp. 5=Non-Mainline. 6=Non-Inventory Direction.
4	Structure_Type	N/A	1=Section is a Bridge. 2=Section is a Tunnel. 3=Section is a Causeway.
5	Access_Control (Formerly Item #55)	1=Full Access Control. 2=Partial Access Control. 3=No Access Control.	NO CHANGE
6	Ownership (Formerly Item #25)	1=State Hwy Agency. 2=County Hwy Agency. 3=Town or Township Hwy Agency. 4=Municipal Hwy Agency. 5=Other State Agency. 6=Other Local Agency. 7=Federal Agency. 8=Other.	1=State Hwy Agency. 2=County Hwy Agency. 3=Town or Township Hwy Agency. 4=City or Municipal Hwy 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 (e.g., Airport, School, University). 50=Indian Tribe Nation. 60=Other Federal Agency. 62=Bureau of Indian Affairs.

Item No.	Item Name	HPMS 2000 Codes	HPMS 2010+ Codes
			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=Corps of Engineers. 72=Air Force. 73=Navy/Marines. 74=Army. 80=Other.
7	Through_Lanes (Formerly Item #34)	Coded/Entered Value	NO CHANGE
8	HOV_Type (Formerly Item #37)	0=Section does not have HOV lanes. 1=Section has exclusive HOV lanes. 2=Normal through lanes(s) used for exclusive HOV in specified time periods. 3=Shoulder/parking lanes(s) used for exclusive HOV in specified time periods.	1=Full-time: Section has 24-hr. exclusive HOV lanes (HOV use only; no other use permitted). 2=Part-time: Normal through lanes used for exclusive HOV during specified time periods. 3=Part-time: Shoulder/Parking lanes used for exclusive HOV during specified time periods.
9	HOV_Lanes	N/A	Coded/Entered Value
10	Peak_Lanes (Formerly Item #87)	Coded/Entered Value	NO CHANGE
11	Counter_Peak_Lanes	N/A	Coded/Entered Value
12	Turn_Lanes_R (Formerly Item #89)	0=Not applicable, this is a rural section or no intersections exist on this section. 1=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. 2=Turns permitted; a continuous exclusive right turning lane exists from intersection to intersection. Through movements are prohibited in this lane. 3=Turns permitted; a single exclusive right turning lane exists. 4=Turns permitted; no exclusive right turning lanes exist. 5=No right turns are permitted during the peak period.	1=No intersections exist on the 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.
13	Turn_Lanes_L (Formerly Item #88)	Same as Turn_Lanes_R	Same as Turn_Lanes_R
14	Speed_Limit (Formerly Item #80)	Coded/Entered Value	NO CHANGE
15	Toll_Charged	N/A	1=Toll charged in one direction only. 2=Toll charged in both directions. 3=No toll charged
16	Toll_Type (Formerly Item #29)	1=Section is non-toll. 2=Section is toll.	1=This section has toll lanes but no HOT lanes. 2=This section has HOT lanes.
17	Route_Number (Formerly Item #24)	Coded/Entered Value (Text)	NO CHANGE
18	Route_Signing (Formerly Item #22)	0=Not Signed. 1=Interstate.	1=Not Signed. 2=Interstate.

Item No.	Item Name	HPMS 2000 Codes	HPMS 2010+ Codes
		2=U.S.. 3=State. 4=Off-Interstate Business Marker. 5=County. 6=Township. 7=Municipal. 8=Parkway Marker or Forest Route Marker. 9=None of the Above.	3=U.S. 4=State. 5=Off-Interstate Business Marker. 6=County. 7=Township. 8=Municipal. 9=Parkway Marker or Forest Route Marker. 10=None of the Above.
19	Route_Qualifier (Formerly Item #23)	0=No Qualifier or Not Signed. 1=Alternate. 2=Business Route. 3=Bypass. 4=Spur. 5=Loop. 6=Proposed. 7=Temporary. 8=Truck Route. 9=None of the Above.	1=No Qualifier or Not Signed. 2=Alternate. 3=Business Route. 4=Bypass. 5=Spur. 6=Loop. 7=Proposed. 8=Temporary. 9=Truck Route. 10=None of the Above.
20	Alternative_Route_Name	N/A	Coded/Entered Value
21	AADT (Formerly Item #33)	Coded/Entered Value	NO CHANGE
22	AADT_Single_Unit (Formerly Item #82)	Coded/Entered Value (Percent)	Coded/Entered Value (AADT)
23	Pct_Peak_Single	Coded/Entered Value	Coded/Entered Value (Nearest 0.001 %)
24	AADT_Combination (Formerly Item #84)	Coded/Entered Value (Percent)	Coded/Entered Value (AADT)
25	Pct_Peak_Combination	Coded/Entered Value	Coded/Entered Value (Nearest 0.001 %)
26	K_Factor (Formerly Item #85)	Coded/Entered Value	NO CHANGE
27	Dir_Factor (Formerly Item #86)	Coded/Entered Value	NO CHANGE
28	Future_AADT (Formerly Item #97 & 98)	Coded/Entered Value	NO CHANGE
29	Signal_Type (Formerly Item #90)	0=Not applicable; this is a rural section. 1=Uncontrolled Fixed Time. 2=Uncoordinated Traffic Actuated. 3=Coordinated Progressive. 4=No signal systems exist.	1=Uncoordinated Fixed Time. 2=Uncoordinated Traffic Actuated. 3=Coordinated Progressive. 4=Coordinated Real-time Adaptive. 5=No signal systems exist.
30	Pct_Green_Time (Formerly Item #91)	Coded/Entered Value	NO CHANGE
31	Number_Signals (Formerly Item #92)	Coded/Entered Value	NO CHANGE
32	Stop_Signs (Formerly Item #93)	Coded/Entered Value	NO CHANGE
33	At_Grade_Other (Formerly Item #94)	Coded/Entered Value	NO CHANGE
34	Lane_Width (Formerly Item #54)	Coded/Entered Value	NO CHANGE

Item No.	Item Name	HPMS 2000 Codes	HPMS 2010+ Codes
35	Median_Type (Formerly Item #56)	1=Curbed. 2=Positive barrier-unspecified. 3=Unprotected. 4=None.	1=None. 2=Unprotected. 3=Curbed. 4=Positive barrier-unspecified. *5=Positive barrier-flexible. *6=Positive barrier-semi-rigid. *7=Positive barrier – rigid. *Codes 5, 6, and 7 are optional.
36	Median_Width (Formerly Item #57)	Coded/Entered Value	NO CHANGE
37	Shoulder_Type (Formerly Item #58)	1=None. 2=Surfaced shoulder exists (bituminous concrete or Portland cement concrete surface). 3=Stabilized shoulder exists- (stabilized gravel or other granular material with or without admixture). 4=Combination shoulder exists – (shoulder width has two or more surface types; e.g., part of the shoulder width is surfaced and a part of the width is earth). 5=Earth shoulder exists. 6=Barrier curb exists; no shoulder in front of curb.	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 a part of the width is earth). 6=Earth shoulder exists. 7=Barrier curb exists; no shoulder in front of curb.
38	Shoulder_Width_R (Formerly Item #59)	Coded/Entered Value	NO CHANGE
39	Shoulder_Width_L (Formerly Item #60)	Coded/Entered Value	NO CHANGE
40	Peak_Parking (Formerly Item #61)	0=Not Applicable-Rural. 1=Parking allowed on one side. 2=Parking allowed on both sides. 3=No parking allowed or none available.	1=Parking allowed on one side. 2=Parking allowed on both sides. 3=No parking allowed or none available.
41	Widening_Obstacle	N/A	X=No obstacles. A=Dense development. B=Major transportation facilities. C=Other public facilities D=Terrain restrictions. E=Historic and archeological sites. F=Environmentally sensitive areas. G=Parkland.
42	Widening_Potential	N/A	Coded/Entered Value
43	Curves (Curves_A through Curves_F) (Formerly Item #63-#68)	Coded/Entered Value	NO CHANGE
44	Terrain_Type (Formerly Item #70)	0=Not Applicable-Urban 1=Level 2=Rolling 3=Mountainous	1=Level 2=Rolling 3=Mountainous
45	Grades (Grades_A through Grades_F) (Formerly Item #72-#77)	Coded/Entered Value	NO CHANGE
46	Pct_Pass_Sight (Formerly Item #78)	Coded/Entered Value	NO CHANGE

Item No.	Item Name	HPMS 2000 Codes	HPMS 2010+ Codes
47	IRI (Formerly Item #35)	Coded/Entered Value	NO CHANGE
48	PSR (Formerly Item #36)	Coded/Entered Value	NO CHANGE
49	Surface_Type (Formerly Item #50)	1=Unpaved. 2=Low Type Bituminous. 3=Intermediate Type Bituminous. 4=High Type Bituminous. 5=High Type Rigid. 6=High Type Composite.	1=Unpaved. 2=Bituminous. 3=JPCP-Jointed Plain Concrete Pavement. 4=JRCP-Jointed Reinforced Concrete Pavement. 5=CRCP-Continuously Reinforced Concrete Pavement. 6=Asphalt-Concrete (AC) Overlay over Existing AC Pavement. 7=AC Overlay over Existing Jointed Concrete Pavement. 8=AC (Bitum. Overlay over Existing CRCP). 9=Unbonded Jointed Concrete Overlay on PCC Pavements. 10=Bonded PCC Overlays on PCC Pavements. 11=Other.
50	Rutting	N/A	Coded/Entered Value
51	Faulting	N/A	Coded/Entered Value
52	Cracking_Percent	N/A	Coded/Entered Value (Percent)
54	Year_Last_Improv (Formerly Item #53)	Coded/Entered Value (Date)	NO CHANGE
55	Year_Last_Construction	N/A	Coded/Entered Value (Date)
56	Last_Overlay_Thickness	N/A	Coded/Entered Value
57	Thickness_Rigid (Formerly Item #51)	Coded/Entered Value	NO CHANGE
58	Thickness_Flexible (Formerly Item #51)	Coded/Entered Value	NO CHANGE
59	Base_Type	N/A	1=No base. 2=Aggregate. 3=Asphalt or cement stabilized. 5=Hot mix AC (Bituminous). 6=Lean concrete. 7=Stabilized open-graded permeable. 8=Fractured PCC.
60	Base_Thickness	N/A	Coded/Entered Value
61	Climate_Zone (Formerly Item #52)	1=Wet; Freeze. 2=Wet; Freeze-Thaw. 3=Wet; No Freeze. 4=Intermediate; Freeze. 5=Intermediate; Freeze-Thaw. 6=Intermediate; No Freeze. 7=Dry; Freeze. 8=Dry; Freeze-Thaw. 9=Dry; No Freeze.	Will be coded by FHWA; States will have override capability: 1=Wet-Freeze. 2=Wet-Non Freeze. 3=Dry-Freeze. 4=Dry-Non Freeze.
62	Soil_Type	N/A	Will be coded by FHWA; States will have override capability: 1=Granular (35% or less passing the 0.075 mm sieve). 2=Fine (Silt-Clay) Materials (>35% passing the

