

MIRE

Model Inventory of Roadway Elements

VERSION 1.0



FOREWORD

The development of the Model Inventory of Roadway Elements (MIRE) comes at a key point in time. Safety data are critical to making sound decisions about the design and operation of roadways. Critical safety data include not only crash data, but also roadway inventory data, traffic data, and other files. State DOT's need accurate and detailed roadway data as they develop and implement their Strategic Highway Safety Plans and look toward making safety investments that are more data driven.

Most States and local transportation agencies currently do not have all the data needed to use analysis tools such as SafetyAnalyst and the Interactive Highway Safety Design Model (IHSDM), and other procedures identified in the new Highway Safety Manual. The MIRE provides a structure for roadway inventory data that will allow State and local transportation agencies to use these analysis tools with their own data rather than relying on default values that may not reflect local conditions.

As the need for roadway inventory information has increased, new and more efficient technologies to collect roadway inventory information have emerged. However, the collected data still need a framework for the common sharing of the information. As with the Model Minimum Uniform Crash Criteria (MMUCC) effort that established a set of uniform crash data elements, definitions, and attributes that States are encouraged to adopt and has become a de facto standard, the MIRE provides an inventory of roadway data elements that addresses a similar need. The MIRE provides a structure for roadway inventory data elements through the use of common consistent definitions and attributes. Consistency is essential for making sense of aggregated data. Without consistency, it would not be possible to effectively compare results across jurisdictions and time regarding the application of safety treatments. Also, inconsistent information can result in safety efforts that are misguided, wasteful, or ineffective.

One of MIRE's intended functions has been to serve multiple roadway applications and user needs. The roadway data elements identified in MIRE were widely vetted across various user groups to ensure it met the data needs for multiple disciplines. The creation and application of this inventory will benefit not only safety but other disciplines such as operations, asset management and maintenance.

The benefits of MIRE — improved safety through the use of analytic tools and improved asset management, operations, and maintenance through the creation of a comprehensive inventory — will be realized only to the degree that transportation agencies use the resource. While the MIRE affords agencies a common framework in which to populate their roadway inventories, the task of completing these inventories still rests with the agencies responsible for building and maintaining the roads. We encourage the widespread adoption of the MIRE by these agencies as the framework for their roadway inventories.



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SI* (MODERN METRIC) CONVERSION FACTORS				
APPROXIMATE CONVERSIONS TO SI UNITS				
Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
AREA				
in ²	square inches	645.2	square millimeters	mm ²
ft ²	square feet	0.093	square meters	m ²
yd ²	square yard	0.836	square meters	m ²
ac	acres	0.405	hectares	ha
mi ²	square miles	2.59	square kilometers	km ²
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft ³	cubic feet	0.028	cubic meters	m ³
yd ³	cubic yards	0.765	cubic meters	m ³
NOTE: volumes greater than 1000 L shall be shown in m ³				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
TEMPERATURE (exact degrees)				
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
ILLUMINATION				
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m ²	cd/m ²
FORCE and PRESSURE or STRESS				
lbf	poundforce	4.45	newtons	N
lbf/in ²	poundforce per square inch	6.89	kilopascals	kPa
APPROXIMATE CONVERSIONS FROM SI UNITS				
Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
AREA				
mm ²	square millimeters	0.0016	square inches	in ²
m ²	square meters	10.764	square feet	ft ²
m ²	square meters	1.195	square yards	yd ²
ha	hectares	2.47	acres	ac
km ²	square kilometers	0.386	square miles	mi ²
VOLUME				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m ³	cubic meters	35.314	cubic feet	ft ³
m ³	cubic meters	1.307	cubic yards	yd ³
MASS				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
TEMPERATURE (exact degrees)				
°C	Celsius	1.8C+32	Fahrenheit	°F
ILLUMINATION				
lx	lux	0.0929	foot-candles	fc
cd/m ²	candela/m ²	0.2919	foot-Lamberts	fl
FORCE and PRESSURE or STRESS				
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in ²

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380. (Revised March 2003)

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ACRONYMS

AADT	Annual Average Daily Traffic
AC	Asphalt-Concrete
CRCP	Continuously Reinforced Concrete Pavement
DOT	Department of Transportation
FHWA	Federal Highway Administration
FIPS	Federal Information Processing System
FRA	Federal Railroad Administration
GIS	Geographic Information System
GLC	Geographic Locator Codes
GSA	General Services Administration
HOT	High-occupancy Toll
HOV	High-occupancy Vehicle
HPMS	Highway Performance Monitoring System
HSM	Highway Safety Manual
IHSDM	Interactive Highway Safety Design Model
IRI	International Roughness Index
JPCP	Jointed Plain Concrete Pavement
JRCP	Jointed Reinforced Concrete Pavement
LRs	Linear Referencing System
MIRE	Model Inventory of Roadway Elements
MMIRE	Model Minimum Inventory of Roadway Elements
MMUCC	Model Minimum Uniform Crash Criteria
MPH (mph)	Miles per hour
MUTCD	Manual Uniform Traffic Control Devices
NBI	National Bridge Inventory
NCHRP	National Cooperative Highway Research Program
NHS	National Highway System
PCC	Portland Cement Concrete
PSR	Present Serviceability Rating
RR	Railroad
RTOR	Right Turn-On-Red
SOV	Single-occupancy Vehicle
SPI	Single point interchange
U.S.	United States

Introduction

Background

Safety data are the key to sound decisions on the design and operation of roadways. Critical safety data include not only crash data, but also roadway inventory data, traffic data, driver history data, citation/adjudication information, and other files. The need for improved and more robust safety data is increasing due to the development of a new generation of safety data analysis tools and methods. The Federal Highway Administration's (FHWA) Interactive Highway Safety Design Model (IHSDM) (1) and SafetyAnalyst (2), the 2010 release of the Highway Safety Manual (HSM) (3), as well as the National Cooperative Highway Research Program (NCHRP) Series 500 Data and Analysis Guide (4), all require crash, roadway, and traffic data to achieve the most accurate results. More detailed roadway data are also needed by State Departments of Transportation (DOT) and local agencies as they implement their strategic highway safety plans and make safety assessments of various roadway treatments. The Model Inventory of Roadway Elements (MIRE) Version 1.0 is a listing and accompanying data dictionary of roadway and traffic data elements critical to safety management.

In August 2007, the FHWA released a report entitled Model Minimum Inventory of Roadway Elements — MMIRE (5). The report presented a list of roadway inventory and traffic elements critical to safety management and proposed standardized coding for each. Since the initial report was released in 2007, the MIRE listing has been revised and now includes over 200 elements. The MIRE listing has become more of a comprehensive listing of elements necessary for safety rather than a minimum listing. Therefore, the minimum has been dropped from the title, and has become the Model Inventory of Roadway Elements (MIRE). This change was made to reflect comments by user-reviewers concerning the number of elements and the fact that “minimum” might imply that all elements are “mandatory.” The new title better reflects the “model” nature of the element listing containing both critical and value-added elements.

The current MIRE effort to revise the initially-proposed MIRE elements, definitions, and attributes has resulted in MIRE Version 1.0. In order to refine the proposed MIRE elements, the project team:

- Compared the proposed MIRE elements to several State databases to determine which elements States are already collecting and how the attributes and codings compare.
- Compared the proposed MIRE elements to other databases, safety analysis tools, and guidance documents to identify common elements and to ensure as much consistency as possible between MIRE and the other datasets. These databases included the Highway Performance Monitoring System (HPMS), Model Minimum Uniform Crash Criteria (MMUCC), IHSDM, HSM, SafetyAnalyst, and the Manual on Uniform Traffic Control Devices (MUTCD).

- Hosted webconferences to obtain additional input from eventual end users.
- Coordinated with an Executive Steering Committee designed to provide technical input and serve as liaisons to potential users.
- Compiled all input into refined attributes and codings for the MIRE elements.

MIRE will serve as the companion to MMUCC, which was developed as a minimum set of crash data elements. MMUCC has become the de-facto standard for crash data elements used by State and local jurisdictions when improving their crash data systems (6). A MIRE website has been developed to provide additional background information, resources, and discussion forums. The website is available at <http://www.mireinfo.org/>.

MIRE is Safety Related

It is important to note that while MIRE is an extensive list of elements, it does not include all elements that a State DOT would collect for all operational and design purposes; the MIRE elements are geared towards safety management. In addition, when selecting MIRE elements, an attempt was made to only retain those elements that were needed by SafetyAnalyst or other safety tools, in analyses conducted by a majority of State and local DOTs or analyses they are expected to conduct in the future (e.g., additional pedestrian safety analyses). There are additional elements that can clearly be added by an individual State or local DOT. For example, at least one state DOT captures “Operational Class” in its inventory where the actual operating class of the roadway differs from the official Functional Class.

In summary, MIRE 1.0 provides elements and attributes that are or will be needed when State and local DOTs make safety management decisions.

Using MIRE

There are a total of 202 elements that comprise MIRE Version 1.0. The MIRE elements are divided among three broad categories: roadway segments, roadway alignment, and roadway junctions. A breakdown of categories and subcategories are shown in Table 1.

Table 1. Categories and Subcategories of MIRE Elements.

I. Roadway Segment Descriptors
I.a. Segment Location/Linkage Elements
I.b. Segment Roadway Classification
I.c. Segment Cross Section
I.c.1. Surface Descriptors
I.c.2. Lane Descriptors
I.c.3. Shoulder Descriptors
I.c.4. Median Descriptors
I.d. Roadside Descriptors
I.e. Other Segment Descriptors
I.f. Segment Traffic Flow Data
I.g. Segment Traffic Operations/Control Data
I.h. Other Supplemental Segment Descriptors
II. Roadway Alignment Descriptors
II.a. Horizontal Curve Data
II.b. Vertical Grade Data
III. Roadway Junction Descriptors
III.a. At-Grade Intersection/Junctions
III.a.1. At-Grade Intersection/Junction General Descriptors
III.a.2. At-Grade Intersection/Junction Descriptors (Each Approach)
III.b. Interchange and Ramp Descriptors
III.b.1. General Interchange Descriptors
III.b.2. Interchange Ramp Descriptors

The listing of MIRE elements presented later in this report is broken down into three main sections based on these categories. At the beginning of each section is a listing of the elements. Following that listing of elements is the detailed information for each element in that section. Appendix A shows an alphabetical listing of the 202 MIRE elements and their corresponding page number.

For each element that is included, there is a definition, a list of attributes (coding), a priority rating, a reference indicating how the element relates to elements in HPMS and new safety tools, and when necessary, an illustration that provides supplemental information on the element. Unless otherwise noted, all illustrations were developed by the University of North Carolina Highway Safety Research Center. The attribute lists contain the suggested coding for each of the elements. There is not a separate code for “unknown” or “not applicable” under each element. In these cases, each agency should develop their own standardized means of recording this information through additional codes or the use of blank fields. Each element also contains a priority rating. The priority ratings are broken down into two major categories: “critical” and “value added”. Elements ranked as “critical” are those elements that are necessary for States to conduct basic safety management and/or are contained in safety analysis tools such as SafetyAnalyst. Elements ranked as “value added” are those elements that would be beneficial but are not crucial to using current versions of safety analysis tools. In addition, there are some elements that capture similar information. These elements are further categorized as “preferred” or “alternative”. As the name suggests, the preferred element better captures the intended data. However, if that element is not available, States can collect the alternative in its place. The alternative option always follows directly after its preferred counterparts in the MIRE listing. An example is truck AADT elements. Collecting both elements 82. Percent Single Unit Trucks, or Single Truck AADT and 83. Percent Combination Trucks or Combination Truck AADT, is designated as Critical Preferred, with collecting only element 84. Percentage Trucks or Truck AADT as the Critical Alternative.

The final descriptor of each element is a notation of its relationship to HPMS, HSM/IHSDM, and SafetyAnalyst. As noted earlier, MIRE is designed to include *safety* elements that are found in HPMS and/or are needed by one of the two new safety tools. (Note that the elements needed in the HSM and IHSDM are the same; thus the combinations of the two into one category.) In addition, the formatting of element attributes in MIRE (i.e., the coding) follows formatting in HPMS and MUTCD to a significant extent. The relationship of a MIRE element to these safety tools is presented in the following format under each variable:

- HPMS/Tool Requirements: HPMS (Full Extent), SafetyAnalyst (Required Conditionally), HSM/IHSDM (Required).

The reference to HPMS will be included if the MIRE element is either a “Sample” or a “Full Extent” element. The data items reported for all public roads are now known as Full Extent data items in HPMS. Additionally for HPMS, an asterisk (*) indicates that data collection requirements differ based on functional class. The reference to HSM/IHSDM will be included if the element is “Required” by those tools. The reference to SafetyAnalyst will be included if the element is either “Required,” “Required Conditionally” or “Optional.” Appendix B includes a matrix showing a summary of this information – a listing of each MIRE element showing its

relationship to each of the three tools. Appendix C includes a second matrix where more information is provided on the three different codes used for SafetyAnalyst.

As previously stated, the MIRE elements are divided among three broad categories: roadway segments, roadway alignment, and roadway junctions. A roadway segment is a “homogenous” section of roadway where some set of crucial elements remain constant. It is up to individual States to determine how they define homogeneous. When the value for one of these elements changes (e.g., a shoulder becomes wider, the number of lanes increases), a new homogeneous segment begins. Each segment should be defined by a beginning and ending “address” along a route. The address can be a milepoint or a set of coordinates. In link/node systems, the begin and end points might be defined by assigned node numbers. In urban systems, the begin and end points might be defined by intersection codes or street addresses.

There will be cases when some elements for which data are collected are not designated as crucial by the user – they can change within a given homogeneous segment without starting a new segment. For such elements that are categorical in nature (e.g. HOV Lane Type), it is recommended that the *predominant value* (i.e., the value for the greatest length within the segment) be used. For numeric elements, either use the predominant value or a length-weighted value. For the latter, a 0.3 mile section with a value of 10 for 0.2 miles and 20 for 0.1 miles would be assigned a value of $[(0.2 \times 10) + 0.1 \times 20]/0.3 = 13.3$.

While the difference among the three broad categories would appear to be very straight-forward, there are some complicating factors. For example, segments are often defined to run from intersection to intersection on a route, with the end points being the crossing point of the centerlines of the crossing roadways. Therefore, left-turn lanes at the intersection would be included in the lengths of the segments approaching and departing from the intersection. However, for the purpose of safety analyses and programs, turn lanes are most often associated with intersections and most current State and local files would begin and end segments at the center point of intersections and would *not* include descriptors of turn lanes on segments. Given these facts, the MIRE elements have been categorized such that elements normally associated with intersections or other junctions (e.g., pedestrian crossings) are included in the junction (intersection) category, and elements normally associated with sections of roadway between intersections are in the segment category. There are a few items which appear to be exceptions. For example, because there may be left turn lanes or turning bays in medians of divided highways which are not associated with intersections, these elements are included under “median descriptors”. However, even on divided highways, left-turn lanes associated with an intersection should be coded in the junction elements.

The second issue is how junction is defined in MIRE. As will be seen under “Junction Type”, MIRE includes not only intersections of two or more roadways, but also locations where a roadway intersects with a pedestrian crossing, bicycle path or railroad grade crossing. What are

not included in this element are locations where a roadway intersects with a driveway. Indeed, counts of driveways by type are included as a segment descriptor.

While the *HPMS 2010+ Reassessment, Data Specifications (7)* repeatedly refers to intersection, there is no definition of the term. Indeed, when defining elements related to counts of intersections in an HPMS section, HPMS says to “Include at-grade intersections at entrances to shopping centers, industrial parks, and other large traffic generating enterprises.” No definition is given of how large the traffic generated should be. MIRE is in agreement with HPMS in this regard in that it does not prescribe a clear definition of driveway or intersection, leaving it to the user to make this determination. The user would employ the same decision criteria used in collecting the HPMS data when making this decision.

Date of Changes

Several of the MIRE elements are followed by an element to document the year or posting date. These are for elements that either can change significantly in a one-year period (e.g., surface friction) or elements which require a date based on the definition (e.g., Annual Average Daily Traffic (AADT) Year, Future AADT Year). While a date element is not currently included with all MIRE elements, the MIRE project team recommends that States track the posting date or date of change for each MIRE element in the file. Knowing when a change has occurred is important in order to know the current state of inventory assets at any point in time, and in order to link the correct inventory with crashes. It would be preferable for States to establish a data system that can be set up to capture the date of change for each element. However, if that is not feasible, an alternative is to make changes as they occur, and then capture and retain an “end-of-year” file each year. Comparison of year-to-year files can then give some indication of attribute changes between years. This alternative is only feasible because, generally, only a small proportion of the inventory file would be changed in a given year.

Supplemental Databases

MIRE is envisioned as the primary standard for roadway inventory and traffic data variables. However, it does not contain all inventory data elements needed for all safety decisions that must be made. Some of the other data needed are contained in existing files that are currently (or could be) collected by State DOTs. These databases should be linked to the MIRE database in order to readily access these crucial supplemental databases. Examples of additional supplemental databases include:

- Roadside fixed objects.
- Signs.
- Speed data.
- Automated enforcement devices.
- Land use elements related to safety.

- Bridge descriptors.
- Railroad grade-crossing descriptors.
- Safety improvements.

They are explained below.

Roadside Fixed Objects

This database would include an inventory of fixed objects on the roadside – both roadside hardware such as barriers and natural objects such as trees. Data related to roadside hardware may be available in an agency’s asset management system or could be added to that system. Other items (e.g., trees) would likely have to be added through a separate inventory effort. Version 1.0 of MIRE has not detailed the list of objects needed, leaving that to future versions. However, the needed elements would be those that can cause harm to vehicle occupants in a collision (e.g., trees trunks over 4” in diameter but not small shrubs). The minimum needed characteristics would include the address of the object (e.g., route/milepoint), object type, side of the road, distance from the edge of the travel lane and the length of the object if linear (e.g., guardrail).