Item No.	Item Name	HPMS 2000 Codes	HPMS 2010+ Codes
			0.075 mm sieve).
63	County_Code	Coded / Entered Value	NO CHANGE
64	NHS (Formerly Item #19)	0 = This section is not on the NHS 1 = This section **is** on the NHS but **is not** an NHS intermodal connector 2 = Major Airport 3 = Major Port Facility 4 = Major Amtrak Station 5 = Major Rail/Truck Terminal 6 = Major Inner City Bus Terminal 7 = Major Public Transportation or Multi-Modal Passenger Terminal 8 = Major Pipeline Terminal 9 = Major Ferry Terminal	1 = Non-connector NHS 2 = Major Airport 3 = Major Port Facility 4 = Major Amtrak Station 5 = Major Rail/Truck Terminal 6 = Major Inner City Bus Terminal 7 = Major Public Transportation or Multi-Modal Passenger Terminal 8 = Major Pipeline Terminal 9 = Major Ferry Terminal
65	STRAHNET_Type (Formerly Item #26)	0 = Section is not on STRAHNET or is a STRAHNET connector 1 = Section is on STRAHNET or is a STRAHNET connector	1 = Regular STRAHNET 2 – Connector
66	Truck (Formerly Item #28)	1 = Not on a designated truck route 2 = Designated truck route under **Federal authority** in 23 CFR 658.	1 = Section is on the National Network (NN) 2 = Other state-designated truck route (optional)
67	Future_Facility (Formerly Item #20)	0 = This roadway section **is not** on the NHS. 1 = This roadway section **is on** the NHS and is open to public travel. 2 = This roadway section **is on** the NHS but is not yet built.	1 = Unbuilt NHS section
68	Maintenance_Operations	N/A	1=State Hwy Agency. 2=County Hwy Agency. 3=Town or Township Hwy Agency. 4=City or Municipal Hwy 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 (e.g., Airport, School, University). 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=Corps of Engineers. 72=Air Force. 73=Navy/Marines. 74=Army.

Item No.	Item Name	HPMS 2000 Codes	HPMS 2010+ Codes
			80=Other.
69	Capacity	N/A	Coded/Entered Value
70	Directional Through Lanes	N/A	Coded/Entered Value

Appendix I. Urbanized Area Codes

State Name	Urban Area Name	Urban Code	PART	State Portion Population#	Total UCAE** Population#
Alabama	Anniston--Oxford, AL	02629		79,796	79,796
Alabama	Auburn, AL	04033		74,741	74,741
Alabama	Birmingham, AL	07786		749,495	749,495
Alabama	Columbus, GA--AL	19099	P	61,264	253,602
Alabama	Daphne--Fairhope, AL	22285		57,383	57,383
Alabama	Decatur, AL	22690		70,436	70,436
Alabama	Dothan, AL	24472		68,781	68,781
Alabama	Florence, AL	29953		77,074	77,074
Alabama	Gadsden, AL	32113		64,172	64,172
Alabama	Huntsville, AL	40780		286,692	286,692
Alabama	Mobile, AL	57925		326,183	326,183
Alabama	Montgomery, AL	58600		263,907	263,907
Alabama	Pensacola, FL--AL	68482	P	6,266	340,067
Alabama	Tuscaloosa, AL	89110		139,114	139,114
Alaska	Anchorage, AK	02305		251,243	251,243
Alaska	Fairbanks, AK	28549		64,513	64,513
Arizona	Avondale--Goodyear, AZ	04549		197,041	197,041
Arizona	Casa Grande, AZ	14401		51,331	51,331
Arizona	Flagstaff, AZ	29818		71,957	71,957
Arizona	Lake Havasu City, AZ	46747		53,427	53,427
Arizona	Phoenix--Mesa, AZ	69184		3,629,114	3,629,114
Arizona	Prescott Valley--Prescott, AZ	72112		84,744	84,744
Arizona	Sierra Vista, AZ	81901		52,745	52,745
Arizona	Tucson, AZ	88732		843,168	843,168
Arizona	Yuma, AZ--CA	98020	P	134,256	135,267
Arkansas	Conway, AR	19801		65,277	65,277
Arkansas	Fayetteville--Springdale--Rogers, AR--MO	29494	P	295,081	295,083
Arkansas	Fort Smith, AR--OK	30925	P	120,714	122,947
Arkansas	Hot Springs, AR	40213		55,121	55,121
Arkansas	Jonesboro, AR	43345		65,419	65,419
Arkansas	Little Rock, AR	50392		431,388	431,388
Arkansas	Memphis, TN--MS--AR	56116	P	40,270	1,060,061
Arkansas	Pine Bluff, AR	69454		53,495	53,495
Arkansas	Texarkana--Texarkana, TX--AR	87193	P	26,072	78,162
California	Antioch, CA	02683		277,634	277,634
California	Arroyo Grande--Grover Beach, CA	03196		52,000	52,000
California	Bakersfield, CA	04681		523,994	523,994

State Name	Urban Area Name	Urban Code	PART	State Portion Population#	Total UCAE** Population#
California	Camarillo, CA	12754		71,772	71,772
California	Chico, CA	16318		98,176	98,176
California	Concord, CA	19504		615,968	615,968
California	Davis, CA	22420		72,794	72,794
California	Delano, CA	22987		54,372	54,372
California	El Centro--Calexico, CA	26416		107,672	107,672
California	El Paso de Robles (Paso Robles)--Atascadero, CA	27261		65,088	65,088
California	Fairfield, CA	28657		133,683	133,683
California	Fresno, CA	31843		654,628	654,628
California	Gilroy--Morgan Hill, CA	33328		98,413	98,413
California	Hanford, CA	36703		87,941	87,941
California	Hemet, CA	38215		163,379	163,379
California	Indio--Cathedral City, CA	41347		345,580	345,580
California	Lancaster--Palmdale, CA	47611		341,219	341,219
California	Livermore, CA	50527		81,624	81,624
California	Lodi, CA	50851		68,738	68,738
California	Lompoc, CA	51040		51,509	51,509
California	Los Angeles--Long Beach--Anaheim, CA	51445		12,150,996	12,150,996
California	Madera, CA	52984		78,413	78,413
California	Manteca, CA	54145		83,578	83,578
California	Merced, CA	56251		136,969	136,969
California	Mission Viejo--Lake Forest--San Clemente, CA	57709		583,681	583,681
California	Modesto, CA	58006		358,172	358,172
California	Murrieta--Temecula--Menifee, CA	60799		441,546	441,546
California	Napa, CA	61057		83,913	83,913
California	Oxnard, CA	66673		367,260	367,260
California	Petaluma, CA	68887		64,078	64,078
California	Porterville, CA	71074		70,272	70,272
California	Redding, CA	73774		117,731	117,731
California	Reno, NV--CA	74179	P	9	392,141
California	Riverside--San Bernardino, CA	75340		1,932,666	1,932,666
California	Sacramento, CA	77068		1,723,634	1,723,634
California	Salinas, CA	78310		184,809	184,809
California	San Diego, CA	78661		2,956,746	2,956,746
California	San Francisco--Oakland, CA	78904		3,281,212	3,281,212
California	San Jose, CA	79039		1,664,496	1,664,496
California	San Luis Obispo, CA	79147		59,219	59,219
California	Santa Barbara, CA	79282		195,861	195,861
California	Santa Clarita, CA	79309		258,653	258,653
California	Santa Cruz, CA	79336		163,703	163,703

State Name	Urban Area Name	Urban Code	PART	State Portion Population#	Total UCAE** Population#
California	Santa Maria, CA	79417		130,447	130,447
California	Santa Rosa, CA	79498		308,231	308,231
California	Seaside--Monterey, CA	80362		114,237	114,237
California	Simi Valley, CA	82144		125,206	125,206
California	Stockton, CA	85087		370,583	370,583
California	Thousand Oaks, CA	87490		214,811	214,811
California	Tracy, CA	88273		87,569	87,569
California	Turlock, CA	89083		99,904	99,904
California	Vacaville, CA	89866		93,141	93,141
California	Vallejo, CA	90028		165,074	165,074
California	Victorville--Hesperia, CA	90541		328,454	328,454
California	Visalia, CA	90946		219,454	219,454
California	Watsonville, CA	92890		73,534	73,534
California	Woodland, CA	96994		55,513	55,513
California	Yuba City, CA	97939		116,719	116,719
California	Yuma, AZ--CA	98020	P	1,011	135,267
Colorado	Boulder, CO	09298		114,591	114,591
Colorado	Colorado Springs, CO	18856		559,409	559,409
Colorado	Denver--Aurora, CO	23527		2,374,203	2,374,203
Colorado	Fort Collins, CO	30628		264,465	264,465
Colorado	Grand Junction, CO	34273		128,124	128,124
Colorado	Greeley, CO	34786		117,825	117,825
Colorado	Lafayette--Louisville--Erie, CO	46126		79,407	79,407
Colorado	Longmont, CO	51175		90,897	90,897
Colorado	Pueblo, CO	72613		136,550	136,550
Connecticut	Bridgeport--Stamford, CT--NY	10162	P	877,630	923,311
Connecticut	Danbury, CT--NY	22096	P	161,323	168,136
Connecticut	Hartford, CT	37243		924,859	924,859
Connecticut	New Haven, CT	62407		562,839	562,839
Connecticut	New York--Newark, NY--NJ--CT	63217	P	114	18,351,295
Connecticut	Norwich--New London, CT--RI	64135	P	188,041	209,190
Connecticut	Springfield, MA--CT	83926	P	89,711	621,300
Connecticut	Waterbury, CT	92485		194,535	194,535
Connecticut	Worcester, MA--CT	97291	P	32,928	486,514
Delaware	Dover, DE	24580		110,769	110,769
Delaware	Philadelphia, PA--NJ--DE--MD	69076	P	481,625	5,441,567
Delaware	Salisbury, MD--DE	78364	P	24,588	98,081
District of Columbia	Washington, DC--VA--MD	92242	P	601,723	4,586,770
Florida	Bonita Springs, FL	08974		310,298	310,298

State Name	Urban Area Name	Urban Code	PART	State Portion Population#	Total UCAE** Population#
Florida	Cape Coral, FL	13510		530,290	530,290
Florida	Deltona, FL	23311		182,169	182,169
Florida	Fort Walton Beach--Navarre--Wright, FL	31060		191,917	191,917
Florida	Gainesville, FL	32167		187,781	187,781
Florida	Homosassa Springs--Beverly Hills--Citrus Springs, FL	39758		80,962	80,962
Florida	Jacksonville, FL	42346		1,065,219	1,065,219
Florida	Kissimmee, FL	45451		314,071	314,071
Florida	Lady Lake--The Villages, FL	45937		112,991	112,991
Florida	Lakeland, FL	46828		262,596	262,596
Florida	Leesburg--Eustis--Tavares, FL	48799		131,337	131,337
Florida	Miami, FL	56602		5,502,379	5,502,379
Florida	North Port--Port Charlotte, FL	63838		169,541	169,541
Florida	Ocala, FL	64567		156,909	156,909
Florida	Orlando, FL	65863		1,510,516	1,510,516
Florida	Palm Bay--Melbourne, FL	67105		452,791	452,791
Florida	Palm Coast--Daytona Beach--Port Orange, FL	67134		349,064	349,064
Florida	Panama City, FL	67294		143,280	143,280
Florida	Pensacola, FL--AL	68482	P	333,801	340,067
Florida	Port St. Lucie, FL	71479		376,047	376,047
Florida	Sarasota--Bradenton, FL	79606		643,260	643,260
Florida	Sebastian--Vero Beach South--Florida Ridge, FL	80400		149,422	149,422
Florida	Sebring--Avon Park, FL	80416		61,625	61,625
Florida	Spring Hill, FL	84024		148,220	148,220
Florida	St. Augustine, FL	77230		69,173	69,173
Florida	Tallahassee, FL	86464		240,223	240,223
Florida	Tampa--St. Petersburg, FL	86599		2,441,770	2,441,770
Florida	Titusville, FL	87787		54,386	54,386
Florida	Winter Haven, FL	96697		201,289	201,289
Florida	Zephyrhills, FL	98182		66,609	66,609
Georgia	Albany, GA	00901		95,779	95,779
Georgia	Athens-Clarke County, GA	03763		128,754	128,754
Georgia	Atlanta, GA	03817		4,515,419	4,515,419
Georgia	Augusta-Richmond County, GA--SC	04222	P	283,283	386,787
Georgia	Brunswick, GA	11026		51,024	51,024
Georgia	Cartersville, GA	14185		52,477	52,477
Georgia	Chattanooga, TN--GA	15832	P	78,364	381,112
Georgia	Columbus, GA--AL	19099	P	192,338	253,602
Georgia	Dalton, GA	22069		85,239	85,239
Georgia	Gainesville, GA	32194		130,846	130,846
Georgia	Hinesville, GA	39133		51,456	51,456

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Georgia	Macon, GA	52822		137,570	137,570
Georgia	Rome, GA	76204		60,851	60,851
Georgia	Savannah, GA	79768		260,677	260,677
Georgia	Valdosta, GA	89974		77,085	77,085
Georgia	Warner Robins, GA	91783		133,109	133,109
Hawaii	Kahului, HI	43615		55,934	55,934
Hawaii	Kailua (Honolulu County)--Kaneohe, HI	43669		113,682	113,682
Hawaii	Urban Honolulu, HI	89770		802,459	802,459
Idaho	Boise City, ID	08785		349,684	349,684
Idaho	Coeur d'Alene, ID	18451		98,378	98,378
Idaho	Idaho Falls, ID	40996		90,733	90,733
Idaho	Lewiston, ID--WA	49312	P	31,740	51,924
Idaho	Nampa, ID	60976		151,499	151,499
Idaho	Pocatello, ID	70426		69,809	69,809
Illinois	Alton, IL--MO	01765	P	83,811	83,890
Illinois	Beloit, WI--IL	06760	P	18,712	63,835
Illinois	Bloomington--Normal, IL	08407		132,600	132,600
Illinois	Cape Girardeau, MO--IL	13537	P	309	52,900
Illinois	Carbondale, IL	13591		67,821	67,821
Illinois	Champaign, IL	15211		145,361	145,361
Illinois	Chicago, IL--IN	16264	P	8,018,716	8,608,208
Illinois	Danville, IL	22204		50,996	50,996
Illinois	Davenport, IA--IL	22366	P	137,150	280,051
Illinois	Decatur, IL	22717		93,863	93,863
Illinois	DeKalb, IL	22960		68,545	68,545
Illinois	Dubuque, IA--IL	24823	P	3,051	67,818
Illinois	Kankakee, IL	43885		81,926	81,926
Illinois	Kenosha, WI--IL	44506	P	4	124,064
Illinois	Peoria, IL	68509		266,921	266,921
Illinois	Rockford, IL	75718		296,863	296,863
Illinois	Round Lake Beach--McHenry--Grayslake, IL--WI	76474	P	259,811	290,373
Illinois	Springfield, IL	83899		161,316	161,316
Illinois	St. Louis, MO--IL	77770	P	372,895	2,150,706
Indiana	Anderson, IN	02386		88,133	88,133
Indiana	Bloomington, IN	08380		108,657	108,657
Indiana	Chicago, IL--IN	16264	P	589,492	8,608,208
Indiana	Cincinnati, OH--KY--IN	16885	P	10,225	1,624,827
Indiana	Columbus, IN	19126		54,933	54,933
Indiana	Elkhart, IN--MI	26794	P	142,692	143,592
Indiana	Evansville, IN--KY	28333	P	200,768	229,351

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Indiana	Fort Wayne, IN	31087		313,492	313,492
Indiana	Indianapolis, IN	41212		1,487,483	1,487,483
Indiana	Kokomo, IN	45694		62,182	62,182
Indiana	Lafayette, IN	46018		147,725	147,725
Indiana	Louisville/Jefferson County, KY--IN	51755	P	140,180	972,546
Indiana	Michigan City--La Porte, IN--MI	56656	P	65,430	66,025
Indiana	Muncie, IN	60625		90,580	90,580
Indiana	South Bend, IN--MI	83116	P	241,870	278,165
Indiana	Terre Haute, IN	87139		92,742	92,742
Iowa	Ames, IA	02062		60,438	60,438
Iowa	Cedar Rapids, IA	14752		177,844	177,844
Iowa	Davenport, IA--IL	22366	P	142,901	280,051
Iowa	Des Moines, IA	23743		450,070	450,070
Iowa	Dubuque, IA--IL	24823	P	64,767	67,818
Iowa	Iowa City, IA	41590		106,621	106,621
Iowa	Omaha, NE--IA	65269	P	68,546	725,008
Iowa	Sioux City, IA--NE--SD	82225	P	84,359	106,494
Iowa	Waterloo, IA	92593		113,418	113,418
Kansas	Kansas City, MO--KS	43912	P	663,508	1,519,417
Kansas	Lawrence, KS	48232		88,053	88,053
Kansas	Manhattan, KS	53848		54,622	54,622
Kansas	St. Joseph, MO--KS	77743	P	2,368	81,176
Kansas	Topeka, KS	88084		150,003	150,003
Kansas	Wichita, KS	95077		472,870	472,870
Kentucky	Bowling Green, KY	09379		78,306	78,306
Kentucky	Cincinnati, OH--KY--IN	16885	P	328,060	1,624,827
Kentucky	Clarksville, TN--KY	17317	P	20,346	158,655
Kentucky	Elizabethtown--Radcliff, KY	73180		73,467	73,467
Kentucky	Evansville, IN--KY	28333	P	28,583	229,351
Kentucky	Huntington, WV--KY--OH	40753	P	56,594	202,637
Kentucky	Lexington-Fayette, KY	49582		290,263	290,263
Kentucky	Louisville/Jefferson County, KY--IN	51755	P	832,366	972,546
Kentucky	Owensboro, KY	66484		70,543	70,543
Louisiana	Alexandria, LA	01279		82,804	82,804
Louisiana	Baton Rouge, LA	05680		594,309	594,309
Louisiana	Hammond, LA	36514		67,629	67,629
Louisiana	Houma, LA	40375		144,875	144,875
Louisiana	Lafayette, LA	46045		252,720	252,720
Louisiana	Lake Charles, LA	46531		143,440	143,440
Louisiana	Mandeville--Covington, LA	53794		88,925	88,925