This inventory will require effort and resources. However, it is not without precedent. The Washington State DOT is currently involved in a roadside inventory effort which is collecting data on over 35 objects including guardrail, mailboxes, trees, utility poles, sign supports, crash cushions and rock outcroppings. Sideslopes are being estimated by the data collectors. The data are being captured in a spatial database that will allow linkage to the roadway centerline and calculation of the distance-from-edgeline for each object. Currently, their district-based teams have completed collection of data for approximately 2,200 miles of roads, collecting information on over 300,000 objects. (See http://www.wsdot.wa.gov/mapsdata/tdo/rfip/RFIP_Resources.htm.)

Signs

This database would include an inventory of all signs on the roadway. Descriptors would include at least sign type (MUTCD designation) and a location address (using a convention that allows linkage to the other MIRE elements), and could include other descriptors such as support type (shoulder single-post, overhead bridge), distance of sign support from edge of travel lane (if not captured in a roadside inventory), condition, retroreflectivity, and dimensions. Note that this information might exist in an agency’s asset management system.

Speed Data

MIRE Version 1.0 includes segment elements concerning both mean and 85th percentile speed on the segment. Both are important predictors of safety. However, collection of these elements

for each roadway segment is impossible with current procedures and the up-stream and down-stream extrapolation of speed data collected at one point would appear to be much more difficult than the extrapolation of traffic counts, since segment characteristics that affect speed change quite often. Speed data should be entered into these elements when collected through a special study on a specific segment. A supplemental file is needed that captures all of the speed data collected by any method with the same linkage elements as in MIRE for the other inventory databases. Speed data are collected in speed zoning studies and by some automated data collection systems used for other purposes (e.g., vehicle classification systems, freeway surveillance systems, weigh-in-motion systems). Consolidation of these data into a single database, which could be linked to the basic inventory files, would greatly increase the number of data points available.

Specific topics related to the future of speed data collection were identified at the Speed Monitoring Data Collection Summit held in 2009, sponsored by FHWA Office of Policy and Management, including the need for additional speed data collection sites within each State. There is an interest in standardizing speed data collection procedures and developing a national speed database. Once this database is in place, it will be relatively easy to link these data with the MIRE elements.

Automated Enforcement Devices

MIRE Version 1.0 has concentrated on the geometric, traffic, and traffic control characteristics of the roadway system. However, automated enforcement devices (i.e., red-light-running camera systems and automated speed enforcement systems) have been shown to be effective treatments and are usually somewhat permanently related to specific locations on the roadway system (as opposed to normal enforcement efforts which either move or are stationary for only short time periods). Knowledge of the presence of these devices is also needed by the 2010 version of IHSDM and 2010 HSM. This supplemental file would include at least the location (linkable to other parts of MIRE), type, and dates that the system is operational for each such device.

Land Use Elements Related to Safety

While not included in MIRE Version 1.0 as individual elements, the 2010 version of IHSDM and the HSM require data on the number of transit stops, schools and alcohol-distribution establishments within 1,000 feet of each intersection. Such data would be difficult to collect in a manual fashion, but locations of such items are found in many spatial data systems. If the basic inventory system is also spatial, the development of variables such as these is not complicated. Other land use characteristics that might be related to safety such as generator of pedestrian exposure (e.g., parks, elderly care facilities) could also be added to the database.

Bridge and Railroad Grade-Crossing Descriptors

Bridge and railroad grade-crossing data are already collected on a regular basis by State DOTs. The bridge data are submitted to FHWA for the National Bridge Inventory (NBI) (8) and the railroad grade crossing data to the Federal Railroad Administration (FRA) (9). There are numerous safety-related elements in each file.

Just as for other supplemental files, critical to use of these elements in safety decisions is linkage to the primary roadway inventory file (i.e., MIRE), crash file and other safety databases. Unfortunately, such linkage is not always present. The linkage can be accomplished in two basic ways. First, the “address” of the bridge or grade crossing (e.g., route/milepost, spatial coordinates) could be entered on the State’s bridge and grade crossing files using the same address system as in the basic inventory files. Second, linkage elements on these two files (e.g., bridge number, railroad grade crossing number) could be entered in the agency’s primary inventory database or in a supplemental file used only for linkage purposes. Indeed, the MIRE junction file includes the grade crossing number as a key attribute (see Element 128). Linkage of the NBI data to the MIRE segment file could be accomplished with a supplemental file which includes the current address for each bridge number. (It is noted that if a route/milepost address system is used, the bridge address would need to be verified each year, since some modifications to a route such as curve flattening can “shift” downstream milepoints so that the address of the same point differs from year to year.)

Safety Improvements Information

Supplemental data are also needed on an agency’s safety projects (i.e. a safety project history file). This file would document for each safety project conducted what was done (i.e., the details of the safety improvement), where it was done (i.e., the linear referencing system (LRS) or spatial data beginning and ending milepoints/coordinates), and the date it was completed. These data would be used in evaluations of project effectiveness, as a history file of what has been tried in the past for a certain location, and as documentation of the agency’s overall safety program (e.g., the number of a certain treatment type implemented by road class). Somewhat surprisingly, although state DOTs have been implementing safety improvements for decades, very few have developed such a file. If retained, historic safety project data are often found only in paper files retained by agency division offices and not in computerized files at headquarters.

Summary

As described above, safety inventory information is critical to sound safety decisions. MIRE Version 1.0 is designed to enumerate, prioritize and provide proposed attributes of the large number of inventory elements either currently used by State and local DOTs in their safety analyses or needed in new safety-analysis tools now available or being developed. This report provides this listing of elements in the following sections. The goal of this report is to establish MIRE Version 1.0 and to begin its voluntary adoption by State and local DOTs. It is expected that this will be modified through use and that subsequent versions will follow. As noted in the initial MIRE report (5), the adoption of MIRE by a State or local agency will not be easy – it will require commitment, adequate resources, and a staging plan. However, the results of this effort will be the foundation for one of the most important tasks conducted by any transportation agency – the development and use of a safety management system that reduces the crashes, deaths and injuries involving the agency’s primary customer, the road user.

MIRE Elements

This section presents a listing of the MIRE elements. The elements are broken down into three main sections: I. Roadway Segment Descriptors, II. Roadway Alignment Descriptors and III. Roadway Junction Descriptors. At the beginning of each section is a listing of the elements in that section, followed by detailed information for each element. Appendix A shows an alphabetical listing of the 202 MIRE elements and their corresponding page number.

I. Roadway Segment Descriptors

I.a. Segment Location/Linkage Elements

1. County Name
2. County Code
3. Highway District
4. Type of Governmental Ownership
5. Specific Governmental Ownership
6. City/Local Jurisdiction Name
7. City/Local Jurisdiction Urban Code
8. Route Number
9. Route/Street Name
10. Begin Point Segment Descriptor
11. End point Segment Descriptor
12. Segment Identifier
13. Segment Length
14. Route Signing
15. Route Signing Qualifier
16. Coinciding Route Indicator
17. Coinciding Route – Minor Route Information
18. Direction of Inventory

I.b. Segment Classification

19. Functional Class
20. Rural/Urban Designation
21. Federal Aid/Route Type
22. Access Control

I.c. Segment Cross Section

23. Surface Type
24. Total Paved Surface Width
25. Surface Friction
26. Surface Friction Date
27. Pavement Roughness/Condition
28. Pavement Roughness Date
29. Pavement Condition (Present Serviceability Rating)
30. Pavement Condition (PSR) Date
31. Number of Through Lanes
32. Outside Through Lane Width
33. Inside Through Lane Width
34. Cross Slope
35. Auxiliary Lane Presence/Type
36. Auxiliary Lane Length
37. HOV Lane Presence/Type
38. HOV Lanes
39. Reversible Lanes
40. Presence/Type of Bicycle Facility
41. Width of Bicycle Facility
42. Number of Peak Period Through Lanes
43. Right Shoulder Type
44. Right Shoulder Total Width
45. Right Paved Shoulder Width
46. Right Shoulder Rumble Strip Presence/Type
47. Left Shoulder Type
48. Left Shoulder Total Width
49. Left Paved Shoulder Width
50. Left Shoulder Rumble Strip Presence/Type
51. Sidewalk Presence
52. Curb Presence
53. Curb Type

- 54. Median Type
- 55. Median Width
- 56. Median Barrier Presence/Type
- 57. Median (Inner) Paved Shoulder Width
- 58. Median Shoulder Rumble Strip Presence/Type
- 59. Median Sideslope
- 60. Median Sideslope Width
- 61. Median Crossover/Left Turn Lane Type

I.d. Segment Roadside Descriptors

- 62. Roadside Clearzone Width
- 63. Right Sideslope
- 64. Right Sideslope Width
- 65. Left Sideslope
- 66. Left Sideslope Width
- 67. Roadside Rating
- 68. Major Commercial Driveway Count
- 69. Minor Commercial Driveway Count
- 70. Major Residential Driveway Count
- 71. Minor Residential Driveway Count
- 72. Major Industrial/Institutional Driveway Count
- 73. Minor Industrial/Institutional Driveway Count
- 74. Other Driveway Count

I.e. Other Segment Descriptors

- 75. Terrain Type
- 76. Number of Signalized Intersections in Segment
- 77. Number of Stop-Controlled Intersections in Segment
- 78. Number of Uncontrolled/Other Intersections in Segment

I.f. Segment Traffic Flow Data

- 79. Annual Average Daily Traffic (AADT)
- 80. AADT Year
- 81. AADT Annual Escalation Percentage

- 82. Percent Single Unit Trucks or Single Truck AADT
- 83. Percent Combination Trucks or Combination Truck AADT
- 84. Percentage Trucks or Truck AADT
- 85. Total Daily Two-Way Pedestrian Count/Exposure
- 86. Bicycle Count/Exposure
- 87. Motorcycle Count or Percentage
- 88. Hourly Traffic Volumes (or Peak and Offpeak AADT)
- 89. K-Factor
- 90. Directional Factor

I.g. Segment Traffic Operations/Control Data

- 91. One/Two-Way Operations
- 92. Speed Limit
- 93. Truck Speed Limit
- 94. Nighttime Speed Limit
- 95. 85th Percentile Speed
- 96. Mean Speed
- 97. School Zone Indicator
- 98. On-Street Parking Presence
- 99. On-Street Parking Type
- 100. Roadway Lighting
- 101. Toll Facility
- 102. Edgeline Presence/Width
- 103. Centerline Presence/Width
- 104. Centerline Rumble Strip Presence/Type
- 105. Passing Zone Percentage

I.h. Other Supplemental Segment Descriptors

- 106. Bridge Numbers for Bridges in Segment

I. Roadway Segment Descriptors

I.a. Segment Location/Linkage Elements

1. County Name

Definition: The name of the county or equivalent entity where the segment is located.

Attributes:

County name or equivalent entity name.

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent), HSM/IHSDM (Required), SafetyAnalyst (Required Conditionally)

2. County Code

Definition: Census defined County Federal Information Processing Standard (FIPS) code or equivalent entity where the segment is located.

Attributes:

The Census defined County FIPS code or equivalent entity where the roadway segment is located. If state-assigned codes are used, they should be convertible to the General Service Administration (GSA)/FIPS format.

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent)

3. Highway District

Definition: The highway district where the segment is located.

Attributes:

- Numeric district number (as defined by the state).

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Optional)

4. Type of Governmental Ownership

Definition: Type of governmental ownership.

Attributes:

- State Highway Agency
- County Highway Agency
- Town or Township Highway Agency
- City or Municipal Highway Agency
- State Park, Forest, or Reservation Agency
- Local Park, Forest, or Reservation Agency
- Other State Agency
- Other Local Agency
- Private (other than Railroad)
- Railroad
- State Toll Authority
- Local Toll Authority
- Other Public Instrumentality (e.g. Airport, School, University)
- Indian Tribe Nation
- Other Federal Agency
- Bureau of Indian Affairs
- Bureau of Fish and Wildlife
- U.S. Forest Service
- National Park Service
- Tennessee Valley Authority
- Bureau of Land Management
- Bureau of Reclamation
- Corps of Engineers
- Air Force
- Navy/Marines
- Army
- Other

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent)

5. Specific Governmental Ownership

Definition: The specific governmental owner of the segment.

Attributes:

- City name or equivalent entity (e.g., tribal jurisdiction) name.

Note: If codes are used instead of name, use the GSA Geographic Locator Codes (GLC) that can be found on the Internet at: <http://www.gsa.gov/portal/content/104507>. If state-assigned codes are used, they should be convertible to the GSA/FIPS format.

Priority: Critical

HPMS/Tool Requirements: None

6. City/Local Jurisdiction Name

Definition: The name of the city or local jurisdiction/agency where the segment is located if applicable.

Attributes:

- The city name or equivalent entity (e.g., tribal jurisdiction).

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Optional)

7. City/Local Jurisdiction Urban Code

Definition: The applicable Census urban area code of the city or local jurisdiction/agency where the segment is located.

Attributes:

- The Census urban code.

Note: See Census Website: http://www.census.gov/geo/www/ua/ua_2k.html.

Priority: Critical

HPMS/Tool Requirements: None

8. *Route Number*

Definition: The signed route number.

Attributes:

- Signed numeric value for the roadway segment.

Note: Descriptive route name information should be included in the Element 9. *Route/Street Name*.

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent), HSM/IHSDM (Required), SafetyAnalyst (Required)

9. *Route/Street Name*

Definition: The route or street name, where different from route number (Element 8).

Attributes:

- The alphanumeric route or street name.

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent), SafetyAnalyst (Required Conditionally)

10. *Begin Point Segment Descriptor*

Definition: Location information defining the location of the beginning of the the segment.

Attributes:

- Begin point will be defined by the user agency (e.g., based on homogeneity of chosen attributes throughout the segment). Begin point segment descriptors can be either related to a Linear Reference System (e.g., Route-beginning milepoint, Route-ending milepoint) or to a spatial data system (i.e., longitude/latitude for begin and end points). Street address could also possibly be used for urban areas. The descriptor types used must be common across all MIRE files and compatible with crash data location coding.

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent), HSM/IHSDM (Required), SafetyAnalyst (Required)

11. End Point Segment Descriptor

Definition: Location information defining the location of the end of the the segment.

Attributes:

- End point will be defined by the user agency (e.g., based on homogeneity of chosen attributes throughout the segment). End point segment descriptors can be either related to a Linear Reference System (e.g., Route-beginning milepoint, Route-ending milepoint) or to a spatial data system (i.e., longitude/latitude for begin and end points). Street address could also possibly be used for urban areas. The descriptor types used must be common across all MIRE files and compatible with crash data location coding.

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent), HSM/IHSDM (Required), SafetyAnalyst (Required)

12. Segment Identifier

Definition: Unique segment identifier

Attributes:

- Derived from other elements (e.g., combination of route number, county location and beginning and ending milepoints).

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent), HSM/IHSDM (Required), SafetyAnalyst (Required)

13. Segment Length

Definition: The length of the segment.

Attributes:

- Miles

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent), HSM/IHSDM (Required), SafetyAnalyst (Required)

14. Route Signing

Definition: The type of route signing on the segment.

Attributes:

- Not signed
- Interstate
- U.S.
- State
- Off-interstate business marker
- County
- Township
- Municipal
- Parkway marker or forest route marker
- None of the above

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent), SafetyAnalyst (Required)

15. Route Signing Qualifier

Definition: The descriptive qualifier for the route sign.

Attributes:

- No qualifier or not signed
- Alternate
- Business route
- Bypass
- Spur
- Loop
- Proposed
- Temporary
- Truck route
- None of the above

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent)

16. Coinciding Route Indicator

Definition: Indication of whether the route segment is a "primary" coinciding route (i.e., the route to which crashes are referenced and which carries the attribute data) or a "minor" coinciding route which is not linked to crashes and does not include attribute data. (Note that minor-route segments might not appear in the inventory since the primary route inventory information is the same for both routes.)

Attributes:

- Segment does not contain coinciding routes.
- Coinciding route – Primary (i.e., crashes linked to this route and attributes included for segment).
- Coinciding route – Minor (i.e., crashes not linked to this route).

Priority: Critical

HPMS/Tool Requirements: None

17. Coinciding Route – Minor Route Information

Definition: If this segment is a primary coinciding route segment, enter the route number for the minor route.

Note: Additional elements may be needed to handle instances of more than one coinciding minor route.

Attributes:

- Signed coinciding minor route number.

Priority: Value Added

HPMS/Tool Requirements: SafetyAnalyst (Required)

18. Direction of Inventory

Definition: Direction of inventory if divided roads are inventoried in each direction.

Attributes:

- Reference compass direction if divided roads are inventoried in each direction usually due to different characteristics on each roadway.
- Both if inventoried in only one direction.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Required Conditionally)

I.b. Segment Classification

19. Functional Class

Definition: The functional class of the segment.

Attributes:

- Interstate
- Principal arterial other freeways and expressways
- Principal arterial other
- Minor arterial
- Major collector
- Minor collector
- Local

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent and Ramps), HSM/IHSDM (Required), SafetyAnalyst (Required)

20. Rural/Urban Designation

Definition: The rural or urban designation based on Census urban boundary and population.

Attributes:

- Rural
- Urban (population \geq 5,000)

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent and Ramps), HSM/IHSDM (Required), SafetyAnalyst (Required)

21. Federal Aid/Route Type

Definition: Federal-aid/National Highway System (NHS) route type.

Attributes:

- Route is non Federal-aid
- Route is Federal-aid, but not on NHS (i.e., all non-NHS routes functionally classified as Interstate, Other Freeways & Expressways, Other Principal Arterials, Minor Arterials, Major Collectors, and Urban Minor Collectors)
- Route is on NHS
- NHS connector to Major Airport
- NHS connector to Major Port Facility
- NHS connector to Major Amtrak Station
- NHS connector to Major Rail/Truck Terminal
- NHS connector to Major Inter City Bus Terminal
- NHS connector to Major Public Transportation or Multi-Modal Passenger Terminal
- NHS connector to Major Pipeline Terminal
- NHS connector to Major Ferry Terminal

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent and Ramps)

22. Access Control

Definition: The degree of access control.

Attributes:

- 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).
- 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.
- No access control - No degree of access control exists (i.e., full access to the facility is permitted).