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Louisiana	Monroe, LA	58330		116,533	116,533
Louisiana	New Orleans, LA	62677		899,703	899,703
Louisiana	Shreveport, LA	81739		298,317	298,317
Louisiana	Slidell, LA	82468		91,151	91,151
Maine	Bangor, ME	04951		61,210	61,210
Maine	Dover--Rochester, NH--ME	24607	P	7,825	88,087
Maine	Lewiston, ME	49339		59,397	59,397
Maine	Portland, ME	71263		203,914	203,914
Maine	Portsmouth, NH--ME	71506	P	15,791	88,200
Maryland	Aberdeen--Bel Air South--Bel Air North, MD	00199		213,751	213,751
Maryland	Baltimore, MD	04843		2,203,663	2,203,663
Maryland	Cumberland, MD--WV--PA	21745	P	49,619	51,899
Maryland	Frederick, MD	31519		141,576	141,576
Maryland	Hagerstown, MD--WV--PA	36190	P	101,406	182,696
Maryland	Lexington Park--California--Chesapeake Ranch Estates, MD	49594		58,875	58,875
Maryland	Philadelphia, PA--NJ--DE--MD	69076	P	48,690	5,441,567
Maryland	Salisbury, MD--DE	78364	P	73,493	98,081
Maryland	Waldorf, MD	91261		109,919	109,919
Maryland	Washington, DC--VA--MD	92242	P	1,749,163	4,586,770
Maryland	Westminster--Eldersburg, MD	94294		72,714	72,714
Massachusetts	Barnstable Town, MA	05167		246,695	246,695
Massachusetts	Boston, MA--NH--RI	09271	P	4,087,709	4,181,019
Massachusetts	Leominster--Fitchburg, MA	49096		116,960	116,960
Massachusetts	Nashua, NH--MA	61165	P	7,318	226,400
Massachusetts	New Bedford, MA	61786		149,443	149,443
Massachusetts	Pittsfield, MA	69778		59,124	59,124
Massachusetts	Providence, RI--MA	72505	P	260,276	1,190,956
Massachusetts	Springfield, MA--CT	83926	P	531,589	621,300
Massachusetts	Worcester, MA--CT	97291	P	453,586	486,514
Michigan	Ann Arbor, MI	02602		306,022	306,022
Michigan	Battle Creek, MI	05707		78,393	78,393
Michigan	Bay City, MI	05869		70,585	70,585
Michigan	Benton Harbor--St. Joseph--Fair Plain, MI	07138		61,022	61,022
Michigan	Detroit, MI	23824		3,734,090	3,734,090
Michigan	Elkhart, IN--MI	26794	P	900	143,592
Michigan	Flint, MI	29872		356,218	356,218
Michigan	Grand Rapids, MI	34300		569,935	569,935
Michigan	Holland, MI	39430		99,941	99,941
Michigan	Jackson, MI	42157		90,057	90,057
Michigan	Kalamazoo, MI	43723		209,703	209,703

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Michigan	Lansing, MI	47719		313,532	313,532
Michigan	Michigan City--La Porte, IN--MI	56656	P	595	66,025
Michigan	Midland, MI	56980		59,014	59,014
Michigan	Monroe, MI	58357		51,240	51,240
Michigan	Muskegon, MI	60841		161,280	161,280
Michigan	Port Huron, MI	71155		87,106	87,106
Michigan	Saginaw, MI	77149		126,265	126,265
Michigan	South Bend, IN--MI	83116	P	36,295	278,165
Michigan	South Lyon--Howell, MI	83332		119,509	119,509
Michigan	Toledo, OH--MI	87868	P	28,461	507,643
Minnesota	Duluth, MN--WI	24850	P	93,333	120,378
Minnesota	Fargo, ND--MN	29089	P	42,527	176,676
Minnesota	Grand Forks, ND--MN	34219	P	8,318	61,270
Minnesota	La Crosse, WI--MN	45910	P	5,358	100,868
Minnesota	Mankato, MN	53983		57,584	57,584
Minnesota	Minneapolis--St. Paul, MN--WI	57628	P	2,650,614	2,650,890
Minnesota	Rochester, MN	75637		107,677	107,677
Minnesota	St. Cloud, MN	77338		110,621	110,621
Mississippi	Gulfport, MS	35920		208,948	208,948
Mississippi	Hattiesburg, MS	37594		80,358	80,358
Mississippi	Jackson, MS	42211		351,478	351,478
Mississippi	Memphis, TN--MS--AR	56116	P	128,310	1,060,061
Mississippi	Pascagoula, MS	67807		50,428	50,428
Missouri	Alton, IL--MO	01765	P	79	83,890
Missouri	Cape Girardeau, MO--IL	13537	P	52,591	52,900
Missouri	Columbia, MO	18937		124,748	124,748
Missouri	Fayetteville--Springdale--Rogers, AR--MO	29494	P	2	295,083
Missouri	Jefferson City, MO	42967		58,533	58,533
Missouri	Joplin, MO	43399		82,775	82,775
Missouri	Kansas City, MO--KS	43912	P	855,909	1,519,417
Missouri	Lee's Summit, MO	48826		85,081	85,081
Missouri	Springfield, MO	83953		273,724	273,724
Missouri	St. Joseph, MO--KS	77743	P	78,808	81,176
Missouri	St. Louis, MO--IL	77770	P	1,777,811	2,150,706
Montana	Billings, MT	07705		114,773	114,773
Montana	Great Falls, MT	34759		65,207	65,207
Montana	Missoula, MT	57736		82,157	82,157
Nebraska	Grand Island, NE	34246		50,440	50,440
Nebraska	Lincoln, NE	49933		258,719	258,719
Nebraska	Omaha, NE--IA	65269	P	656,462	725,008

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Nebraska	Sioux City, IA--NE--SD	82225	P	16,576	106,494
Nevada	Carson City, NV	14158		58,079	58,079
Nevada	Las Vegas--Henderson, NV	47995		1,886,011	1,886,011
Nevada	Reno, NV--CA	74179	P	392,132	392,141
New Hampshire	Boston, MA--NH--RI	09271	P	93,038	4,181,019
New Hampshire	Dover--Rochester, NH--ME	24607	P	80,262	88,087
New Hampshire	Manchester, NH	53740		158,377	158,377
New Hampshire	Nashua, NH--MA	61165	P	219,082	226,400
New Hampshire	Portsmouth, NH--ME	71506	P	72,409	88,200
New Jersey	Allentown, PA--NJ	01495	P	32,443	664,651
New Jersey	Atlantic City, NJ	03898		248,402	248,402
New Jersey	East Stroudsburg, PA--NJ	25849	P	249	54,316
New Jersey	New York--Newark, NY--NJ--CT	63217	P	6,159,466	18,351,295
New Jersey	Philadelphia, PA--NJ--DE--MD	69076	P	1,150,865	5,441,567
New Jersey	Poughkeepsie--Newburgh, NY--NJ	71803	P	11,228	423,566
New Jersey	Trenton, NJ	88462		296,668	296,668
New Jersey	Twin Rivers--Hightstown, NJ	89263		64,037	64,037
New Jersey	Villas, NJ	90658		51,291	51,291
New Jersey	Vineland, NJ	90730		95,259	95,259
New Mexico	Albuquerque, NM	01171		741,318	741,318
New Mexico	El Paso, TX--NM	27253	P	30,712	803,086
New Mexico	Farmington, NM	29278		53,049	53,049
New Mexico	Las Cruces, NM	47935		128,600	128,600
New Mexico	Los Lunas, NM	51499		63,758	63,758
New Mexico	Santa Fe, NM	79363		89,284	89,284
New York	Albany--Schenectady, NY	00970		594,962	594,962
New York	Binghamton, NY--PA	07732	P	155,662	158,084
New York	Bridgeport--Stamford, CT--NY	10162	P	45,681	923,311
New York	Buffalo, NY	11350		935,906	935,906
New York	Danbury, CT--NY	22096	P	6,813	168,136
New York	Elmira, NY	27118		67,983	67,983
New York	Glens Falls, NY	33598		65,443	65,443
New York	Ithaca, NY	41914		53,661	53,661
New York	Kingston, NY	45262		57,442	57,442
New York	Middletown, NY	56899		58,381	58,381
New York	New York--Newark, NY--NJ--CT	63217	P	12,191,715	18,351,295
New York	Poughkeepsie--Newburgh, NY--NJ	71803	P	412,338	423,566
New York	Rochester, NY	75664		720,572	720,572

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New York	Saratoga Springs, NY	79633		64,100	64,100
New York	Syracuse, NY	86302		412,317	412,317
New York	Utica, NY	89785		117,328	117,328
New York	Watertown, NY	92674		57,840	57,840
North Carolina	Asheville, NC	03358		280,648	280,648
North Carolina	Burlington, NC	11728		119,911	119,911
North Carolina	Charlotte, NC--SC	15670	P	1,180,484	1,249,442
North Carolina	Concord, NC	19558		214,881	214,881
North Carolina	Durham, NC	25228		347,602	347,602
North Carolina	Fayetteville, NC	29440		310,282	310,282
North Carolina	Gastonia, NC--SC	32653	P	169,333	169,495
North Carolina	Goldsboro, NC	33814		61,054	61,054
North Carolina	Greensboro, NC	35164		311,810	311,810
North Carolina	Greenville, NC	35380		117,798	117,798
North Carolina	Hickory, NC	38647		212,195	212,195
North Carolina	High Point, NC	38809		166,485	166,485
North Carolina	Jacksonville, NC	42400		105,419	105,419
North Carolina	Myrtle Beach--Socastee, SC--NC	60895	P	20,279	215,304
North Carolina	New Bern, NC	61840		50,503	50,503
North Carolina	Raleigh, NC	73261		884,891	884,891
North Carolina	Rocky Mount, NC	75988		68,243	68,243
North Carolina	Wilmington, NC	95833		219,957	219,957
North Carolina	Winston-Salem, NC	96670		391,024	391,024
North Dakota	Bismarck, ND	07921		81,955	81,955
North Dakota	Fargo, ND--MN	29089	P	134,149	176,676
North Dakota	Grand Forks, ND--MN	34219	P	52,952	61,270
Ohio	Akron, OH	00766		569,499	569,499
Ohio	Canton, OH	13375		279,245	279,245
Ohio	Cincinnati, OH--KY--IN	16885	P	1,286,542	1,624,827
Ohio	Cleveland, OH	17668		1,780,673	1,780,673
Ohio	Columbus, OH	19234		1,368,035	1,368,035
Ohio	Dayton, OH	22528		724,091	724,091
Ohio	Huntington, WV--KY--OH	40753	P	33,775	202,637
Ohio	Lima, OH	49852		72,852	72,852
Ohio	Lorain--Elyria, OH	51364		180,956	180,956
Ohio	Mansfield, OH	54091		75,250	75,250
Ohio	Middletown, OH	56926		97,503	97,503
Ohio	Newark, OH	61705		76,068	76,068
Ohio	Parkersburg, WV--OH	67672	P	7,586	67,229
Ohio	Springfield, OH	83980		85,256	85,256

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Ohio	Toledo, OH--MI	87868	P	479,182	507,643
Ohio	Weirton--Steubenville, WV--OH--PA	93592	P	39,918	70,889
Ohio	Wheeling, WV--OH	94726	P	30,182	81,249
Ohio	Youngstown, OH--PA	97831	P	348,073	387,550
Oklahoma	Fort Smith, AR--OK	30925	P	2,233	122,947
Oklahoma	Lawton, OK	48394		94,457	94,457
Oklahoma	Norman, OK	63433		103,898	103,898
Oklahoma	Oklahoma City, OK	65080		861,505	861,505
Oklahoma	Tulsa, OK	88948		655,479	655,479
Oregon	Albany, OR	00955		56,997	56,997
Oregon	Bend, OR	06868		83,794	83,794
Oregon	Corvallis, OR	20422		62,433	62,433
Oregon	Eugene, OR	28117		247,421	247,421
Oregon	Grants Pass, OR	34516		50,520	50,520
Oregon	Longview, WA--OR	51283	P	2,354	63,952
Oregon	Medford, OR	55981		154,081	154,081
Oregon	Portland, OR--WA	71317	P	1,490,336	1,849,898
Oregon	Salem, OR	78229		236,632	236,632
Oregon	Walla Walla, WA--OR	91405	P	8,825	55,805
Pennsylvania	Allentown, PA--NJ	01495	P	632,208	664,651
Pennsylvania	Altoona, PA	01792		79,930	79,930
Pennsylvania	Binghamton, NY--PA	07732	P	2,422	158,084
Pennsylvania	Bloomsburg--Berwick, PA	08434		53,618	53,618
Pennsylvania	Chambersburg, PA	15184		50,887	50,887
Pennsylvania	Cumberland, MD--WV--PA	21745	P	31	51,899
Pennsylvania	East Stroudsburg, PA--NJ	25849	P	54,067	54,316
Pennsylvania	Erie, PA	27766		196,611	196,611
Pennsylvania	Hagerstown, MD--WV--PA	36190	P	9,503	182,696
Pennsylvania	Hanover, PA	36784		66,301	66,301
Pennsylvania	Harrisburg, PA	37081		444,474	444,474
Pennsylvania	Hazleton, PA	37945		56,827	56,827
Pennsylvania	Johnstown, PA	43291		69,014	69,014
Pennsylvania	Lancaster, PA	47530		402,004	402,004
Pennsylvania	Lebanon, PA	48664		77,086	77,086
Pennsylvania	Monessen--California, PA	58168		66,086	66,086
Pennsylvania	Philadelphia, PA--NJ--DE--MD	69076	P	3,760,387	5,441,567
Pennsylvania	Pittsburgh, PA	69697		1,733,853	1,733,853
Pennsylvania	Pottstown, PA	71749		107,682	107,682
Pennsylvania	Reading, PA	73693		266,254	266,254
Pennsylvania	Scranton, PA	80227		381,502	381,502

State Name	Urban Area Name	Urban Code	PART	State Portion Population#	Total UCAE** Population#
Pennsylvania	State College, PA	84493		87,454	87,454
Pennsylvania	Uniontown--Connellsville, PA	89650		51,370	51,370
Pennsylvania	Weirton--Steubenville, WV--OH--PA	93592	P	302	70,889
Pennsylvania	Williamsport, PA	95455		56,142	56,142
Pennsylvania	York, PA	97750		232,045	232,045
Pennsylvania	Youngstown, OH--PA	97831	P	39,477	387,550
Rhode Island	Boston, MA--NH--RI	09271	P	272	4,181,019
Rhode Island	Norwich--New London, CT--RI	64135	P	21,149	209,190
Rhode Island	Providence, RI--MA	72505	P	930,680	1,190,956
South Carolina	Anderson, SC	02413		75,702	75,702
South Carolina	Augusta-Richmond County, GA--SC	04222	P	103,504	386,787
South Carolina	Charleston--North Charleston, SC	15508		548,404	548,404
South Carolina	Charlotte, NC--SC	15670	P	68,958	1,249,442
South Carolina	Columbia, SC	18964		549,777	549,777
South Carolina	Florence, SC	30061		89,557	89,557
South Carolina	Gastonia, NC--SC	32653	P	162	169,495
South Carolina	Greenville, SC	35461		400,492	400,492
South Carolina	Hilton Head Island, SC	39079		68,998	68,998
South Carolina	Mauldin--Simpsonville, SC	55603		120,577	120,577
South Carolina	Myrtle Beach--Socastee, SC--NC	60895	P	195,025	215,304
South Carolina	Rock Hill, SC	75745		104,996	104,996
South Carolina	Spartanburg, SC	83548		180,786	180,786
South Carolina	Sumter, SC	85708		73,107	73,107
South Dakota	Rapid City, SD	73396		81,251	81,251
South Dakota	Sioux City, IA--NE--SD	82225	P	5,559	106,494
South Dakota	Sioux Falls, SD	82252		156,777	156,777
Tennessee	Bristol--Bristol, TN--VA	10351	P	36,130	69,501
Tennessee	Chattanooga, TN--GA	15832	P	302,748	381,112
Tennessee	Clarksville, TN--KY	17317	P	138,309	158,655
Tennessee	Cleveland, TN	17722		66,777	66,777
Tennessee	Jackson, TN	42265		71,880	71,880
Tennessee	Johnson City, TN	43210		120,415	120,415
Tennessee	Kingsport, TN--VA	45235	P	102,428	106,571
Tennessee	Knoxville, TN	45640		558,696	558,696
Tennessee	Memphis, TN--MS--AR	56116	P	891,481	1,060,061
Tennessee	Morristown, TN	59410		59,036	59,036
Tennessee	Murfreesboro, TN	60733		133,228	133,228
Tennessee	Nashville-Davidson, TN	61273		969,587	969,587
Texas	Abilene, TX	00280		110,421	110,421
Texas	Amarillo, TX	01927		196,651	196,651

State Name	Urban Area Name	Urban Code	PART	State Portion Population#	Total UCAE** Population#
Texas	Austin, TX	04384		1,362,416	1,362,416
Texas	Beaumont, TX	06058		147,922	147,922
Texas	Brownsville, TX	10972		217,585	217,585
Texas	College Station--Bryan, TX	18748		171,345	171,345
Texas	Conroe--The Woodlands, TX	19755		239,938	239,938
Texas	Corpus Christi, TX	20287		320,069	320,069
Texas	Dallas--Fort Worth--Arlington, TX	22042		5,121,892	5,121,892
Texas	Denton--Lewisville, TX	23500		366,174	366,174
Texas	El Paso, TX--NM	27253	P	772,374	803,086
Texas	Harlingen, TX	36892		135,663	135,663
Texas	Houston, TX	40429		4,944,332	4,944,332
Texas	Killeen, TX	44992		217,630	217,630
Texas	Lake Jackson--Angleton, TX	46801		74,830	74,830
Texas	Laredo, TX	47854		235,730	235,730
Texas	Longview, TX	51256		98,884	98,884
Texas	Lubbock, TX	51877		237,356	237,356
Texas	McAllen, TX	52390		728,825	728,825
Texas	McKinney, TX	52687		170,030	170,030
Texas	Midland, TX	57007		117,807	117,807
Texas	Odessa, TX	64864		126,405	126,405
Texas	Port Arthur, TX	70993		153,150	153,150
Texas	San Angelo, TX	78553		92,984	92,984
Texas	San Antonio, TX	78580		1,758,210	1,758,210
Texas	San Marcos, TX	79201		52,826	52,826
Texas	Sherman, TX	81631		61,900	61,900
Texas	Temple, TX	87058		90,390	90,390
Texas	Texarkana--Texarkana, TX--AR	87193	P	52,090	78,162
Texas	Texas City, TX	87220		106,383	106,383
Texas	Tyler, TX	89326		130,247	130,247
Texas	Victoria, TX	90514		63,683	63,683
Texas	Waco, TX	91027		172,378	172,378
Texas	Wichita Falls, TX	95104		99,437	99,437
Utah	Logan, UT	50959		94,983	94,983
Utah	Ogden--Layton, UT	64945		546,026	546,026
Utah	Provo--Orem, UT	72559		482,819	482,819
Utah	Salt Lake City--West Valley City, UT	78499		1,021,243	1,021,243
Utah	St. George, UT	77446		98,370	98,370
Vermont	Burlington, VT	11755		108,740	108,740
Virginia	Blacksburg, VA	08002		88,542	88,542
Virginia	Bristol--Bristol, TN--VA	10351	P	33,371	69,501