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent and Ramps*, Sample*), SafetyAnalyst (Required)

I.c. Segment Cross Section

I.c.1. Surface Descriptors

23. Surface Type

Definition: The surface type of the segment.

Attributes:

- Unpaved
- Bituminous
- JPCP – Jointed Plain Concrete Pavement
- JRCP – Jointed Reinforced Concrete Pavement
- CRCP – Continuously Reinforced Concrete Pavement
- Asphalt-Concrete (AC) Overlay over Existing AC Pavement
- AC Overlay over Existing Jointed Concrete Pavement
- AC (Bi Overlay over Existing CRCP)
- Unbonded Jointed Concrete Overlay on Portland Cement Concrete (PCC) Pavements
- Unbonded CRCP Overlay on PCC Pavements
- Bonded PCC Overlays on PCC Pavements
- Other

Priority: Critical

HPMS/Tool Requirements: HPMS (Sample), HSM/IHSDM (Required)

24. Total Paved Surface Width

Definition: The total paved surface width.

Note: This element could be derived if all paved lane and paved shoulder widths are captured.

Attributes:

- Feet

Priority: Critical

HPMS/Tool Requirements: None

25. Surface Friction

Definition: The surface friction indicator for the segment.

Attributes:

- Measured skid number on the segment or general indication of wet-surface friction (e.g., high, medium, low).

Note: Agencies will decide how to code segments with no measured number or multiple skid numbers and whether one number is indicative of friction on entire segment.

Priority: Critical

HPMS/Tool Requirements: None

26. Surface Friction Date

Definition: Date surface friction was last measured or assigned.

Attributes:

- mm/dd/yyyy

Priority: Critical

HPMS/Tool Requirements: None

27. Pavement Roughness/Condition

Definition: The numeric value used to indicate pavement roughness.

Attributes:

- International Roughness Index (IRI), reported as an integer to the nearest inch per mile.

Priority: Value Added Preferred

HPMS/Tool Requirements: HPMS (Full Extent and Ramps*, Sample*)

28. Pavement Roughness Date

Definition: Date pavement roughness (IRI) was collected.

Attributes:

- mm/dd/yyyy

Priority: Value Added Preferred

HPMS/Tool Requirements: HPMS (Full Extent and Ramps*, Sample*)

29. Pavement Condition (Present Serviceability Rating)

Definition: Present Serviceability Rating (PSR) (descriptive scale).

Attributes:

- Code a PSR or equivalent value, to the nearest tenth (x.x), for all paved segments where IRI is not reported. Code "0.0" for unpaved facilities. User full range of values.
 - 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.

Priority: Value Added Alternative

HPMS/Tool Requirements: HPMS (Sample)

30. Pavement Condition (PSR) Date

Definition: Date PSR was last assigned.

Attributes:

- mm/dd/yyyy

Priority: Value Added Alternative

HPMS/Tool Requirements: HPMS (Sample)

I.c.2. Lane Descriptors

31. Number of Through Lanes

Definition: The total number of through lanes on the segment. This excludes auxiliary lanes, such as collector-distributor lanes, weaving lanes, frontage road lanes, parking and turning lanes, acceleration/deceleration lanes, toll collection lanes, shoulders, and truck climbing lanes.

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent and Ramps), HSM/IHSDM (Required), SafetyAnalyst (Required)

32. Outside Through Lane Width

Definition: Width of the outside (curb) through lane (not including parking area, bicycle lanes, gutter pan, etc.). Lane width is measured from center of edgeline to center of centerline or to the center of the lane line (if multilane). If edgeline 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 (or double) centerline stripe or to the center of the lane line (if multilane) If there is no edgeline or centerline, estimate a reasonable split between the actual width used by traffic and the shoulder or parking lane based on State/local design guides.

Attributes:

- Feet

See Figures 1a-1c depending on number of lanes and direction of inventory.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Optional)

33. Inside Through Lane Width

Definition: Predominant lane width of all inside through lanes, not including outside through lane (see Element 32. *Outside Through Lane Width*). For a two-lane road, leave this element blank.

Attributes:

- Feet

See Figures 1b-1c depending on number of lanes and direction of inventory.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Optional)

- | | |
|-------------------------------|------------------------------|
| ③② Outside Through Lane Width | ④⑨ Left Paved Shoulder Width |
| ④④ Right Shoulder Total Width | ⑥④ Right Sideslope Width |
| ④⑤ Right Paved Shoulder Width | ⑥⑥ Left Sideslope Width |
| ④⑧ Left Shoulder Total Width | |

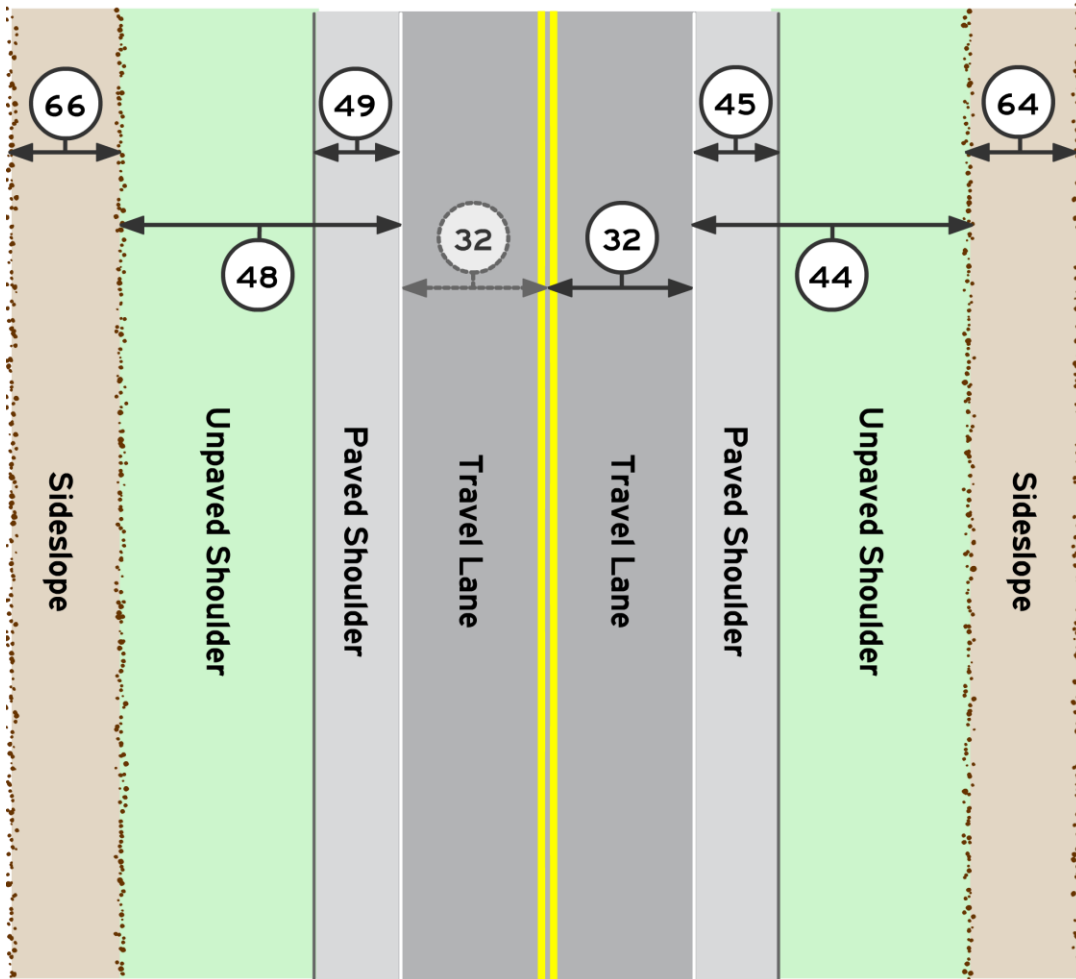


Figure 1a. Illustration of Cross Section, Two-Lane Roadway.

- | | | |
|-------------------------------|-------------------------------|--------------------------|
| 32 Outside Through Lane Width | 45 Right Paved Shoulder Width | 55 Median Width |
| 33 Inside Through Lane Width | 48 Left Shoulder Total Width | 64 Right Sideslope Width |
| 44 Right Shoulder Total Width | 49 Left Paved Shoulder Width | 66 Left Sideslope Width |

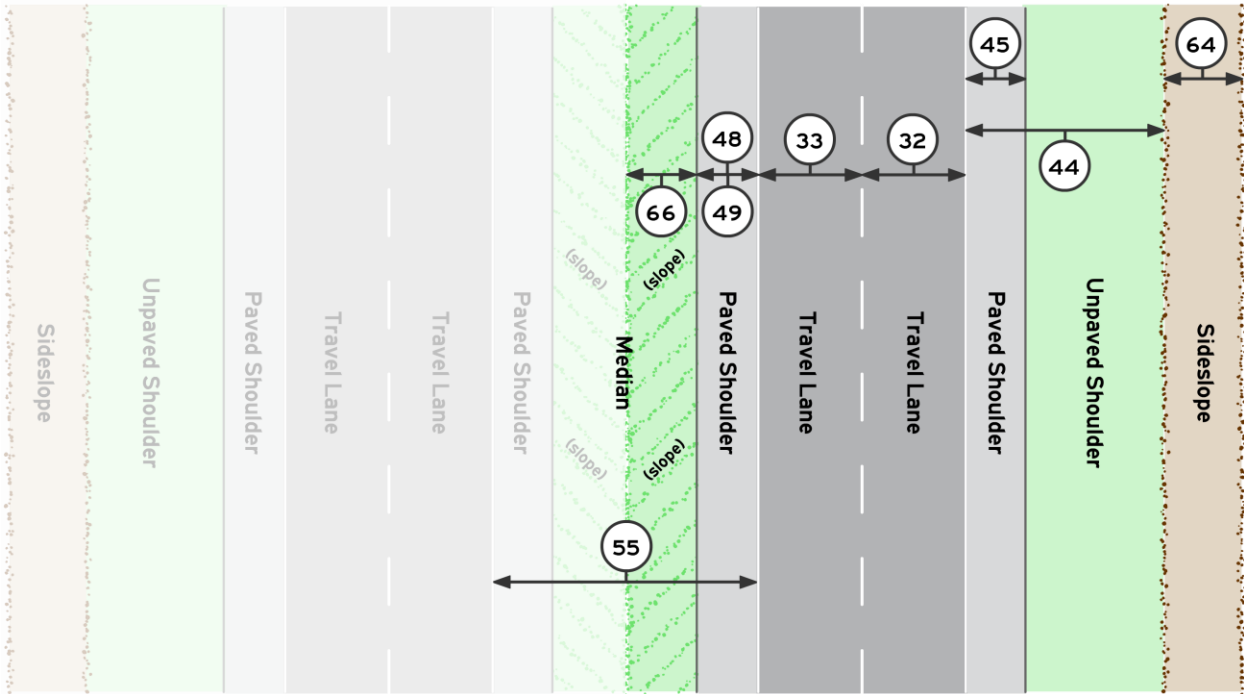


Figure 1b. Illustration of Cross Section, Multilane Divided Roadway Inventoried in Two Directions (each direction inventoried separately).

- | | | |
|-------------------------------|--------------------------------|---------------------------|
| 32 Outside Through Lane Width | 48 Left Shoulder Total Width | 60 Median Sideslope Width |
| 33 Inside Through Lane Width | 49 Left Paved Shoulder Width | 64 Right Sideslope Width |
| 44 Right Shoulder Total Width | 55 Median Width | 66 Left Sideslope Width |
| 45 Right Paved Shoulder Width | 57 Median Paved Shoulder Width | |

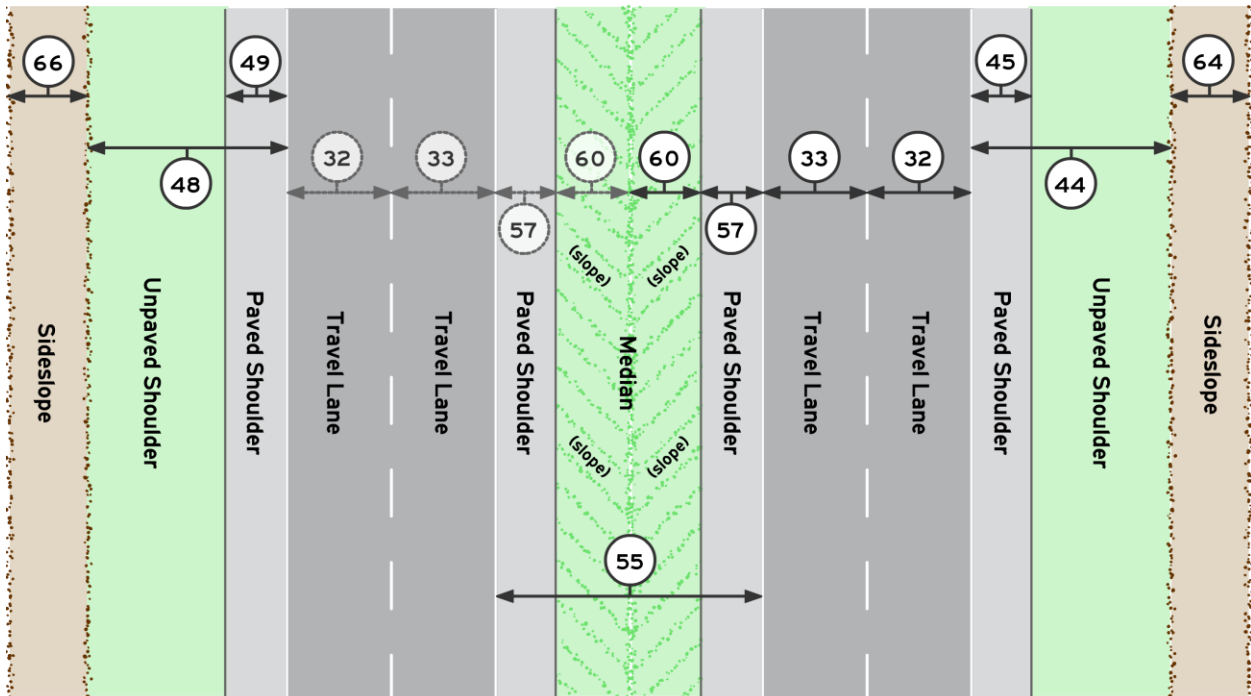


Figure 1.c. Illustration of Cross Section, Multilane Divided Roadway Inventoried in One Direction (both directions inventoried together).

34. Cross Slope

Definition: The cross slope for each lane starting with the leftmost lane according to direction of inventory.

Note: Cross slope needs to be captured for each lane individually, thus multiple elements will be needed.

Attributes:

- Sign (+ or -) and percent

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

35. Auxiliary Lane Presence/Type

Definition: The presence and type of auxiliary lane present on the segment. Center two-way left turn lanes and HOV lanes are not included here. They are included under Element 54. *Median Type* and Elements 37. *HOV Lane Types* and 38. *HOV Lanes* respectively.

Attributes:

- Climbing lane
- Passing lane
- Exclusive continuous right turn lane
- Other

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Required)

36. Auxiliary Lane Length

Definition: Length of auxiliary lane (noted in Element 35. *Auxiliary Lane Presence/Type*) if not full segment length. Length does not include taper.

Attributes:

- Feet

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

37. HOV Lane Presence/Type

Definition: Presence and type of high-occupancy vehicle (HOV) lane(s) on the segment.

Attributes:

- No HOV lanes
- Has exclusive HOV lanes
- Normal through lanes used as HOV at specified times
- Shoulder/parking lanes used as HOV at specified times

Priority: Value Added

HPMS/Tool Requirements: HPMS (Full Extent)

38. HOV Lanes

Definition: The maximum number of HOV lanes in both directions on the segment.

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent)

39. Reversible Lanes

Definition: Number of reversible lanes on the segment.

Attributes:

- No reversible lanes
- One reversible lane
- Two reversible lanes
- More than two reversible lanes

Priority: Value Added

HPMS/Tool Requirements: None

40. Presence/Type of Bicycle Facility

Definition: The presence and type of bicycle facility on the segment.

Attributes:

- None
- Wide curb lane with no bicycle markings
- Wide curb lane with bicycle markings (e.g., sharrows)
- Marked bicycle lane
- Separate parallel bicycle path
- Signed bicycle route only (no designated bicycle facility)
- Other

See Figure 2 for additional detail.