State Name	Urban Area Name	Urban Code	PART	State Portion Population#	Total UCAE** Population#
Virginia	Charlottesville, VA	15724		92,359	92,359
Virginia	Fredericksburg, VA	31600		141,238	141,238
Virginia	Harrisonburg, VA	37162		66,784	66,784
Virginia	Kingsport, TN--VA	45235	P	4,143	106,571
Virginia	Lynchburg, VA	52201		116,636	116,636
Virginia	Richmond, VA	74746		953,556	953,556
Virginia	Roanoke, VA	75421		210,111	210,111
Virginia	Staunton--Waynesboro, VA	84630		56,611	56,611
Virginia	Virginia Beach, VA	90892		1,439,666	1,439,666
Virginia	Washington, DC--VA--MD	92242	P	2,235,884	4,586,770
Virginia	Williamsburg, VA	95411		75,689	75,689
Virginia	Winchester, VA	96103		69,449	69,449
Washington	Bellingham, WA	06652		114,473	114,473
Washington	Bremerton, WA	09946		198,979	198,979
Washington	Kennewick--Pasco, WA	44479		210,975	210,975
Washington	Lewiston, ID--WA	49312	P	20,184	51,924
Washington	Longview, WA--OR	51283	P	61,598	63,952
Washington	Marysville, WA	55333		145,140	145,140
Washington	Mount Vernon, WA	60490		62,966	62,966
Washington	Olympia--Lacey, WA	65242		176,617	176,617
Washington	Portland, OR--WA	71317	P	359,562	1,849,898
Washington	Seattle, WA	80389		3,059,393	3,059,393
Washington	Spokane, WA	83764		387,847	387,847
Washington	Walla Walla, WA--OR	91405	P	46,980	55,805
Washington	Wenatchee, WA	93862		67,227	67,227
Washington	Yakima, WA	97507		129,534	129,534
West Virginia	Beckley, WV	06139		64,022	64,022
West Virginia	Charleston, WV	15481		153,199	153,199
West Virginia	Cumberland, MD--WV--PA	21745	P	2,249	51,899
West Virginia	Hagerstown, MD--WV--PA	36190	P	71,787	182,696
West Virginia	Huntington, WV--KY--OH	40753	P	112,268	202,637
West Virginia	Morgantown, WV	59275		70,350	70,350
West Virginia	Parkersburg, WV--OH	67672	P	59,643	67,229
West Virginia	Weirton--Steubenville, WV--OH--PA	93592	P	30,669	70,889
West Virginia	Wheeling, WV--OH	94726	P	51,067	81,249
Wisconsin	Appleton, WI	02764		216,154	216,154
Wisconsin	Beloit, WI--IL	06760	P	45,123	63,835
Wisconsin	Duluth, MN--WI	24850	P	27,045	120,378
Wisconsin	Eau Claire, WI	26038		102,852	102,852
Wisconsin	Fond du Lac, WI	30223		54,901	54,901

State Name	Urban Area Name	Urban Code	PART	State Portion Population#	Total UCAE** Population#
Wisconsin	Green Bay, WI	34813		206,520	206,520
Wisconsin	Janesville, WI	42562		69,658	69,658
Wisconsin	Kenosha, WI--IL	44506	P	124,060	124,064
Wisconsin	La Crosse, WI--MN	45910	P	95,510	100,868
Wisconsin	Madison, WI	53200		401,661	401,661
Wisconsin	Milwaukee, WI	57466		1,376,476	1,376,476
Wisconsin	Minneapolis--St. Paul, MN--WI	57628	P	276	2,650,890
Wisconsin	Oshkosh, WI	66160		74,495	74,495
Wisconsin	Racine, WI	73153		133,700	133,700
Wisconsin	Round Lake Beach--McHenry--Grayslake, IL--WI	76474	P	30,562	290,373
Wisconsin	Sheboygan, WI	81118		71,313	71,313
Wisconsin	Wausau, WI	93025		74,632	74,632
Wisconsin	West Bend, WI	93916		68,444	68,444
Wyoming	Casper, WY	14482		64,548	64,548
Wyoming	Cheyenne, WY	16237		73,588	73,588
Guam	Hag†t¤a, GU	36163			
Northern Mariana Islands	Saipan, MP	78040			
Puerto Rico	Aguadilla--Isabela--San Sebastián, PR	00631		306,196	306,196
Puerto Rico	Arecibo, PR	03034		139,171	139,171
Puerto Rico	Fajardo, PR	28981		85,225	85,225
Puerto Rico	Florida--Imbéry--Barceloneta, PR	30115		71,747	71,747
Puerto Rico	Guayama, PR	35866		80,155	80,155
Puerto Rico	Juana Díaz, PR	43453		80,928	80,928
Puerto Rico	Mayagüez, PR	55738		109,572	109,572
Puerto Rico	Ponce, PR	70642		149,539	149,539
Puerto Rico	San Germán--Cabo Rojo--Sabana Grande, PR	78985		118,199	118,199
Puerto Rico	San Juan, PR	79093		2,148,346	2,148,346
Puerto Rico	Yauco, PR	97561		90,899	90,899
*	Rural	99999			< 5,000
*	Small Urban	99998			5,000 - 49,000

Population is based on the 2010 Decennial Census

* These codes are to be utilized by all States wherever these area types exist

** UACE (Urban Area Census Code) – Total UACE population is listed for reference purposes.

NOTES:

1. The following 2000 Census Year Urban Areas were classified as Urban Clusters (UC's) with the 2010 Census and should be coded with Small Urban area values for applicable States:

- Danville, VA-NC: Pop. 49,344
- Sandusky, OH: Pop. 48,990
- Galveston, TX: Pop. 44,022

2. The "PART" field is used to identify urban areas that are located in multiple States. States must report data in HPMS for their "PART" of every applicable Urban Area listed in this appendix.

Appendix J. County Code Reference Tables (AK, DC, and PR)

Alaska

Borough Name	County Code
City and Borough of Juneau	001
Bristol Bay Borough	002
Ketchikan Gateway Borough	003
Municipality of Anchorage	004
City and Borough of Sitka	005
Kenai Peninsula Borough	006
Kodiak Island Borough	007
Matanuska-Susitna Borough	008
Fairbanks North Star Borough	009
Haines Borough	010
North Slope Borough	011
Northwest Arctic Borough	012
Aleutians East Borough	013
Denali Borough	014
Lake and Peninsula Borough	015
City and Borough of Yakutat	016
Municipality of Skagway	017
City and Borough of Wrangel	018
Petersburg	019
Unorganized Borough	099

District of Columbia

County Name	County Code
Northwest	001
Northeast	002
Southeast	003
Southwest	004
Boundary	005

Puerto Rico

Highway District	Municipio Name	County Code
San Juan	Bayamon	001
	Canovanas	
	Carolina	
	Catano	
	Guaynabo	
	Loiza	
	San Juan	
	Trujillo Alto	
Arecibo	Arecibo	002
	Barceloneta	
	Ciales	
	Corozal	
	Dorado	
	Florida	
	Manati	
	Morovis	
	Naranjito	
	Toa Alta	
	Toa Baja	
	Utuado	
	Vega Alta	
	Vega Baja	
Aguadilla	Aguada	003
	Aguadilla	
	Camuy	
	Hatillo	
	Isabela	
	Lares	
	Moca	
	Quebradillas	
	Rincon	
	San Sebastian	
Mayaguez	Anasco	004
	Cabo Rojo	
	Guanica	
	Hormigueros	
	Lajas	
	Las Marias	
	Maricao	
	Mayaguez	
	Sabana Grande	
	San German	
	Yauco	

Highway District	Municipio Name	County Code
Ponce	Adjuntas	005
	Coamo	
	Guayanilla	
	Jayuya	
	Juana Diaz	
	Orocovis	
	Penuelas	
	Ponce	
	Santa Isabel	
	Villalba	
Guayama	Aguas Buenas	006
	Aibonito	
	Arroyo	
	Barranquitas	
	Cayey	
	Cidra	
	Comerio	
	Guayama	
	Patillas	
	Salinas	
Humucao	Caguas	007
	Ceiba	
	Culebra	
	Fajardo	
	Gurabo	
	Humacao	
	Juncos	
	Las Piedras	
	Luquillo	
	Maunabo	
	Humacao	
	Rio Grande	
	San Lorenzo	
	Vieques	
	Yabucoa	

Appendix K. NAAQS Pollutant Standards

State	Area Name	Pollutant Standard*
Alabama	Birmingham, AL	Ozone_8-hr.1997.Birmingham
Alabama	Birmingham, AL	PM-2.5.1997.Birmingham
Alabama	Birmingham, AL	PM-2.5.2006.Birmingham
Alaska	Fairbanks, AK	PM-2.5.2006.Fairbanks
Arizona	Nogales, AZ	PM-2.5.2006.Nogales
Arizona	Phoenix-Mesa, AZ	Ozone_8-hr.1997.Phoenix
Arkansas	Memphis, TN-AR	Ozone_8-hr.1997.Memphis
California	Amador and Calaveras Cos., CA: (Central Moun	Ozone_8-hr.1997.Amador_and_Calaveras_Cos
California	Chico, CA	Ozone_8-hr.1997.Chico
California	Chico, CA	PM-2.5.2006.Chico
California	Imperial Co, CA	PM-2.5.2006.Imperial_Co
California	Imperial Co., CA	Ozone_8-hr.1997.Imperial_Co
California	Kern County (Eastern Kern), CA	Ozone_8-hr.1997.East_Kern
California	Los Angeles, CA	PM-2.5.2006.LA-South_Coast
California	Los Angeles-San Bernardino Cos. (W Mojave De	Ozone_8-hr.1997.LA-Desert
California	Los Angeles-South Coast Air Basin, CA	Ozone_8-hr.1997.LA-South_Coast
California	Los Angeles-South Coast Air Basin, CA	PM-2.5.1997.LA-South_Coast
California	Mariposa and Tuolumne Cos., CA: (Southern Mo	Ozone_8-hr.1997.Mariposa_and_Tuolumne_Cos
California	Nevada County (Western part), CA	Ozone_8-hr.1997.Nevada_Co
California	Riverside Co. (Coachella Valley), CA	Ozone_8-hr.1997.Coachella_Valley
California	Sacramento Metro, CA	Ozone_8-hr.1997.Sacramento
California	Sacramento, CA	PM-2.5.2006.Sacramento
California	San Diego, CA	Ozone_8-hr.1997.San_Diego
California	San Francisco Bay Area, CA	Ozone_8-hr.1997.San_Francisco
California	San Francisco Bay Area, CA	PM-2.5.2006.San_Francisco
California	San Joaquin Valley, CA	Ozone_8-hr.1997.San_Joaquin_Valley
California	San Joaquin Valley, CA	PM-2.5.1997.San_Joaquin_Valley
California	San Joaquin Valley, CA	PM-2.5.2006.San_Joaquin_Valley
California	Sutter County (Sutter Buttes), CA	Ozone_8-hr.1997.Sutter_Buttes
California	Ventura County, CA	Ozone_8-hr.1997.Ventura_Co
California	Yuba City-Marysville, CA	PM-2.5.2006.Yuba_City
Colorado	Denver-Boulder-Greeley-Ft.Collins-Love., CO	Ozone_8-hr.1997.Denver
Connecticut	Greater Connecticut, CT	Ozone_8-hr.1997.Connecticut
Connecticut	New York, NY-NJ-CT	PM-2.5.2006.New_York