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Optional)

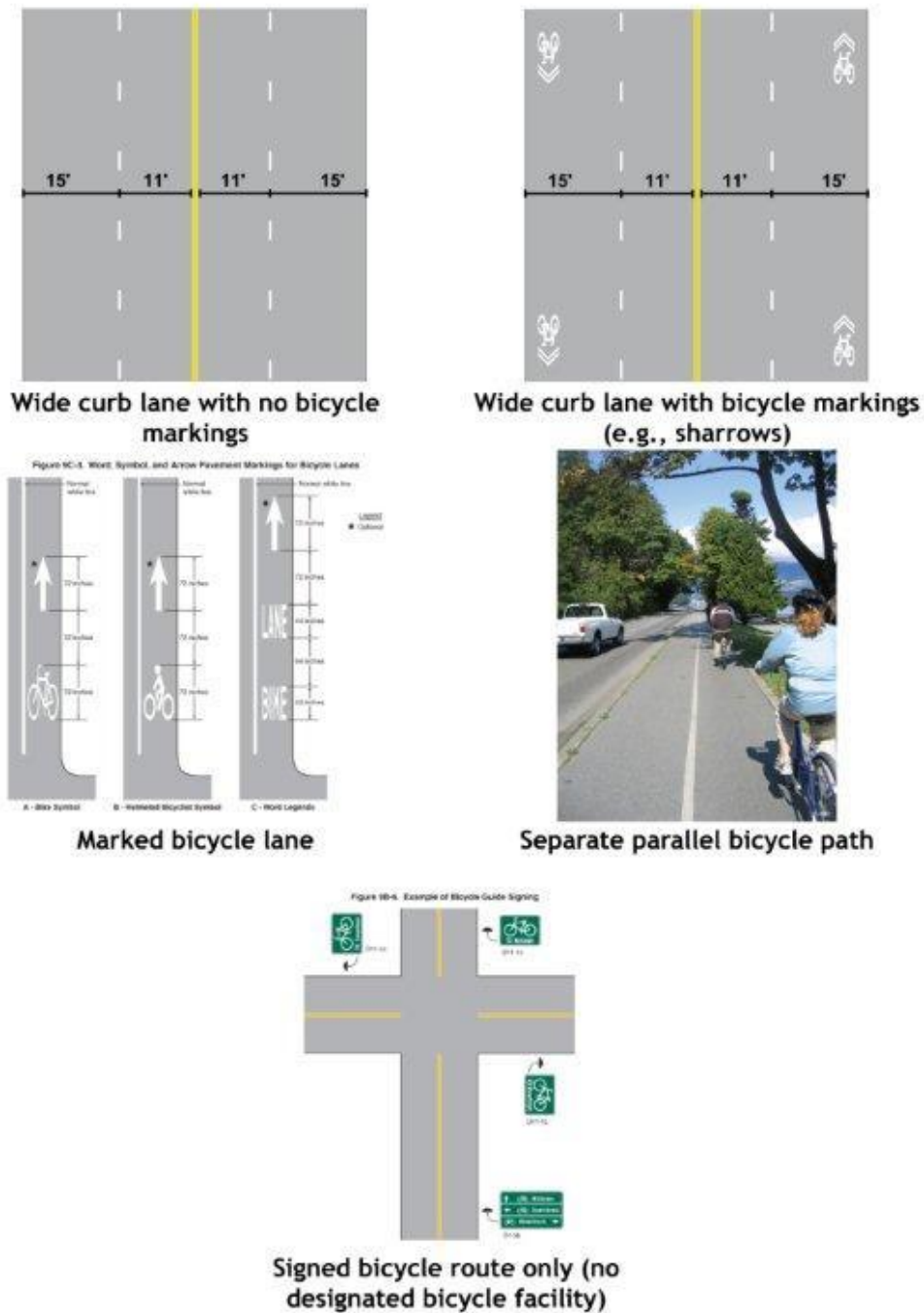


Figure 2. Illustration of Presence/Types of Bicycle Facilities.

Source (Marked bicycle lane and Signed bicycle route only): *Manual Uniform Traffic Control Devices for Streets and Highways, 2009 edition*. Federal Highway Administration, Washington DC, 2009.

41. Width of Bicycle Facility

Definition: The width of the bicycle facility; either the width of the marked bicycle lane or bicycle path.

Attributes:

- Feet

Priority: Critical

HPMS/Tool Requirements: None

42. Number of Peak Period Through Lanes

Definition: The number of through lanes used in peak period in the peak direction. This includes reversible lanes, parking lanes, or shoulders that legally are used for through traffic whether for single-occupancy vehicle (SOV) or HOV operation.

Attributes:

- Numeric

Note: For inventory covering both directions, code total number of through lanes. For directional inventory, code total number of lanes for this inventory direction.

Priority: Value Added

HPMS/Tool Requirements: HPMS (Sample)

I.c.3. Shoulder Descriptors

43. Right Shoulder Type

Definition: The predominant shoulder type on the right side of road in the direction of inventory.

Attributes:

- None
- Surfaced shoulder exists - bituminous concrete (AC)
- Surfaced shoulder exists - Portland Cement Concrete surface (PCC)
- Stabilized shoulder exists (stabilized gravel or other granular material with or without admixture)
- Combination shoulder exists (shoulder width has two or more surface types; e.g., part of the shoulder width is surfaced and part of the width is earth)
- Earth shoulder exists

Priority: Critical

HPMS/Tool Requirements: HPMS (Sample), HSM/IHSDM (Required), SafetyAnalyst (Optional)

44. Right Shoulder Total Width

Definition: The total width of the right shoulder including both paved and unpaved parts measured from the center of the edgeline outward. Do not include parking or bicycle lanes in the shoulder width measurement; code the predominant width where it changes back and forth along the roadway section; ensure that the total width of combination shoulders is reported. Include gutter pans on outside of shoulder in shoulder width.

Attributes:

- Feet

See Figures 1a-1c on pages 33-35 depending on number of lanes and direction of inventory.

Priority: Critical

HPMS/Tool Requirements: HPMS (Sample), HSM/IHSDM (Required), SafetyAnalyst (Optional)

45. Right Paved Shoulder Width

Definition: The width of paved portion of right shoulder measured from the center of the edgeline outward. Do not include parking or bicycle lanes in the paved shoulder width measurement; code the predominant width if it changes back and forth along the roadway section. Include gutter pans on outside of shoulder in paved shoulder width.

Attributes:

- Feet

See Figures 1a-1c on pages 33-35 depending on number of lanes and direction of inventory.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

46. Right Shoulder Rumble Strip Presence/Type

Definition: Presence and type of rumble strips on the right shoulder.

Attributes:

- None
- Milled beyond edgeline
- Rolled beyond edgeline
- Milled or rolled on/under edgeline (e.g., rumble stripes)
- Edgeline-rumble strip combination (e.g., raised/inverted thermoplastic profile marker)

Priority: Critical

HPMS/Tool Requirements: None

47. Left Shoulder Type

Definition: Shoulder type on left side of roadway in direction of inventory. For undivided roads and divided roads with one direction of inventory, this will be the outside shoulder on the opposing side. Note that information on paved width of the inner (left) shoulder is included under median descriptors (see Element 49. *Left Paved Shoulder Width*).

Attributes:

- None
- Surfaced shoulder exists - bituminous concrete (AC)
- Surfaced shoulder exists - Portland Cement Concrete surface (PCC)
- Stabilized shoulder exists (stabilized gravel or other granular material with or without admixture)
- Combination shoulder exists (shoulder width has two or more surface types; e.g., part of the shoulder width is surfaced and part of the width is earth)
- Earth shoulder exists

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Optional)

48. Left Shoulder Total Width

Definition: Width of left (outside) shoulder, including both paved and unpaved parts measured from the center of the edgeline outward. See definition of Element 47. *Left Shoulder Type* above. Do not include parking or bicycle lanes in the shoulder width measurement; code the predominant width where it changes back and forth along the roadway section; ensure that the total width of combination shoulders is reported. Include gutter pans on outside of shoulder in shoulder width.

Attributes:

- Feet

See Figures 1a-1c on pages 33-35 depending on number of lanes and direction of inventory.

Priority: Critical

HPMS/Tool Requirements: HPMS (Sample), HSM/IHSDM (Required), SafetyAnalyst (Optional)

49. Left Paved Shoulder Width

Definition: The width of the paved portion of left (outside) shoulder measured from the center of the edgeline outward. Do not include parking or bicycle lanes in the paved shoulder width measurement; code the predominant width where it changes back and forth along the roadway section. Include gutter pans on outside of shoulder in paved shoulder width.

Attributes:

- Feet

See Figures 1a-1c on pages 33-35 depending on number of lanes and direction of inventory.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

50. Left Shoulder Rumble Strip Presence And Type

Definition: Presence and type of rumble strips on the left shoulder.

Attributes:

- None
- Milled beyond edgeline
- Rolled beyond edgeline
- Milled or rolled on/under edgeline (e.g., rumble stripes)
- Edgeline-rumble strip combination (e.g., raised/inverted thermoplastic profile marker)

Priority: Critical

HPMS/Tool Requirements: None

51. Sidewalk Presence

Definition: The presence of a paved sidewalk along the segment.

Attributes:

- None
- Continuous left-side
- Discontinuous left-side
- Continuous right-side
- Discontinuous right-side
- Continuous both sides
- Discontinuous both sides

Priority: Critical

HPMS/Tool Requirements: None

52. Curb Presence

Definition: The presence of curb along the segment.

Attributes:

- No curb
- Curb on left
- Curb on right
- Curb on both sides

Priority: Critical

HPMS/Tool Requirements: None

53. Curb Type

Definition: The type of curb present on the segment.

Attributes:

- No curb
- Sloping curb - A curb that does not exceed a 4-inch height (for a slope steeper than 1V:1H) or a 6-inch height (for a slope equal to or flatter than 1V:1H).
- Vertical (barrier) curb - A curb that is steeper or taller than the ranges given for a sloping curb.

Priority: Value Added

HPMS/Tool Requirements: None

I.c.4. Median Descriptors

54. Median Type

Definition: The type of median present on the segment.

Attributes:

- Undivided
- Flush paved median (at least 4 ft in width)
- Raised median
- Depressed median
- Two-way left turn lane
- Railroad or rapid transit
- Divided, separate grades without retaining wall
- Divided, separate grades with retaining wall
- Other divided

Priority: Critical

HPMS/Tool Requirements: HPMS (Sample), HSM/IHSDM (Required), SafetyAnalyst (Required)

55. Median Width

Definition: The width of the median, including inside shoulders (i.e., measured from center of edgeline to center of edgeline on inside edges of opposing through lanes).

Attributes:

- Feet

See Figures 1b-1c on pages 34-35 depending on number of lanes and direction of inventory.

Priority: Critical

HPMS/Tool Requirements: HPMS (Sample), HSM/IHSDM (Required), SafetyAnalyst (Optional)

56. Median Barrier Presence/Type

Definition: The presence and type of median barrier on the segment.

Attributes:

- None
- Unprotected
- Curbed
- Rigid barrier system (i.e., concrete)
- Semi-rigid barrier system (i.e., box beam, W-beam strong post, etc.)
- Flexible barrier system (i.e., cable, W-beam weak post, etc.)
- Rigidity unspecified

Priority: Critical

HPMS/Tool Requirements: HPMS (Sample)

57. Median (Inner) Paved Shoulder Width

Definition: The width of the paved shoulder on the median (inner) side of the roadway on a divided roadway measured from the center of the edgeline outward. Note that information on type, width and paved width of non-median shoulders is included in section I.c.3. Shoulder Descriptors (See Element 47. *Left Shoulder Type*). If the roadway is divided AND inventoried in two directions, this is already captured under Element 49. *Left Shoulder Paved Width*.

Attributes:

- Feet

See Figure 1c on page 35 for additional detail.

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Optional)

58. Median Shoulder Rumble Strip Presence/Type

Definition: Presence and type of median shoulder rumble strip. If the roadway is divided AND inventoried in two directions, this is already captured under Element 50. *Left Shoulder Rumble Strip Presence/Type*.

Attributes:

- None
- Milled beyond edgeline
- Rolled beyond edgeline
- Milled or rolled on/under edgeline (e.g., rumble stripes)
- Edgeline-rumble strip combination (e.g., raised/inverted thermoplastic profile marker)

Priority: Critical

HPMS/Tool Requirements: None

59. Median Sideslope

Definition: The sideslope in the median adjacent to the median shoulder or travel lane. If the sideslope varies along the segment, code the predominant sideslope. If the roadway is divided AND inventoried in two directions, this is already captured under Element 65. *Left Sideslope*.

Attributes:

- Numeric percent of the sideslope

Note: This can be positive (if backslope) or negative (if foreslope).

Priority: Critical Preferred

HPMS/Tool Requirements: None

60. Median Sideslope Width

Definition: The width of the median sideslope adjacent to the median shoulder or travel lane. If width varies along the segment, code the predominant width. If the roadway is divided AND inventoried in two directions, this is already captured under Element 66. *Left Sideslope Width*.

Attributes:

- Feet

See Figure 1c on page 35 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None

61. Median Crossover/Left Turn Lane Type

Definition: The presence and type of crossover/left turn bay in the median along the segment. Note: This element is intended to capture the typical median characteristic along the segment at non-intersection locations. Information on intersection-related turn lanes will be coded in the Junction File.

Attributes:

- None
- Median crossover, no left turn bay
- Median crossover, left turn bay
- Median crossover, directional left turn lane bays (to prevent crossing traffic from driveways)
- Two-way left turn lane

See Figure 3 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None

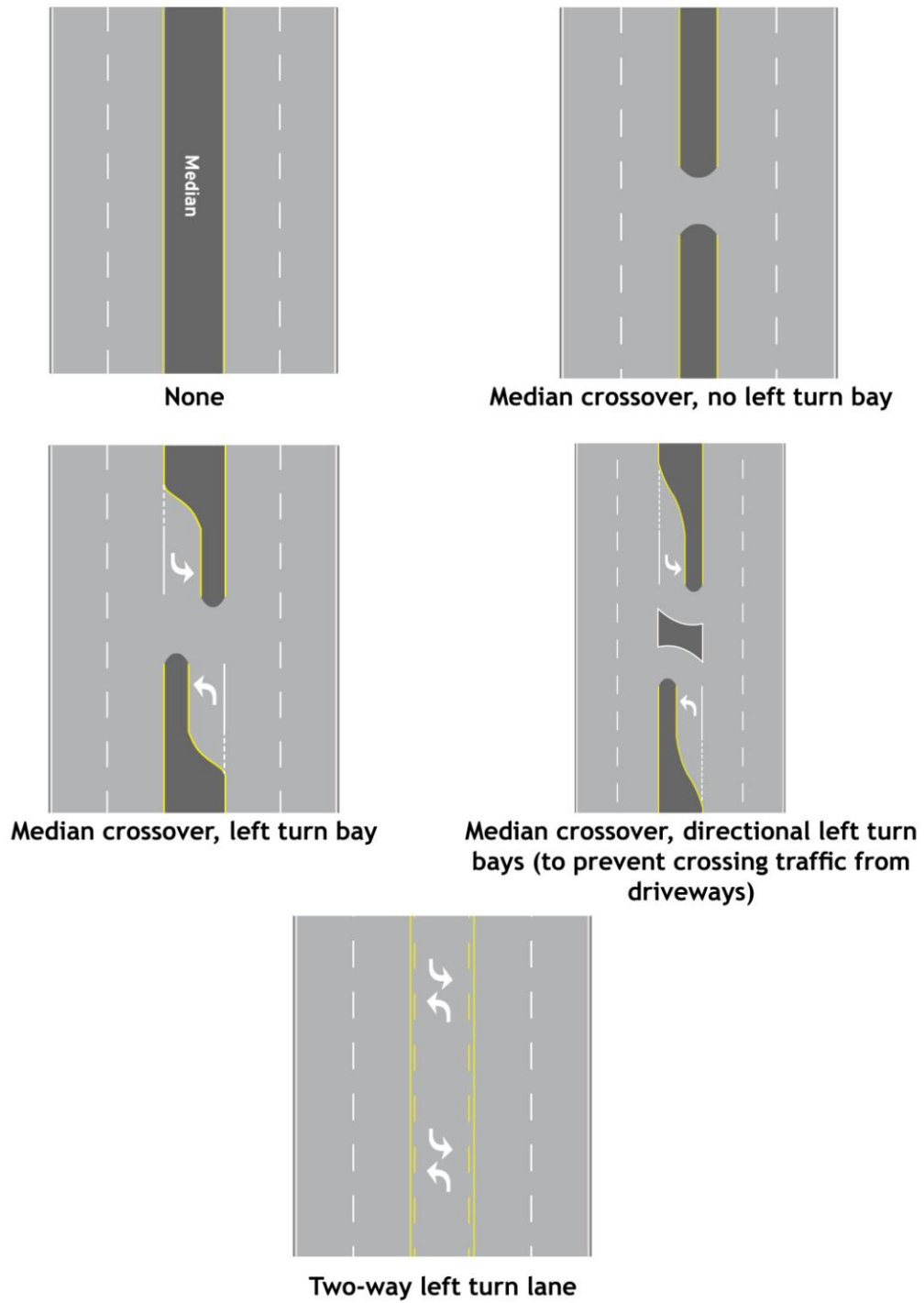


Figure 3. Illustration of Types of Median Crossover/Left Turn Lanes.

I.d. Segment Roadside Descriptors

62. Roadside Clearzone Width

Definition: Predominate or average roadside clearzone width. Clear zone is the total roadside border area, starting at the edge of the traveled way, available for safe use by errant vehicles. This area may consist of a shoulder, a recoverable slope, a non-recoverable slope, and/or a clear run-out area.

Attributes:

- Feet

Priority: Critical Preferred

HPMS/Tool Requirements: None

63. Right Sideslope

Definition: The sideslope (foreslope or backslope) on right side of roadway immediately adjacent to the travel lane, shoulder edge or drainage ditch in direction of inventory. If sideslope varies within the section, code predominant sideslope.

Attributes:

- Numeric percent (Note: This can be positive (if backslope) or negative (if foreslope))
- Not applicable – protected by roadside barrier
- Not applicable – other (e.g., city center street)

Priority: Critical Preferred

HPMS/Tool Requirements: HSM/IHSDM (Required)

64. Right Sideslope Width

Definition: The width of the sideslope on right side of roadway immediately adjacent to the travel lane, shoulder edge or drainage ditch in direction of inventory. If the width varies along the segment, code the predominant width.

Attributes:

- Feet

See Figures 1a-1c on pages 33-35 depending on number of lanes and direction of inventory.

Priority: Critical Preferred

HPMS/Tool Requirements: None

65. Left Sideslope

Definition: The sideslope (foreslope or backslope) on left side of roadway immediately adjacent to the travel lane, shoulder edge or drainage ditch in direction of inventory. If sideslope varies within the section, code the predominant sideslope. For undivided roads and divided roads with one direction of inventory, this will be the outside shoulder on the opposing side.

Attributes:

- Numeric percent of the sideslope. (Note: This can be positive (if backslope) or negative (if foreslope))
- Not applicable – protected by roadside barrier
- Not applicable – other (e.g., city center street)

Priority: Critical Preferred

HPMS/Tool Requirements: HSM/IHSDM (Required)

66. *Left Sideslope Width*

Definition: The width of the sideslope on left side of roadway immediately adjacent to the travel lane, shoulder edge or drainage ditch in direction of inventory. If the width varies along the segment, code the predominant width.

Attributes:

- Feet

See Figures 1a-1c on pages 33-35 depending on number of lanes and direction of inventory.

Priority: Critical Preferred

HPMS/Tool Requirements: None

67. Roadside Rating

Definition: A rating of the safety of the roadside, ranked on a seven-point categorical scale from 1 (best) to 7 (worst).

Attributes:

- **Rating = 1**
 - Wide clear zones greater than or equal to 30 ft from the pavement edgeline.
 - Sideslope flatter than 1:4.
 - Recoverable.

- **Rating = 2**
 - Clear zone between 20 and 25 ft from pavement edgeline.
 - Sideslope about 1:4.
 - Recoverable.

- **Rating = 3**
 - Clear zone about 10 ft from pavement edgeline.
 - Sideslope about 1:3 or 1:4.
 - Rough roadside surface.
 - Marginally recoverable.

- **Rating = 4**
 - Clear zone between 5 to 10 ft from pavement edgeline.
 - Sideslope about 1:3 or 1:4.
 - May have guardrail (5 to 6.5 ft from pavement edgeline).
 - May have exposed trees, poles, or other objects (about 10 ft from pavement edgeline).
 - Marginally forgiving, but increased chance of a reportable roadside collision.

- **Rating = 5**
 - Clear zone between 5 to 10 ft from pavement edgeline.
 - Sideslope about 1:3.
 - May have guardrail (0 to 5 ft from pavement edgeline).
 - May have rigid obstacles or embankment within 6.5 to 10 ft of pavement edgeline.
 - Virtually non-recoverable.

- **Rating = 6**
 - Clear zone less than or equal to 5 ft.
 - Sideslope about 1:2.
 - No guardrail.
 - Exposed rigid obstacles within 0 to 6.5 ft of the pavement edgeline.
 - Non-recoverable.

- **Rating = 7**
 - Clear zone less than or equal to 5 ft.
 - Sideslope 1:2 or steeper.
 - Cliff or vertical rock cut.
 - No guardrail.
 - Non-recoverable with high likelihood of severe injuries from roadside collision.

See Figure 4 for additional detail.

Priority: Critical Alternative

HPMS/Tool Requirements: HSM/IHSDM (Required)



Typical Roadway with Roadside Hazard Rating Equal to 1.



Typical Roadway with Roadside Hazard Rating Equal to 2.



Typical Roadway with Roadside Hazard Rating Equal to 3.



Typical Roadway with Roadside Hazard Rating Equal to 4.

Figure 4. Illustration of Roadside Ratings.



Typical Roadway with Roadside Hazard Rating Equal to 5.



Typical Roadway with Roadside Hazard Rating Equal to 6.



Typical Roadway with Roadside Hazard Rating Equal to 7.

Figure 4. Illustration of Roadside Ratings. (Continued).

Source: Zegeer, C.V., J. Hummer; D. Reinfurt; L. Herf; and W. Hunter (1986). Safety Effects of Cross-Section Design for Two-Lane Roads, FHWA-RD-87-008, Federal Highway Administration, Washington, DC.

68. Major Commercial Driveway Count

Definition: Count of commercial driveways in segment serving 50 or more parking spaces.

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Optional)

69. Minor Commercial Driveway Count

Definition: Count of commercial driveways in segment serving fewer than 50 parking spaces.

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Optional)

70. Major Residential Driveway Count

Definition: Count of residential driveways in segment serving 50 or more parking spaces.

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Optional)

71. Minor Residential Driveway Count

Definition: Count of residential driveways in segment serving fewer than 50 parking spaces.

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Optional)

72. Major Industrial/Institutional Driveway Count

Definition: Count of industrial/institutional driveways in segment serving 50 or more parking spaces.

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Optional)

73. Minor Industrial/Institutional Driveway Count

Definition: Count of industrial/institutional driveways in segment serving fewer than 50 parking spaces.

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Optional)

74. Other Driveway Count

Definition: Count of “other” driveways in segment.

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Optional)

I.e. Other Segment Descriptors

75. Terrain Type

Definition: The basic terrain type for the segment. This is a (less than desirable) surrogate for detailed data on curvature, grade and the nature of the roadside, and would be collected only in the absence of those elements. See roadside descriptors above and alignment elements below.

Attributes:

- Mountainous - Any combination of grades and horizontal or vertical alignment that causes heavy vehicles to operate at crawl speeds for significant distances or at frequent intervals.
- 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.
- 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.

Priority: Critical Alternative

HPMS/Tool Requirements: HPMS (Sample), SafetyAnalyst (Optional)

76. Number Of Signalized Intersections in Segment

Definition: The number of at-grade intersections with a signal controlling traffic on the inventory route within the segment. A signal that cycles through red, yellow, and green for all or a portion of the day should be counted as a signalized intersection. Include at-grade intersections at entrances to shopping centers, industrial parks, and other large traffic generating enterprises.

Attributes:

- Numeric

Priority: Critical (only if no intersection file exists; can be derived if intersection file exists)

HPMS/Tool Requirements: HPMS (Sample)

77. Number of Stop-Controlled Intersections in Segment

Definition: The number of at-grade intersections with a stop sign controlling traffic on the inventory route within the segment. A continuously operating, flashing red signal should be counted as a stop sign control. Include at-grade intersections at entrances to shopping centers, industrial parks, and other large traffic generating enterprises.

Attributes:

- Numeric

Priority: Critical (only if no intersection exists; can be derived if intersection file exists)

HPMS/Tool Requirements: HPMS (Sample)

78. Number Of Uncontrolled/Other Intersections in Segment

Definition: Number of at-grade intersections where traffic on the inventory route is not controlled by either a signal or a stop sign; or is controlled by other types of signing; or has no controls within the segment. A continuously operating, flashing yellow signal should be considered as "other or no control." Include at-grade intersections at entrances to shopping centers, industrial parks, and other large traffic generating enterprises.

Attributes:

- Numeric

Priority: Critical (only if no intersection file exists; can be derived if intersection file exists)

HPMS/Tool Requirements: HPMS (Sample)

*I.f. Segment Traffic Flow Data***79. Annual Average Daily Traffic (AADT)**

Definition: AADT value to represent the current data year. For two-way facilities, provide the AADT for both directions; provide the directional AADT if part of a one-way couplet or for one-way streets.

Attributes:

- Vehicles per day

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent and Ramps), HSM/IHSDM (Required), SafetyAnalyst (Required)

80. AADT Year

Definition: Year of AADT.

Attributes:

- Year

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent and Ramps), HSM/IHSDM (Required), SafetyAnalyst (Required)

81. AADT Annual Escalation Percentage

Definition: Expected annual percent growth in AADT, with “AADT YEAR” as base year. This will allow calculation of current year’s AADT if “AADT YEAR” differs from current year.

Attributes:

- Percent

Priority: Value Added

HPMS/Tool Requirements: SafetyAnalyst (Optional)

82. Percent Single Unit Trucks Or Single Truck AADT

Definition: Percentage combination truck or combination truck AADT (Classes 4-7).

Attributes:

- Percent or numeric count

Priority: Critical Preferred

HPMS/Tool Requirements: HPMS (Full Extent and Ramps*, Sample*)

83. Percent Combination Trucks Or Combination Truck AADT

Definition: Percentage combination truck or combination truck AADT (Classes 8-13).

Attributes:

- Percent or numeric count

Priority: Critical Preferred

HPMS/Tool Requirements: HPMS (Full Extent and Ramps*, Sample*)

84. Percentage Trucks Or Truck AADT

Definition: Percentage truck or truck AADT (includes tractor-semis and trucks with 6+ wheels). Note that this can be derived if both Element 82. *Percent Single Unit Trucks Or Single Truck AADT* and Element 83. *Percent Combination Trucks Or Combination Truck AADT* are captured.

Attributes:

- Percent or numeric count

Priority: Critical Alternative

HPMS/Tool Requirements: SafetyAnalyst (Optional)

85. Total Daily Two-Way Pedestrian Count/Exposure

Definition: Total daily pedestrian flow along roadway in both directions (unless directional segment). This is a (less than desirable) surrogate for crossing pedestrian counts.

Attributes:

- Average daily count (numeric)

Priority: Value Added (Collect only if crossing counts are unavailable for intersection/ junction approaches.)

HPMS/Tool Requirements: None

86. Bicycle Count/Exposure

Definition: The total daily bicycle flow in both directions along the roadway (unless directional segment).

Attributes:

- Average daily count (numeric)

Priority: Value Added

HPMS/Tool Requirements: None

87. Motorcycle Count/ Percentage

Definition: Motorcycle daily count or percentage of AADT.

Attributes:

- Percent or numeric count

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent)

88. Hourly Traffic Volumes (Or Peak And Offpeak AADT)

Definition: Hourly traffic volumes (or peak and offpeak AADT).

Attributes:

- Numeric count

Priority: Value Added

HPMS/Tool Requirements: SafetyAnalyst (Optional)

89. K-Factor

Definition: The K-factor is the 30th highest hourly volume (i.e., the design hour volume) for a year, as a percentage of the annual average daily traffic.

Attributes:

- Percent

Priority: Value Added

HPMS/Tool Requirements: HPMS (Sample)

90. Directional Factor

Definition: Proportion of peak hour traffic in the predominant direction of flow.

Attributes:

- Numeric

Priority: Value Added

HPMS/Tool Requirements: HPMS (Sample)

I.g. Segment Traffic Operations/Control Data

91. One/Two-Way Operations

Definition: Indication of whether the segment operates as a one- or two-way roadway.

Attributes:

- One-way
- Two-way
- One direction of travel for divided roadways

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent and Ramps), HSM/IHSDM (Required), SafetyAnalyst (Required)

92. Speed Limit

Definition: The daytime regulatory speed limit for automobiles posted or legally mandated on the greater part of the section.

Attributes:

- mph
- No posted or legally mandated speed limit

Priority: Critical

HPMS/Tool Requirements: HPMS (Sample), HSM/IHSDM (Required), SafetyAnalyst (Optional)

93. Truck Speed Limit

Definition: The regulatory speed limit for trucks posted or legally mandated on the greater part of the section (i.e., differential speed limit).

Attributes:

- mph

Note: Only code if the speed limit for trucks is different than the limit for automobiles.

Priority: Value Added

HPMS/Tool Requirements: None

94. Nighttime Speed Limit

Definition: The regulatory speed limit for vehicles at night posted or legally mandated on the greater part of the section (i.e., differential speed limit).

Attributes:

- mph

Note: Only code if the speed limit is different at night than during the day.

Priority: Value Added

HPMS/Tool Requirements: None

95. 85th Percentile Speed

Definition: Traffic speed exceeded by 15 percent of the vehicles in the flow for this section.

Attributes:

- mph

Priority: Value Added (Difficult to collect for all sections; see discussion in Introduction)

HPMS/Tool Requirements: None

96. Mean Speed

Definition: The arithmetic mean (average) of all observed vehicle speeds in the segment (i.e., the sum of all spot speeds divided by the number of recorded speeds).

Attributes:

- mph

Priority: Value added (Difficult to collect for all sections; see discussion in Introduction)

HPMS/Tool Requirements: None

97. School Zone Indicator

Definition: Indication of whether the segment contains a school zone.

Attributes:

- Yes
- No

Priority: Critical

HPMS/Tool Requirements: None

98. On-Street Parking Presence

Definition: Time-based parking restrictions.

Attributes:

- Permitted 24 hrs/day
- Prohibited 24 hrs/day
- Permitted during specified times

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

99. On-Street Parking Type

Definition: *Type of on-street parking present on the segment.*

Attributes:

- No parking allowed or none available
- Head-in/back-out angle parking on one side
- Head-in/back-out angle parking on both sides
- Back-in/head-out angle parking on one side
- Back-in/head-out angle parking on both sides
- Parallel parking on one side
- Parallel parking on both sides

Priority: Critical

HPMS/Tool Requirements: HPMS (Sample), HSM/IHSDM (Required)

100. Roadway Lighting

Definition: The type of roadway lighting present on the segment.

Attributes:

- None
- Spot on one side
- Spot on both sides
- Continuous on one side
- Continuous on both sides

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

101. Toll Facility

Definition: Presence and typed of toll facility on the segment.

Attributes:

- No toll
- Toll paid in one direction only, non-high-occupancy toll (non-HOT) lanes
- Toll paid in both directions, non-HOT lanes
- Toll paid in one direction, HOT lanes
- Toll paid in both directions, HOT lanes

Priority: Critical

HPMS/Tool Requirements: HPMS (Full Extent)

102. Edgeline Presence/Width

Definition: Presence and width of edgeline.

Attributes:

- No marked edgeline
- 4 inch marked edgeline
- 6 inch marked edgeline
- 8 inch marked edgeline
- Greater than 8 inch marked edgeline

Priority: Critical

HPMS/Tool Requirements: None

103. Centerline Presence/Width

Definition: Presence and width of centerline.

Attributes:

- No marked centerline
- 4 inch marked centerline
- 6 inch marked centerline
- 8 inch marked centerline
- Greater than 8 inch marked centerline

Priority: Critical

HPMS/Tool Requirements: None

104. Centerline Rumble Strip Presence/Type

Definition: Presence and type of centerline rumble strips on the segment.

Attributes:

- None
- Milled adjacent to centerline
- Rolled adjacent to centerline
- Milled or rolled on/under centerline (e.g., rumble stripes)
- Centerline-rumble strip combination (e.g., raised/inverted thermoplastic profile marker)

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

105. Passing Zone Percentage

Definition: Percent of segment length striped for passing.

Attributes:

- Percent

Note: Where there is a discernible directional difference, code the more restrictive direction.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

I.h. Other Supplemental Segment Descriptors

106. Bridge Numbers For Bridges In Segment

Definition: Bridge numbers from bridge file for bridges in segment (See discussion in Introduction).

Attributes:

- Bridge number for each bridge in the segment.

Priority: Critical (unless addresses in Bridge File provide linkage to other inventory files – See discussion in Introduction)

HPMS/Tool Requirements: None

II. Roadway Alignment Descriptors

II.a. Horizontal Curve Data

- 107. Curve Identifiers and Linkage Elements
- 108. Curve Feature Type
- 109. Horizontal Curve Degree or Radius
- 110. Horizontal Curve Length
- 111. Curve Superelevation
- 112. Horizontal Transition/Spiral Curve Presence
- 113. Horizontal Curve Intersection/Deflection Angle
- 114. Horizontal Curve Direction

II.b. Vertical Grade Data

- 115. Grade Identifiers and Linkage Elements
- 116. Vertical Alignment Feature Type
- 117. Percent of Gradient
- 118. Grade Length
- 119. Vertical Curve Length

II. ROADWAY ALIGNMENT DESCRIPTORS

II.a. Horizontal Curve Data

107. Curve Identifiers And Linkage Elements

Definition: All elements needed to define location of each curve record and all elements necessary to link with other safety files.

Attributes:

- Route and location descriptors (e.g., route and beginning and ending milepoints or route and beginning and ending spatial coordinates). Must be consistent with other MIRE files for linkage.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

108. Curve Feature Type

Definition: Type of horizontal alignment feature being described in the data record.

Attributes:

- Horizontal angle point (i.e., joining of two tangents without a horizontal curve)
- Independent horizontal curve
- Component of compound curve (i.e., one curve in compound curve)
- Component of reverse curve (i.e., one curve in a reverse curve)

See Figure 5 for additional detail.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

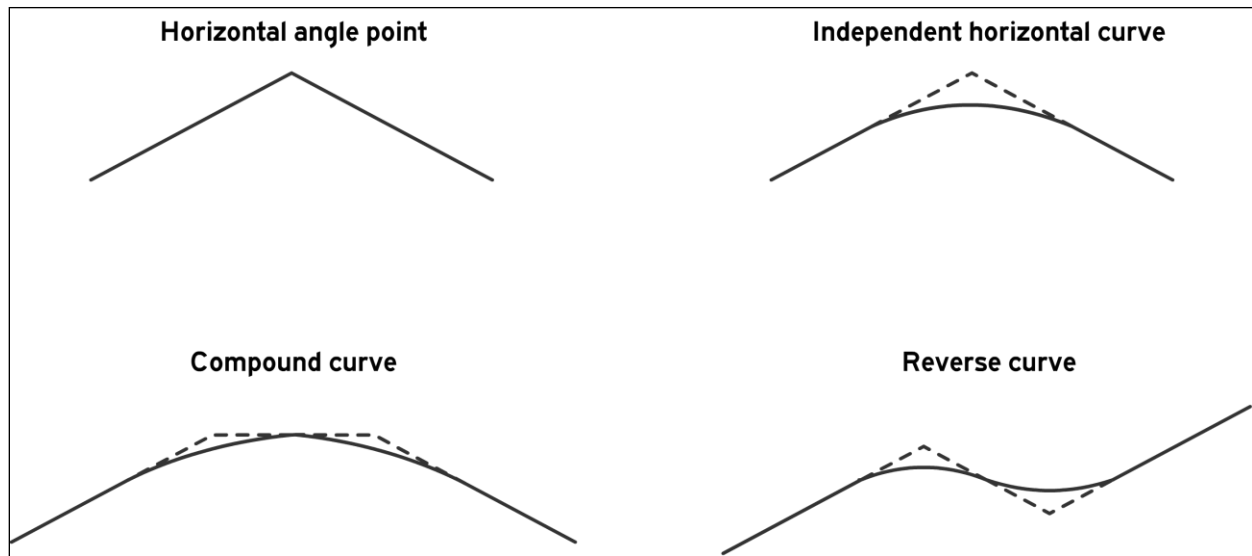


Figure 5. Illustration of Types of Curve Features.

109. Horizontal Curve Degree or Radius**Definition:** Degree or radius of curve.**Attributes:**

- Numeric, feet if radius

Priority: Critical**HPMS/Tool Requirements:** HPMS (Sample*), HSM/IHSDM (Required)***110. Horizontal Curve Length*****Definition:** Length of curve including spiral.**Attributes:**

- Feet

Priority: Critical**HPMS/Tool Requirements:** HSM/IHSDM (Required)***111. Curve Superelevation*****Definition:** Measured superelevation rate or percent.**Attributes:**

- Rate/percent

Priority: Critical**HPMS/Tool Requirements:** HSM/IHSDM (Required)

112. Horizontal Transition/Spiral Curve Presence

Definition: Presence and type of transition from tangent to curve and curve to tangent.