State	Area Name	Pollutant Standard*
Connecticut	New York-N. New Jersey-Long Island, NY-NJ-CT	Ozone_8-hr.1997.New_York
Connecticut	New York-N. New Jersey-Long Island, NY-NJ-CT	PM-2.5.1997.New_York
Delaware	Philadelphia-Wilmington-Atlantic Ci, PA-NJ-M	Ozone_8-hr.1997.Philadelphia
Delaware	Philadelphia-Wilmington, PA-NJ-DE	PM-2.5.1997.Philadelphia
Delaware	Philadelphia-Wilmington, PA-NJ-DE	PM-2.5.2006.Philadelphia
District of Columbia	Washington, DC-MD-VA	Ozone_8-hr.1997.Washington
District of Columbia	Washington, DC-MD-VA	PM-2.5.1997.Washington
Georgia	Atlanta, GA	Ozone_8-hr.1997.Atlanta
Georgia	Atlanta, GA	PM-2.5.1997.Atlanta
Georgia	Chattanooga, TN-GA	Ozone_8-hr.1997.Chattanooga
Georgia	Chattanooga, TN-GA	PM-2.5.1997.Chattanooga
Georgia	Macon, GA	Ozone_8-hr.1997.Macon
Georgia	Macon, GA	PM-2.5.1997.Macon
Georgia	Murray Co. (Chattahoochee Nat Forest), GA	Ozone_8-hr.1997.Murray_Co
Georgia	Rome, GA	PM-2.5.1997.Rome
Idaho	Logan, UT-ID	PM-2.5.2006.Logan
Illinois	Chicago-Gary-Lake County, IL-IN	Ozone_8-hr.1997.Chicago
Illinois	Chicago-Gary-Lake County, IL-IN	PM-2.5.1997.Chicago
Illinois	St. Louis, MO-IL	Ozone_8-hr.1997.St_Louis
Illinois	St. Louis, MO-IL	PM-2.5.1997.St_Louis
Indiana	Chicago-Gary-Lake County, IL-IN	Ozone_8-hr.1997.Chicago
Indiana	Chicago-Gary-Lake County, IL-IN	PM-2.5.1997.Chicago
Indiana	Cincinnati-Hamilton, OH-KY-IN	Ozone_8-hr.1997.Cincinnati
Indiana	Cincinnati-Hamilton, OH-KY-IN	PM-2.5.1997.Cincinnati
Indiana	Evansville, IN	Ozone_8-hr.1997.Evansville
Indiana	Evansville, IN	PM-2.5.1997.Evansville
Indiana	Fort Wayne, IN	Ozone_8-hr.1997.Fort_Wayne
Indiana	Greene Co., IN	Ozone_8-hr.1997.Greene_Co_IN
Indiana	Indianapolis, IN	Ozone_8-hr.1997.Indianapolis
Indiana	Indianapolis, IN	PM-2.5.1997.Indianapolis
Indiana	Jackson Co., IN	Ozone_8-hr.1997.Jackson_Co
Indiana	La Porte Co., IN	Ozone_8-hr.1997.La_Porte_Co
Indiana	Louisville, KY-IN	Ozone_8-hr.1997.Louisville
Indiana	Louisville, KY-IN	PM-2.5.1997.Louisville
Indiana	Muncie, IN	Ozone_8-hr.1997.Muncie
Indiana	South Bend-Elkhart, IN	Ozone_8-hr.1997.South_Bend
Indiana	Terre Haute, IN	Ozone_8-hr.1997.Terre_Haute
Kentucky	Cincinnati-Hamilton, OH-KY-IN	Ozone_8-hr.1997.Cincinnati
Kentucky	Cincinnati-Hamilton, OH-KY-IN	PM-2.5.1997.Cincinnati

State	Area Name	Pollutant Standard*
Kentucky	Clarkesville-Hopkinsville, TN-KY	Ozone_8-hr.1997.Clarksville
Kentucky	Huntington-Ashland, WV-KY	Ozone_8-hr.1997.Huntington
Kentucky	Huntington-Ashland, WV-KY-OH	PM-2.5.1997.Huntington
Kentucky	Louisville, KY-IN	Ozone_8-hr.1997.Louisville
Kentucky	Louisville, KY-IN	PM-2.5.1997.Louisville
Louisiana	Baton Rouge, LA	Ozone_8-hr.1997.Baton_Rouge
Maine	Hancock, Knox, Lincoln and Waldo Cos., ME	Ozone_8-hr.1997.Central_Maine_Coast
Maine	Portland, ME	Ozone_8-hr.1997.Portland_ME
Maryland	Baltimore, MD	Ozone_8-hr.1997.Baltimore
Maryland	Baltimore, MD	PM-2.5.1997.Baltimore
Maryland	Kent and Queen Anne's Cos., MD	Ozone_8-hr.1997.Kent_and_Queen_Annes_Cos
Maryland	Martinsburg, WV-Hagerstown, MD	PM-2.5.1997.Hagerstown
Maryland	Philadelphia-Wilmington-Atlantic Ci, PA-NJ-M	Ozone_8-hr.1997.Philadelphia
Maryland	Washington, DC-MD-VA	Ozone_8-hr.1997.Washington
Maryland	Washington, DC-MD-VA	PM-2.5.1997.Washington
Massachusetts	Boston-Lawrence-Worcester (E. Mass), MA	Ozone_8-hr.1997.Boston_MA
Massachusetts	Boston-Manchester-Portsmouth (SE), NH	Ozone_8-hr.1997.Boston_NH
Massachusetts	Springfield (W. Mass), MA	Ozone_8-hr.1997.Springfield
Michigan	Allegan Co., MI	Ozone_8-hr.1997.Allegan_Co
Michigan	Benton Harbor, MI	Ozone_8-hr.1997.Benton_Harbor
Michigan	Benzie Co., MI	Ozone_8-hr.1997.Benzie_Co
Michigan	Cass County, MI	Ozone_8-hr.1997.Cass_Co
Michigan	Detroit-Ann Arbor, MI	Ozone_8-hr.1997.Detroit
Michigan	Detroit-Ann Arbor, MI	PM-2.5.1997.Detroit
Michigan	Detroit-Ann Arbor, MI	PM-2.5.2006.Detroit
Michigan	Flint, MI	Ozone_8-hr.1997.Flint
Michigan	Grand Rapids, MI	Ozone_8-hr.1997.Grand_Rapids
Michigan	Huron Co., MI	Ozone_8-hr.1997.Huron_Co
Michigan	Kalamazoo-Battle Creek, MI	Ozone_8-hr.1997.Kalamazoo
Michigan	Lansing-East Lansing, MI	Ozone_8-hr.1997.Lansing
Michigan	Mason Co, MI	Ozone_8-hr.1997.Mason_Co
Michigan	Muskegon, MI	Ozone_8-hr.1997.Muskegon
Missouri	St. Louis, MO-IL	Ozone_8-hr.1997.St_Louis
Missouri	St. Louis, MO-IL	PM-2.5.1997.St_Louis
Montana	Libby, MT	PM-2.5.1997.Libby
Nevada	Las Vegas, NV	Ozone_8-hr.1997.Las_Vegas
New Hampshire	Boston-Manchester-Portsmouth (SE), NH	Ozone_8-hr.1997.Boston_NH
New Jersey	New York, NY-NJ-CT	PM-2.5.2006.New_York
New Jersey	New York-N. New Jersey-Long Island, NY-NJ-CT	Ozone_8-hr.1997.New_York