Attributes:

- No transition
- Spiral transition
- Other transition

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

113. Horizontal Curve Intersection/Deflection Angle

Definition: The angle between the two intersecting tangents in the direction of inventory (sometimes called the "deflection angle"). Code only for Horizontal Angle Points; not applicable if there is a curve joining the tangents.

Attributes:

- Degrees (absolute value)

Priority: Critical (only for Horizontal Angle Points)

HPMS/Tool Requirements: None

114. Horizontal Curve Direction

Definition: Direction of curve in direction of inventory.

Attributes:

- Right
- Left

Priority: Critical

HPMS/Tool Requirements: None

II.b. Vertical Grade Data

115. Grade Identifiers and Linkage Elements

Definition: All elements needed to define location of each vertical feature and all elements necessary to link with other safety files.

Attributes:

- Route/linear reference system descriptors (e.g., route and beginning and ending milepoints or route and beginning and ending spatial coordinates). Must be consistent with other MIRE files for linkage.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

116. Vertical Alignment Feature Type

Definition: Type of vertical alignment feature being described in the data record.

Attributes:

- Vertical angle point (i.e., joining of two vertical gradients without a verticle curve)
- Vertical gradient
- Sag vertical curve (i.e., vertical curve that connects a segment of roadway with a segment of roadway that has a more positive grade)
- Crest vertical curve (i.e., vertical curve that connects a segment of roadway with a segment of roadway that has a more negative grade)

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

117. Percent of Gradient

Definition: Percent of gradient. Leave blank if record concerns a sag or crest vertical curve.

Attributes:

- Percent

Priority: Critical

HPMS/Tool Requirements: HPMS (Sample*), HSM/IHSDM (Required)

118. Grade Length

Definition: Grade length if 116. *Vertical Alignment Feature Type* is “Vertical gradient.” Length does not include any portion of a vertical curve. Leave blank if record concerns a sag or crest vertical curve.

Attributes:

- Feet

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

119. Vertical Curve Length

Definition: Vertical curve length if 116. *Vertical Alignment Feature Type* is “Sag vertical curve” or Crest vertical curve.”

Attributes:

- Feet

Priority: Critical

HPMS/Tool Requirements: None

III. Roadway Junction Descriptors

III.a. At-Grade Intersection/Junctions

General Descriptors

- 120. Unique Junction Identifier
- 121. Type of Intersection/Junction
- 122. Location Identifier for Road 1 Crossing Point
- 123. Location Identifier for Road 2 Crossing Point
- 124. Location Identifier for Additional Road Crossing Points
- 125. Intersection/Junction Number of Legs
- 126. Intersection/Junction Geometry
- 127. School Zone Indicator
- 128. Railroad Crossing Number
- 129. Intersecting Angle
- 130. Intersection/Junction Offset Distance
- 131. Intersection/Junction Traffic Control
- 132. Signalization Presence/Type
- 133. Intersection/Junction Lighting
- 134. Circular Intersection - Number of Circulatory Lanes
- 135. Circular Intersection - Circulatory Lane Width
- 136. Circular Intersection - Inscribed Diameter
- 137. Circular Intersection - Bicycle Facility

Approach Descriptors (Each Approach)

- 138. Intersection Identifier for this Approach
- 139. Unique Approach Identifier
- 140. Approach AADT
- 141. Approach AADT Year

- 142. Approach Mode
- 143. Approach Directional Flow
- 144. Number of Approach Through Lanes
- 145. Left Turn Lane Type
- 146. Number of Exclusive Left Turn Lanes
- 147. Amount of Left turn Lane Offset
- 148. Right Turn Channelization
- 149. Traffic Control of Exclusive Right Turn Lanes
- 150. Number of Exclusive Right Turn Lanes
- 151. Length of Exclusive Left Turn Lanes
- 152. Length of Exclusive Right Turn Lanes
- 153. Median Type at Intersection
- 154. Approach Traffic Control
- 155. Approach Left Turn Protection
- 156. Signal Progression
- 157. Crosswalk Presence/Type
- 158. Pedestrian Signalization Type
- 159. Pedestrian Signal Special Features
- 160. Crossing Pedestrian Count/Exposure
- 161. Left/Right Turn Prohibitions
- 162. Right Turn-On-Red Prohibitions
- 163. Left Turn Counts/Percent
- 164. Year of Left Turn Counts/Percent
- 165. Right Turn Counts/Percent
- 166. Year of Right Turn Counts/Percent
- 167. Transverse Rumble Strip Presence
- 168. Circular Intersection - Entry Width

- 169. Circular Intersection - Number of Entry Lanes
- 170. Circular Intersection – Presence/Type of Exclusive Right Turn Lane
- 171. Circular Intersection - Entry Radius
- 172. Circular Intersection - Exit Width
- 173. Circular Intersection - Number of Exit Lanes
- 174. Circular Intersection - Exit Radius
- 175. Circular Intersection - Pedestrian Facility
- 176. Circular Intersection - Crosswalk Location
- 177. Circular Intersection – Island Width

III.b. Interchange and Ramp Descriptors

- 178. Unique Interchange Identifier
- 179. Location Identifier for Road 1 Crossing Point
- 180. Location Identifier for Road 2 Crossing Point
- 181. Location Identifier for Additional Road Crossing Points
- 182. Interchange Type
- 183. Interchange Lighting
- 184. Interchange Entering Volume
- 185. Interchange Identifier for this Ramp
- 186. Unique Ramp Identifier
- 187. Ramp Length
- 188. Ramp Acceleration Lane Length
- 189. Ramp Deceleration Lane Length
- 190. Ramp Number of Lanes
- 191. Ramp AADT
- 192. Year of Ramp AADT
- 193. Ramp Metering

- 194. Ramp Advisory Speed Limit
- 195. Roadway Type at Beginning Ramp Terminal
- 196. Roadway Feature at Beginning Ramp Terminal
- 197. Location Identifier for Roadway at Beginning Ramp Terminal
- 198. Location of Beginning Ramp Terminal Relative to Mainline Flow
- 199. Roadway Type at Ending Ramp Terminal
- 200. Roadway Feature at Ending Ramp Terminal
- 201. Location Identifier for Roadway at Ending Ramp Terminal
- 202. Location of Ending Ramp Terminal Relative to Mainline Flow

III. Roadway Junction Descriptors

III.a. At-Grade Intersection/Junctions

III.a.1. General Descriptors

120. Unique Junction Identifier

Definition: A unique junction identifier.

Attributes:

- User defined (e.g., node number, LRS of primary route, etc.)

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Required)

121. Type of Intersection/Junction

Definition: Type of Junction being described in the data record.

Attributes:

- Roadway/roadway (not interchange related)
- Roadway/roadway (interchange ramp terminal)
- Roadway/pedestrian crossing (e.g., midblock crossing, pedestrian path or trail)
- Roadway/bicycle path or trail
- Roadway/railroad grade crossing
- Other

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Required)

122. Location Identifier for Road 1 Crossing Point

Definition: Location of the center of the junction on the first intersecting route (e.g. route-milepost). Note that if the Junction File is a spatial data file, this would be the coordinates and would be the same for all crossing roads.

Attributes:

- Route and location descriptors (e.g., route and milepoint or route and spatial coordinates).

Note: Must be consistent with other MIRE files for linkage.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Required)

123. Location Identifier for Road 2 Crossing Point

Definition: Location of the center of the junction on the second intersecting route (e.g. route-milepost). Note that in a spatial data system, this would be the same as Element 122. *Location Identifier For Road 1 Crossing Point*. Not applicable if intersecting route is not an inventoried road (i.e., a railroad or bicycle path).

Attributes:

- Route and location descriptors (e.g., route and milepoint or route and spatial coordinates).

Note: Must be consistent with other MIRE files for linkage.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Required Conditionally)

124. Location Identifier for Additional Road Crossing Points

Definition: Location of the center of the junction on the third and subsequent intersecting route (e.g. route-milepost). Note that in a spatial data system, this would be the same as Element 122. *Location Identifier For Road 1 Crossing Point*. Not applicable if intersecting route is not an inventoried road (i.e., a railroad or bicycle path).

Attributes:

- Route and location descriptors (e.g., route and milepoint or route and spatial coordinates). Must be consistent with other MIRE files for linkage.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Required Conditionally)

125. Intersection/Junction Number of Legs

Definition: The number of legs entering an at-grade intersection/junction.

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

126. Intersection/Junction Geometry

Definition: The type of geometric configuration that best describes the intersection/junction.

Attributes:

- T-Intersection
- Y-Intersection
- Cross-Intersection (four legs)
- Five or more legs and not circular
- Roundabout
- Other circular intersection (e.g., rotaries, neighborhood traffic circles)
- Non-conventional intersection (e.g. superstreet, median U-turn, displaced left turn)
- Midblock pedestrian crossing

See Figure 6 for additional detail.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Required)

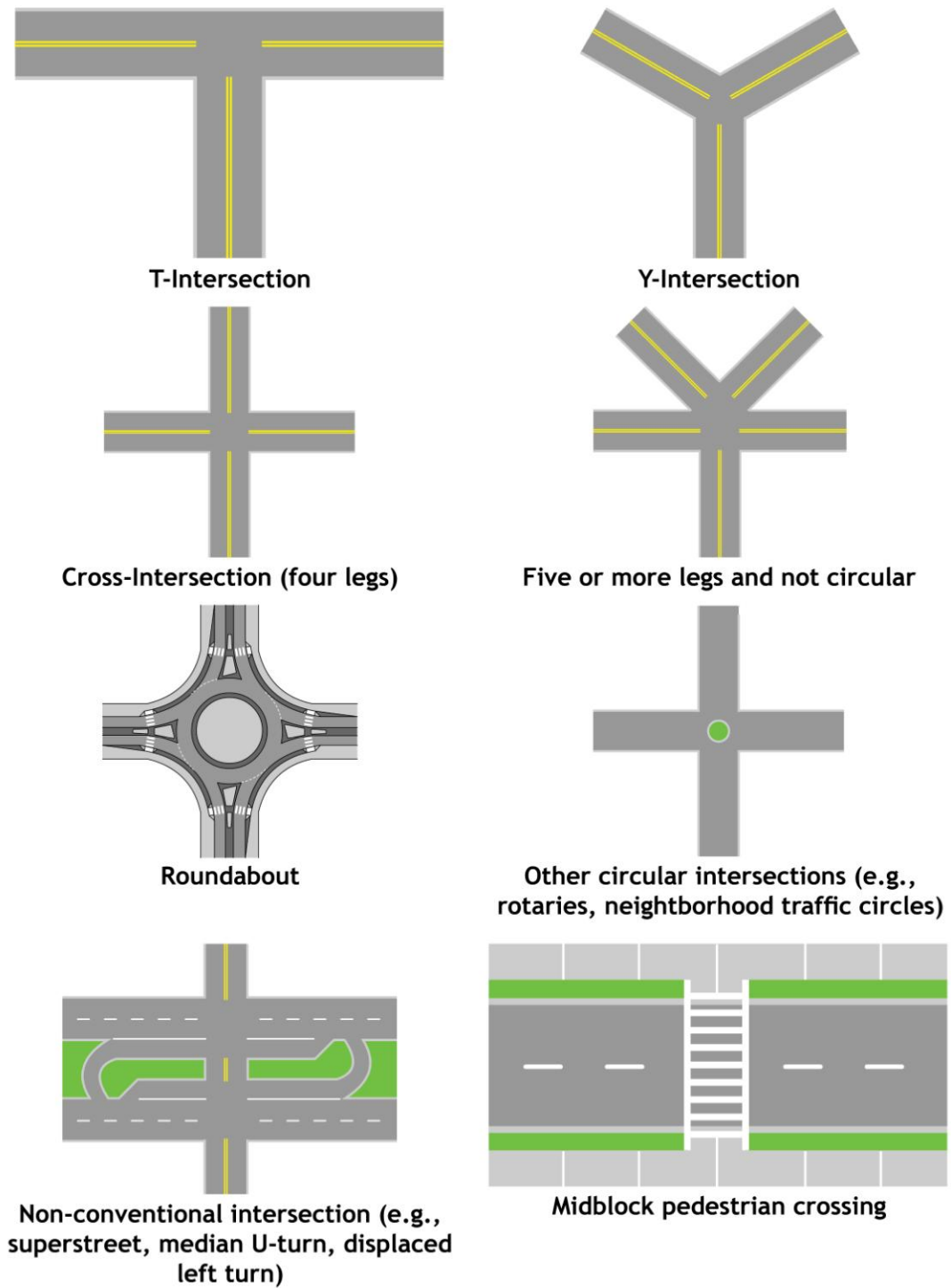


Figure 6. Illustration of Types of Intersection/Junction Geometry.

127. School Zone Indicator

Definition: An indication of whether the intersection/junction is in a school zone.

Attributes:

- Yes
- No

Priority: Critical

HPMS/Tool Requirements: None

128. Railroad Crossing Number

Definition: Railroad (RR) crossing number if a RR grade crossing (for linkage to National Highway-Rail Crossing Inventory).

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: None

129. Intersecting Angle

Definition: The measurement in degrees of the smallest angle between any two legs of the intersection. This value will always be within a range of 0 to 90 degrees (i.e., for non-zero angles, always measure the acute rather than the obtuse angle).

Attributes:

- Degrees

See Figure 7 for additional detail.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

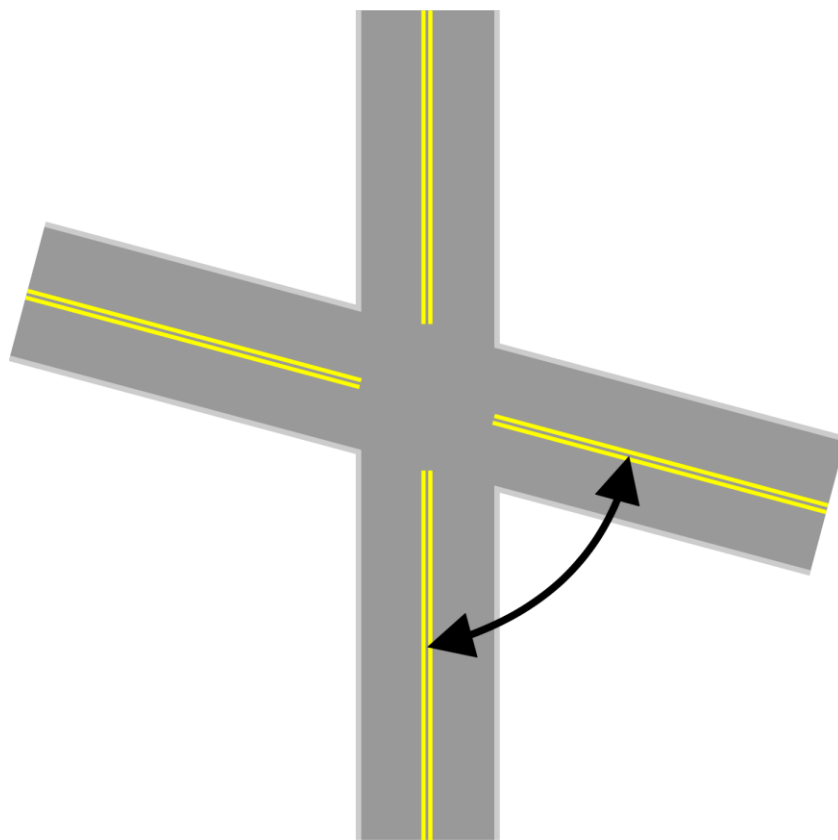


Figure 7. Illustration of Intersecting Angle.

130. Intersection/Junction Offset Distance

Definition: Offset distance between the centerlines of the intersecting legs (minor road) at the intersection. When the intersection legs are not offset, the value of this data item should be zero.

Attributes:

- Numeric (Note that “zero” should be entered if crossing road centerlines are not offset).

See Figure 8 for additional detail.

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Optional)

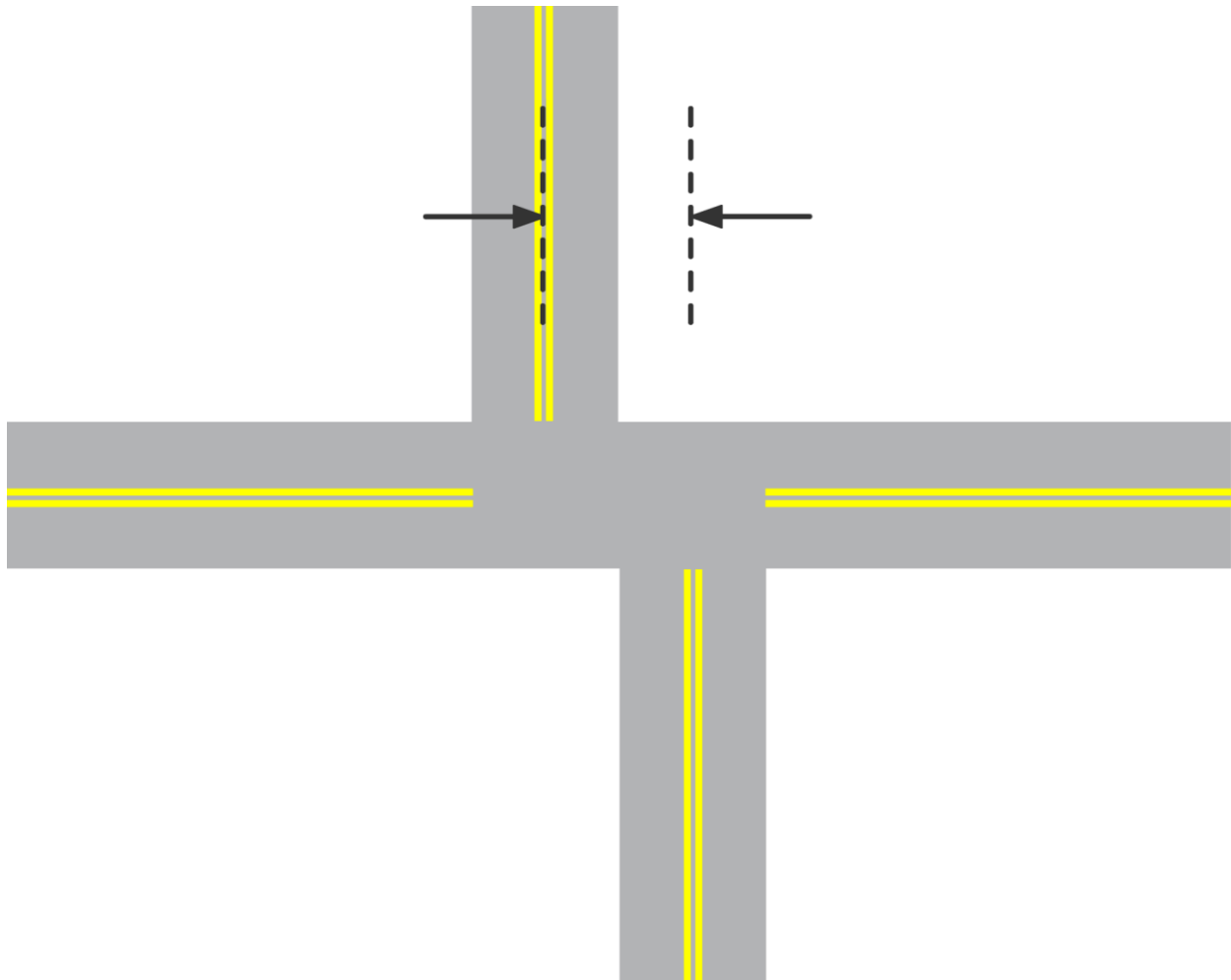


Figure 8. Illustration of Intersection/Junction Offset Distance.

131. Intersection/Junction Traffic Control

Definition: Traffic control present at intersection/junction.

Attributes:

- Uncontrolled
- Two-way stop
- All-way stop
- Yield sign
- Signalized (with ped signal)
- Signalized (w/o ped signal)
- Railroad crossing, gates and flashing lights
- Railroad crossing, flashing lights only
- Railroad crossing, stop-sign controlled
- Railroad crossing, crossbucks only
- Other

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Required)

132. Signalization Presence/Type

Definition: Presence and type of signalization at intersection/junction.

Attributes:

- No signal
- Uncoordinated fixed time
- Uncoordinated traffic actuated
- Progressive coordination (with several signals along either road)
- System coordination (e.g., real-time adaptive systemwide)
- Railroad crossing signal (includes signal-only and signal and gates)
- Other

Priority: Value added

HPMS/Tool Requirements: SafetyAnalyst (Required)

133. Intersection/Junction Lighting

Definition: Presence of lighting at intersection/junction.

Attributes:

- Yes
- No

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

134. Circular Intersection - Number of Circulatory Lanes

Definition: Number of circulatory lanes in circular intersection.

Attributes:

- Numeric

See Figure 9 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None

135. Circular Intersection - Circulatory Lane Width

Definition: Width of the roadway between the central island and outer edge of the circulatory lane in a circular intersection.

Attributes:

- Feet

See Figure 9 for additional detail.

Priority: Value added

HPMS/Tool Requirements: None

136. Circular Intersection - Inscribed Diameter

Definition: Distance between the outer edges of the circulatory roadway of a circular intersection.

Attributes:

- Feet

See Figure 9 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None

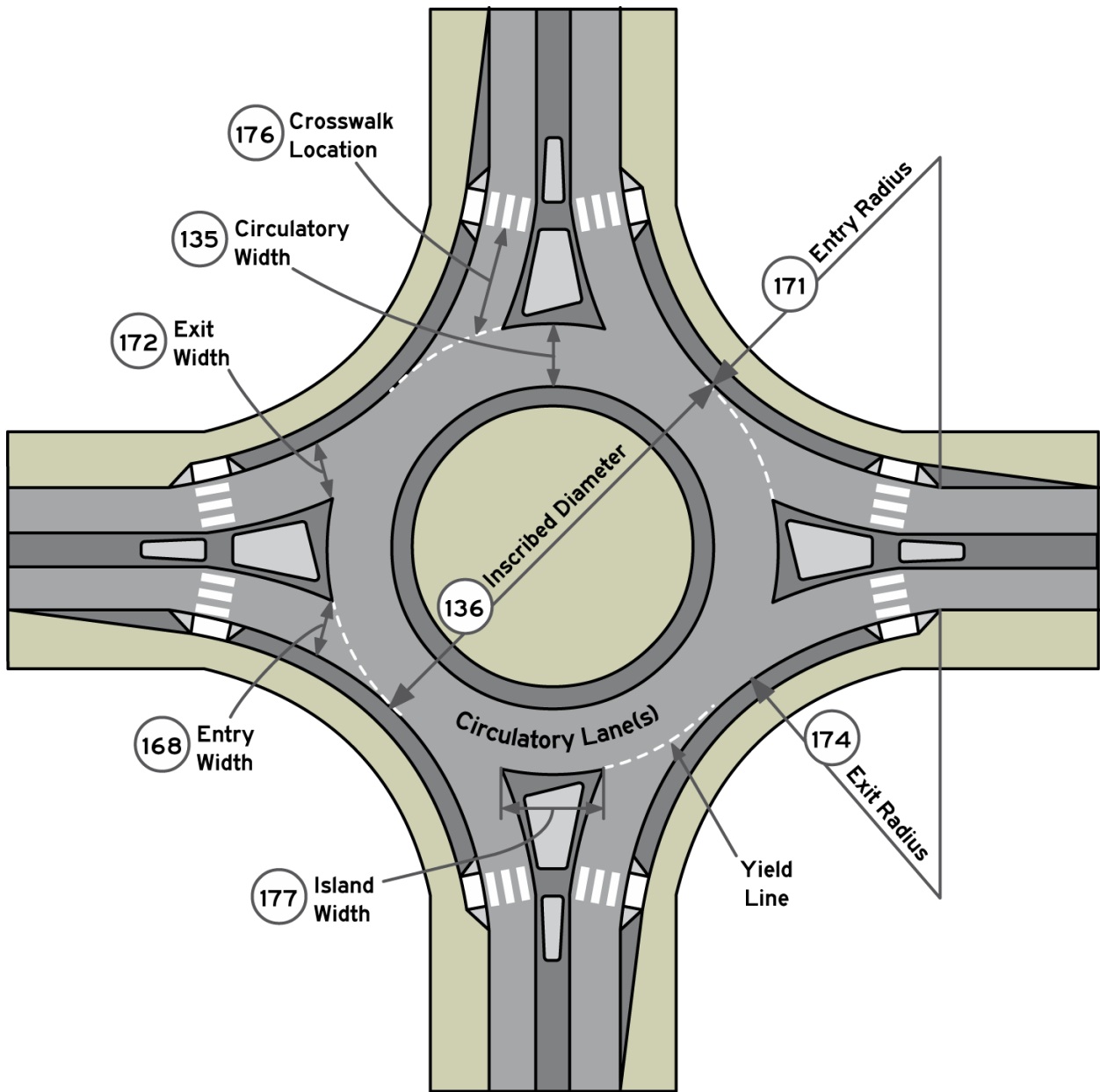


Figure 9. Illustration of Circular Intersection.

137. Circular Intersection - Bicycle Facility

Definition: Presence and type of bicycle facility at circular intersection.

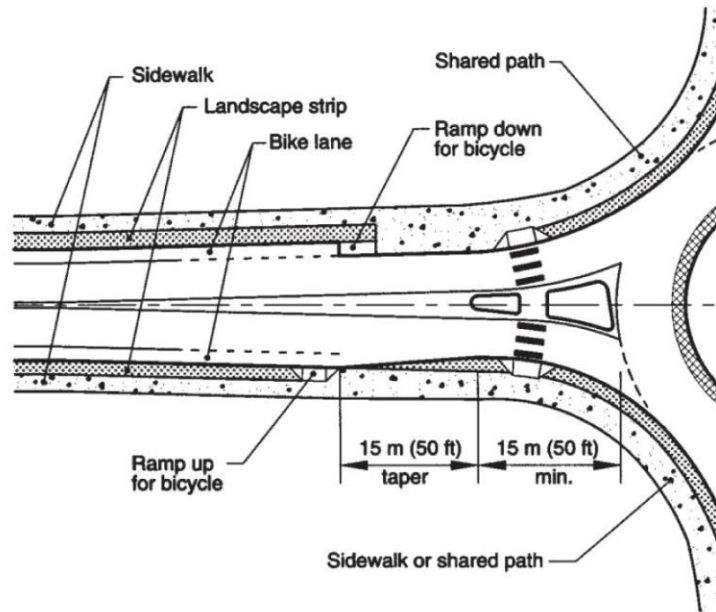
Attributes:

- None
- Separate cycle path
- Circulatory bike lane

See Figure 10 for additional detail.

Priority: Value added

HPMS/Tool Requirements: None



None

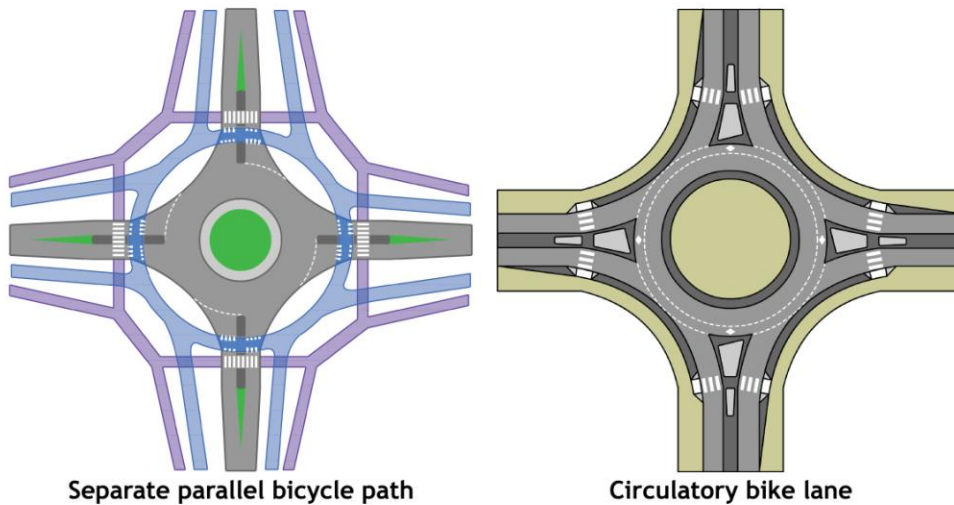


Figure 10. Illustration of Types of Bicycle Facilities at Circular Intersections.

Source : Robinson, Bruce; L. Rodegerdts; W. Scarborough; W. Kittleson; R. Troutbeck; W. Brilon; L. Bondizo; K. Courage; M. Kyte; J. Mason; A. Flannery; E. Myers; J. Bunker; G. Jacquemart. *Roundabouts, An Informational Guide*. Report No. FHWA-RD-00-067, Federal Highway Administration, McLean, VA, 2000.

III.a.2. At-Grade Intersection/Junction Approach Descriptors (Each Approach)

138. Intersection Identifier for this Approach

Definition: The unique numeric identifier assigned to the intersection that includes this approach (see Element 120. *Unique Junction Identifier*). This element provides linkage to the basic intersection information and to all other approaches.

Attributes:

- The intersection identifier entered in Element 120. *Unique Junction Identifier*.

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

139. Unique Approach Identifier

Definition: A unique identifier for each approach of an intersection.

Attributes:

- Any identifier that is unique for each approach within a single intersection (e.g., sequential numbers or letters, compass directions, “clock hours”).

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Required)

140. Approach AADT

Definition: The Annual Average Daily Traffic (AADT) on the approach leg of the intersection/junction.

Attributes:

- Vehicles per day

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Required Conditionally)

141. Approach AADT Year

Definition: The year of the Annual Average Daily Traffic (AADT) on the approach leg of the intersection/junction.

Attributes:

- Year

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Required Conditionally)

142. Approach Mode

Definition: Intended modes for the approach.

Attributes:

- Vehicles only or shared use (e.g., vehicles, peds, bikes)
- Pedestrians only
- Bicycles only
- Pedestrians and bicycles
- Railroad
- Other

Priority: Critical

HPMS/Tool Requirements: None

143. Approach Directional Flow

Definition: Indication of one-way or two-way flow on approach.

Attributes:

- One-way
- Two-way

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Optional)

144. Number Of Approach Through Lanes

Definition: Total number of through lanes on approach (both directions if two-way, one direction if one-way).

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Optional)

145. Left Turn Lane Type

Definition: Type of left turn lane(s) that accommodate left turns from this approach.

Attributes:

- No left turn lanes
- Conventional left turn lane(s)
- U-turn followed by right turn
- Right turn followed by U-turn
- Right turn followed by left turn (e.g., jughandle near side)
- Right turn followed by right turn (e.g., jughandle far side)
- Left turn crossover prior to intersection (e.g., displaced left turn)
- Other

See Figure 11 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None

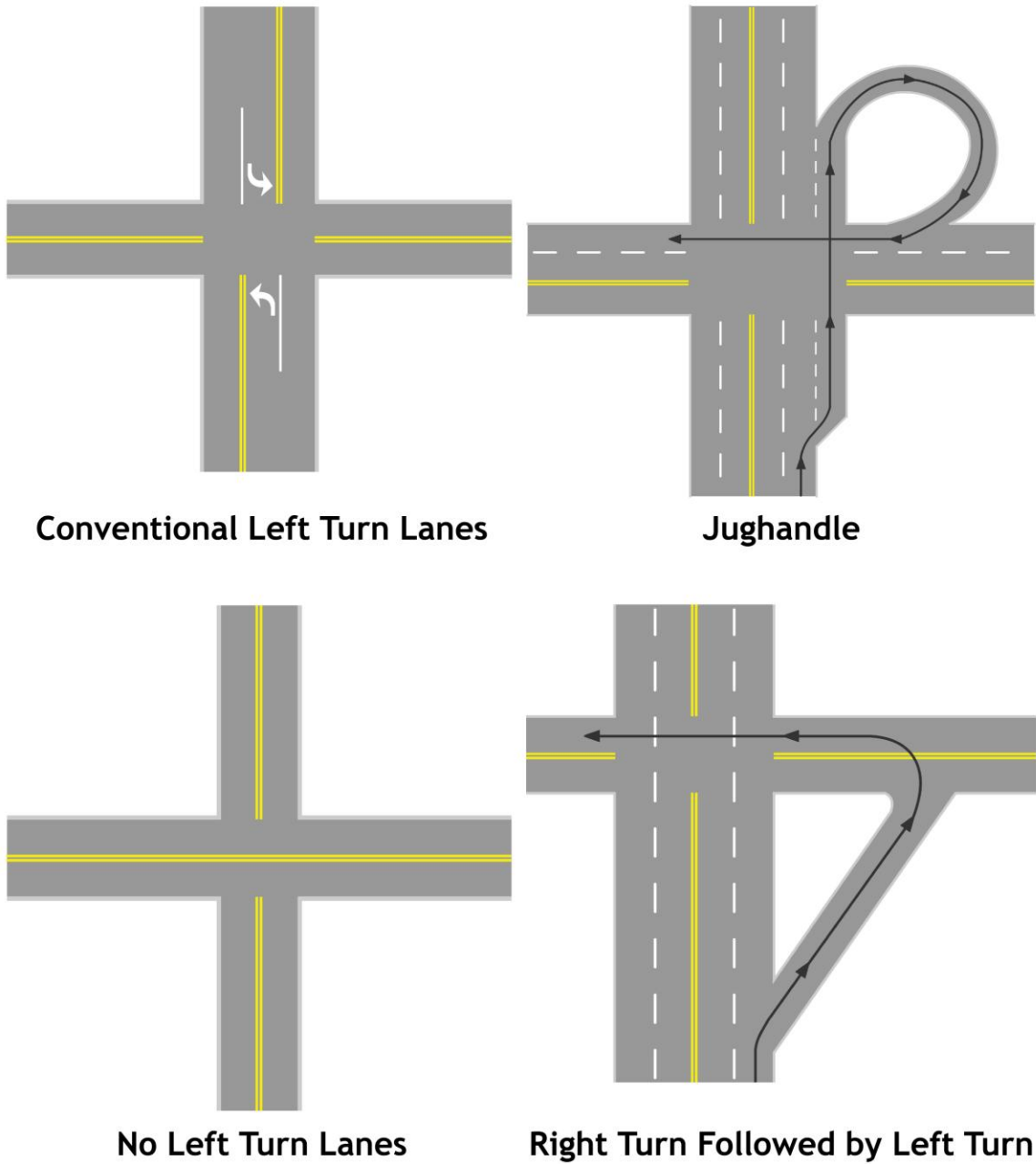
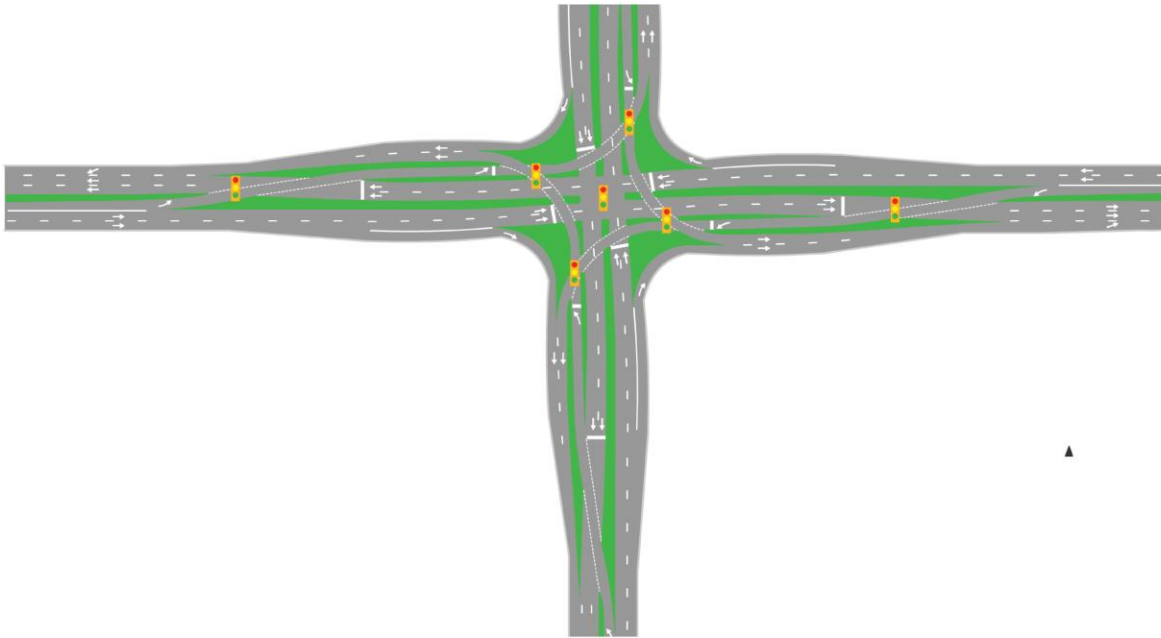
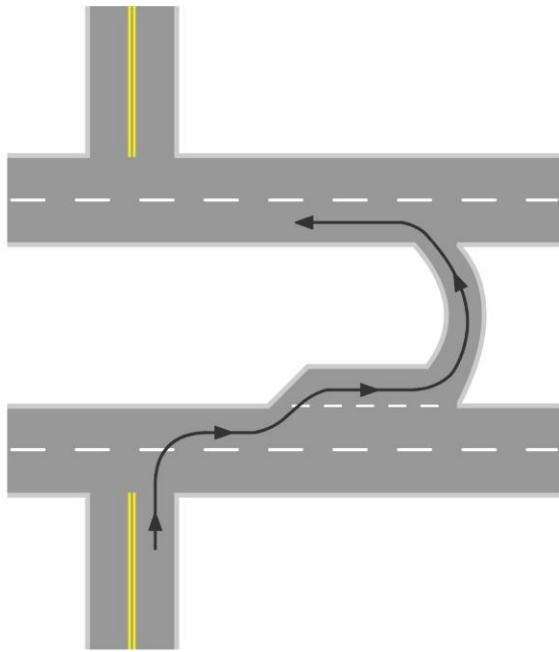