State	Area Name	Pollutant Standard*
New Jersey	New York-N. New Jersey-Long Island, NY-NJ-CT	PM-2.5.1997.New_York
New Jersey	Philadelphia-Wilmington, PA-NJ-DE	PM-2.5.1997.Philadelphia
New Jersey	Philadelphia-Wilmington, PA-NJ-DE	PM-2.5.2006.Philadelphia
New Jersey	Philadelphia-Wilmington-Atlantic Ci, PA-NJ-M	Ozone_8-hr.1997.Philadelphia
New York	Albany-Schenectady-Troy, NY	Ozone_8-hr.1997.Albany
New York	Buffalo-Niagara Falls, NY	Ozone_8-hr.1997.Buffalo
New York	Essex County (Whiteface Mtn.), NY	Ozone_8-hr.1997.Whiteface_Mountain
New York	Jamestown, NY	Ozone_8-hr.1997.Jamestown
New York	Jefferson County, NY	Ozone_8-hr.1997.Jefferson_Co
New York	New York, NY-NJ-CT	PM-2.5.2006.New_York
New York	New York-N. New Jersey-Long Island, NY-NJ-CT	Ozone_8-hr.1997.New_York
New York	New York-N. New Jersey-Long Island, NY-NJ-CT	PM-2.5.1997.New_York
New York	Poughkeepsie, NY	Ozone_8-hr.1997.Poughkeepsie
New York	Rochester, NY	Ozone_8-hr.1997.Rochester
North Carolina	Charlotte-Gastonia-Rock Hill, NC-SC	Ozone_8-hr.1997.Charlotte
North Carolina	Greensboro-Winston-Salem-High Point, NC	PM-2.5.1997.Greensboro
North Carolina	Haywood and Swain Cos. (Great Smoky NP), NC	Ozone_8-hr.1997.Haywood_and_Swain_Cos
North Carolina	Hickory-Morganton-Lenoir, NC	PM-2.5.1997.Hickory
North Carolina	Raleigh-Durham-Chapel Hill, NC	Ozone_8-hr.1997.Raleigh
North Carolina	Rocky Mount, NC	Ozone_8-hr.1997.Rocky_Mount
Ohio	Canton-Massillon, OH	Ozone_8-hr.1997.Canton
Ohio	Canton-Massillon, OH	PM-2.5.1997.Canton
Ohio	Canton-Massillon, OH	PM-2.5.2006.Canton
Ohio	Cincinnati-Hamilton, OH-KY-IN	Ozone_8-hr.1997.Cincinnati
Ohio	Cincinnati-Hamilton, OH-KY-IN	PM-2.5.1997.Cincinnati
Ohio	Cleveland-Akron-Lorain, OH	Ozone_8-hr.1997.Cleveland
Ohio	Cleveland-Akron-Lorain, OH	PM-2.5.1997.Cleveland
Ohio	Cleveland-Akron-Lorain, OH	PM-2.5.2006.Cleveland
Ohio	Columbus, OH	Ozone_8-hr.1997.Columbus
Ohio	Columbus, OH	PM-2.5.1997.Columbus
Ohio	Dayton-Springfield, OH	Ozone_8-hr.1997.Dayton
Ohio	Dayton-Springfield, OH	PM-2.5.1997.Dayton
Ohio	Huntington-Ashland, WV-KY-OH	PM-2.5.1997.Huntington
Ohio	Lima, OH	Ozone_8-hr.1997.Lima
Ohio	Parkersburg-Marietta, WV-OH	Ozone_8-hr.1997.Parkersburg
Ohio	Parkersburg-Marietta, WV-OH	PM-2.5.1997.Parkersburg
Ohio	Steubenville-Weirton, OH-WV	Ozone_8-hr.1997.Weirton
Ohio	Steubenville-Weirton, OH-WV	PM-2.5.1997.Weirton
Ohio	Steubenville-Weirton, OH-WV	PM-2.5.2006.Weirton

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Ohio	Toledo, OH	Ozone_8-hr.1997.Toledo
Ohio	Wheeling, WV-OH	Ozone_8-hr.1997.Wheeling
Ohio	Wheeling, WV-OH	PM-2.5.1997.Wheeling
Ohio	Youngstown-Warren-Sharon, PA-OH	Ozone_8-hr.1997.Youngstown
Oregon	Klamath Falls, OR	PM-2.5.2006.Klamath_Falls
Oregon	Oakridge, OR	PM-2.5.2006.Oakridge
Pennsylvania	Allentown, PA	PM-2.5.2006.Allentown
Pennsylvania	Allentown-Bethlehem-Easton, PA	Ozone_8-hr.1997.Allentown
Pennsylvania	Altoona, PA	Ozone_8-hr.1997.Altoona
Pennsylvania	Clearfield & Indiana Cos., PA	Ozone_8-hr.1997.Clearfield_and_Indiana_Cos
Pennsylvania	Erie, PA	Ozone_8-hr.1997.Erie
Pennsylvania	Franklin Co., PA	Ozone_8-hr.1997.Franklin_Co
Pennsylvania	Greene Co., PA	Ozone_8-hr.1997.Greene_Co_PA
Pennsylvania	Harrisburg-Lebanon-Carlisle, PA	Ozone_8-hr.1997.Harrisburg
Pennsylvania	Harrisburg-Lebanon-Carlisle, PA	PM-2.5.1997.Harrisburg
Pennsylvania	Harrisburg-Lebanon-Carlisle-York, PA	PM-2.5.2006.Harrisburg
Pennsylvania	Johnstown, PA	Ozone_8-hr.1997.Johnstown
Pennsylvania	Johnstown, PA	PM-2.5.1997.Johnstown
Pennsylvania	Johnstown, PA	PM-2.5.2006.Johnstown
Pennsylvania	Lancaster, PA	Ozone_8-hr.1997.Lancaster
Pennsylvania	Lancaster, PA	PM-2.5.1997.Lancaster
Pennsylvania	Lancaster, PA	PM-2.5.2006.Lancaster
Pennsylvania	Philadelphia-Wilmington, PA-NJ-DE	PM-2.5.1997.Philadelphia
Pennsylvania	Philadelphia-Wilmington, PA-NJ-DE	PM-2.5.2006.Philadelphia
Pennsylvania	Philadelphia-Wilmington-Atlantic Ci, PA-NJ-M	Ozone_8-hr.1997.Philadelphia
Pennsylvania	Pittsburgh-Beaver Valley, PA	Ozone_8-hr.1997.Pittsburgh
Pennsylvania	Pittsburgh-Beaver Valley, PA	PM-2.5.1997.Pittsburgh
Pennsylvania	Pittsburgh-Beaver Valley, PA	PM-2.5.2006.Pittsburgh
Pennsylvania	Reading, PA	Ozone_8-hr.1997.Reading
Pennsylvania	Reading, PA	PM-2.5.1997.Reading
Pennsylvania	Scranton-Wilkes-Barre, PA	Ozone_8-hr.1997.Scranton
Pennsylvania	State College, PA	Ozone_8-hr.1997.State_College
Pennsylvania	Tioga Co., PA	Ozone_8-hr.1997.Tioga_Co
Pennsylvania	York, PA	Ozone_8-hr.1997.York
Pennsylvania	York, PA	PM-2.5.1997.York
Pennsylvania	Youngstown-Warren-Sharon, PA-OH	Ozone_8-hr.1997.Youngstown
Rhode Island	Providence (all of RI), RI	Ozone_8-hr.1997.Providence
South Carolina	Charlotte-Gastonia-Rock Hill, NC-SC	Ozone_8-hr.1997.Charlotte
South Carolina	Greenville-Spartanburg-Anderson, SC	Ozone_8-hr.1997.Greenville

State	Area Name	Pollutant Standard*
Tennessee	Chattanooga, TN-GA	PM-2.5.1997.Chattanooga
Tennessee	Clarkesville-Hopkinsville, TN-KY	Ozone_8-hr.1997.Clarksville
Tennessee	Knoxville, TN	Ozone_8-hr.1997.Knoxville
Tennessee	Knoxville, TN	PM-2.5.1997.Knoxville
Tennessee	Knoxville-Sevierville-La Follette, TN	PM-2.5.2006.Knoxville
Tennessee	Memphis, TN-AR	Ozone_8-hr.1997.Memphis
Texas	Beaumont/Port Arthur, TX	Ozone_8-hr.1997.Beaumont
Texas	Dallas-Fort Worth, TX	Ozone_8-hr.1997.Dallas
Texas	Houston-Galveston-Brazoria, TX	Ozone_8-hr.1997.Houston
Utah	Logan, UT-ID	PM-2.5.2006.Logan
Utah	Provo, UT	PM-2.5.2006.Provo
Utah	Salt Lake City, UT	PM-2.5.2006.Salt_Lake
Virginia	Fredericksburg, VA	Ozone_8-hr.1997.Fredericksburg
Virginia	Madison & Page Cos. (Shenandoah NP), VA	Ozone_8-hr.1997.Madison_and_Page_Cos
Virginia	Norfolk-Virginia Beach-Newport News (Hampton	Ozone_8-hr.1997.Norfolk
Virginia	Richmond-Petersburg, VA	Ozone_8-hr.1997.Richmond
Virginia	Washington, DC-MD-VA	Ozone_8-hr.1997.Washington
Virginia	Washington, DC-MD-VA	PM-2.5.1997.Washington
Washington	Seattle-Tacoma, WA	PM-2.5.2006.Tacoma
West Virginia	Charleston, WV	Ozone_8-hr.1997.Charleston
West Virginia	Charleston, WV	PM-2.5.1997.Charleston
West Virginia	Charleston, WV	PM-2.5.2006.Charleston
West Virginia	Huntington-Ashland, WV-KY	Ozone_8-hr.1997.Huntington
West Virginia	Huntington-Ashland, WV-KY-OH	PM-2.5.1997.Huntington
West Virginia	Martinsburg, WV-Hagerstown, MD	PM-2.5.1997.Hagerstown
West Virginia	Parkersburg-Marietta, WV-OH	Ozone_8-hr.1997.Parkersburg
West Virginia	Parkersburg-Marietta, WV-OH	PM-2.5.1997.Parkersburg
West Virginia	Steubenville-Weirton, OH-WV	Ozone_8-hr.1997.Weirton
West Virginia	Steubenville-Weirton, OH-WV	PM-2.5.1997.Weirton
West Virginia	Steubenville-Weirton, OH-WV	PM-2.5.2006.Weirton
West Virginia	Wheeling, WV-OH	Ozone_8-hr.1997.Wheeling
West Virginia	Wheeling, WV-OH	PM-2.5.1997.Wheeling
Wisconsin	Door County, WI	Ozone_8-hr.1997.Door_Co
Wisconsin	Kewaunee County, WI	Ozone_8-hr.1997.Kewaunee_Co
Wisconsin	Manitowoc County, WI	Ozone_8-hr.1997.Manitowoc_Co
Wisconsin	Milwaukee-Racine, WI	Ozone_8-hr.1997.Milwaukee
Wisconsin	Milwaukee-Racine, WI	PM-2.5.2006.Milwaukee
Wisconsin	Sheboygan, WI	Ozone_8-hr.1997.Sheboygan

* Pollutant standards are designated by the Environmental Protection Agency. More information can be found online at: http://www.epa.gov/air/criteria.html.