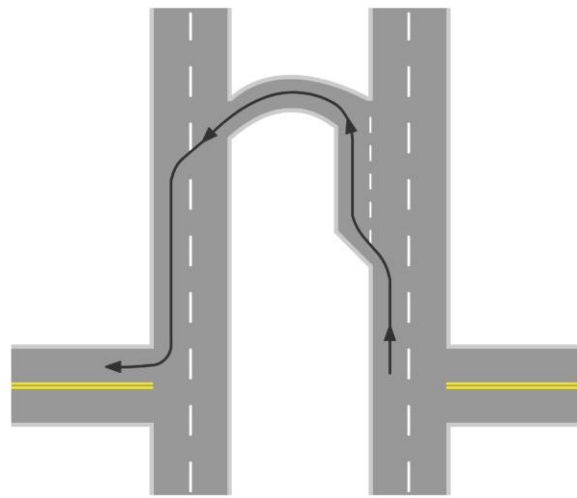
Figure 11. Illustration of Left Turn Lane Types.



Left Turn Prior to Intersection



Right Turn Followed by U-turn



U-turn Followed by Right Turn

Figure 11. Illustration of Left Turn Lane Types.

146. Number of Exclusive Left Turn Lanes

Definition: Number of exclusive left turn lanes that accommodate left turns from this approach.

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Optional)

147. Amount of Left Turn Lane Offset

Definition: Amount of offset between conventional left turn lane(s) on this approach and opposing approach. Offset refers to direction (plus or minus) and distance between the centerline of the left turn lane on this approach and the centerline of the left turn lane on the opposing approach. The direction is positive if the left turn lane on this approach is to the left of the opposing left turn lane and negative if vice versa. If the opposing left turn lanes are aligned, enter “0”.

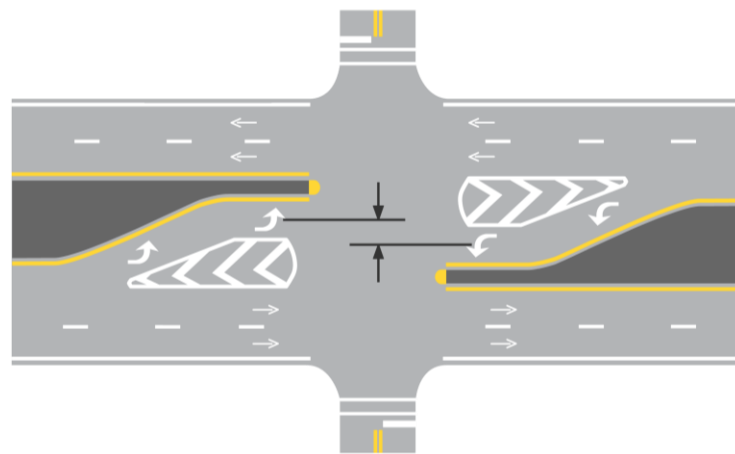
Attributes:

- Sign (+ or -) and distance (feet)

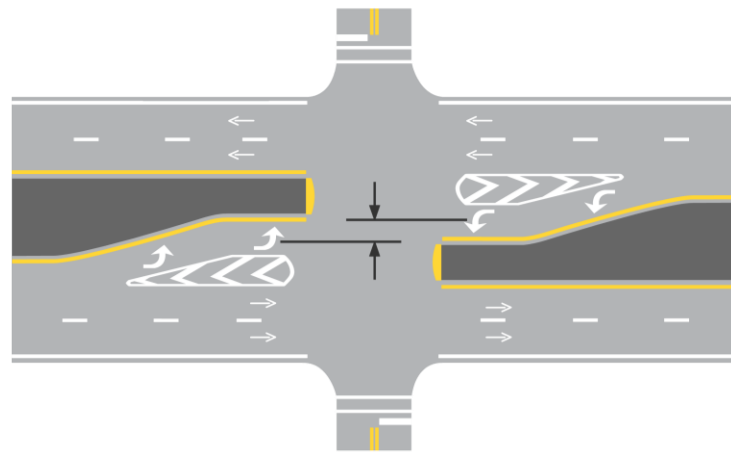
See Figure 12 for additional detail.

Priority: Critical

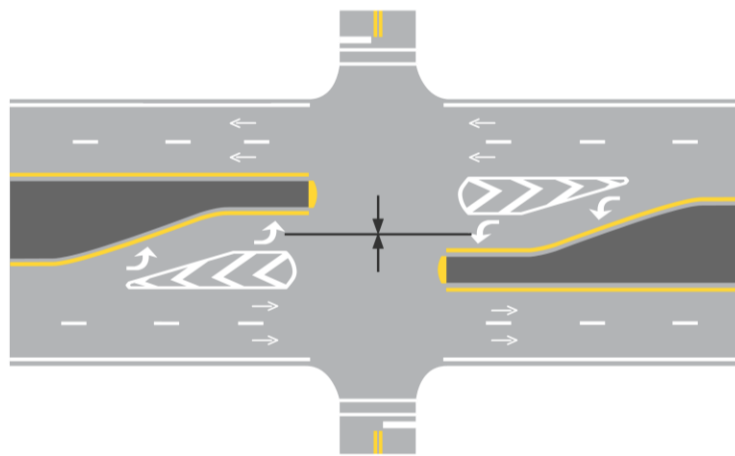
HPMS/Tool Requirements: None



Positive Offset



Negative Offset



Zero Offset

Figure 12. Illustration of Positive, Negative, and Zero Offset Distance.

148. Right Turn Channelization

Definition: Right turn channelization on approach.

Attributes:

- None
- Painted island with receiving lane
- Painted island without receiving lane
- Raised island with receiving lane
- Raised island without receiving lane

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

149. Traffic Control of Exclusive Right Turn Lanes

Definition: Traffic control of exclusive right turn lanes on approach.

Attributes:

- Signal
- Yield sign
- Stop sign
- No control (e.g., free flow)

Priority: Critical

HPMS/Tool Requirements: None

150. Number of Exclusive Right Turn Lanes

Definition: Number of exclusive right turn lanes on approach.

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Optional)

151. Length of Exclusive Left Turn Lanes

Definition: Storage length of exclusive left turn lane(s) (not including taper).

Attributes:

- Feet

See Figure 13 for additional detail.

Priority: Value added

HPMS/Tool Requirements: None

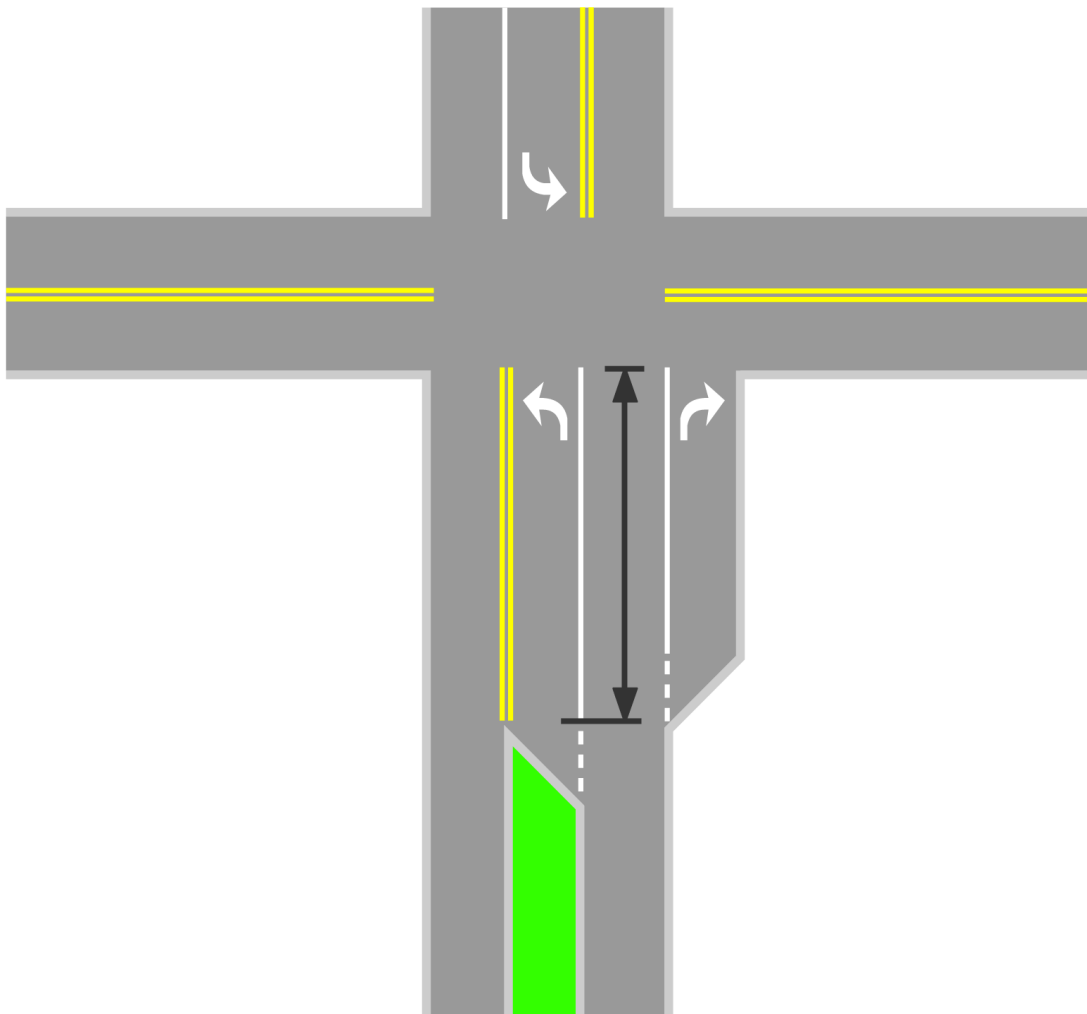


Figure 13. Illustration of Exclusive Left Turn Lane Length.

152. Length of Exclusive Right Turn Lanes

Definition: Storage length of exclusive right turn lane(s) (not including taper).

Attributes:

- Feet

See Figure 14 for additional detail.

Priority: Value added

HPMS/Tool Requirements: None

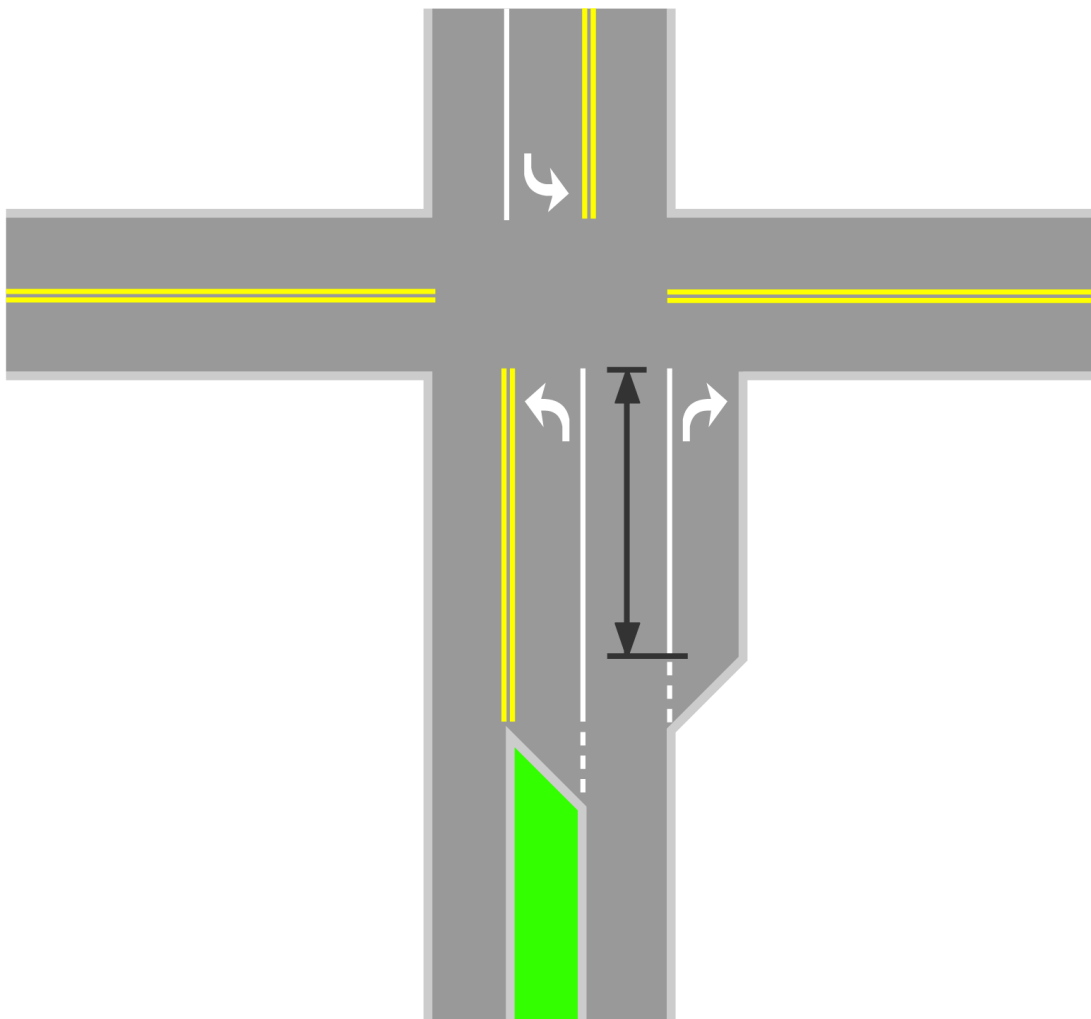


Figure 14. Illustration of Exclusive Right Turn Lane Length.

153. Median Type at Intersection

Definition: Median type at intersection separating opposing traffic lanes on this approach. Pedestrian refuge islands are also captured in Element 157. *Crosswalk Presence/Type*.

Attributes:

- Undivided
- Flush paved median (at least 4 ft in width)
- Raised median with curb
- Depressed median
- Two-way left turn lane
- Railroad or rapid transit
- Other divided

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Optional)

154. Approach Traffic Control

Definition: Traffic control present on approach. Pedestrian signalization is captured in Element 158. *Pedestrian Signalization Type*.

Attributes:

- Uncontrolled
- Stop sign
- Yield sign
- Signalized
- Railroad crossing, gates and flashing lights
- Railroad crossing, flashing lights only
- Railroad crossing, stop-sign controlled
- Railroad crossing, crossbucks only
- Other

Priority: Critical

HPMS/Tool Requirements: None

155. Approach Left Turn Protection

Definition: Presence and type of left turn protection on the approach.

Attributes:

- Unsignalized
- Signalized with no left turn protection (i.e., permissive)
- Protected, all day
- Protected, peak hour only
- Protected permissive, all day
- Protected permissive, peak hour only
- Other

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required), SafetyAnalyst (Required)

156. Signal Progression

Definition: Signal progression on approach.

Attributes:

- No signal
- Uncoordinated fixed time
- Uncoordinated traffic actuated
- Progressive coordination (with several signals along either road)
- System coordination (e.g., real-time adaptive systemwide)
- Railroad crossing signal (includes signal-only and signal and gates)
- Other

Priority: Critical

HPMS/Tool Requirements: None

157. Crosswalk Presence/Type

Definition: Presence and type of crosswalk crossing this approach leg.

Attributes:

- Unmarked crosswalk
- Marked crosswalk
- Marked crosswalk with supplemental devices (e.g., in-street yield signs, in-pavement warning lights, pedestrian bulb outs, etc.)
- Marked crosswalk with refuge island
- Marked with refuge island and supplemental devices (e.g., in-street yield signs, in-pavement warning lights, pedestrian bulb outs, etc.)
- Pedestrian crossing prohibited at this approach
- Other

Priority: Critical

HPMS/Tool Requirements: None

158. Pedestrian Signalization Type

Definition: Type of pedestrian signalization for crossing this approach.

Attributes:

- None
- Activated by traffic signal (e.g., recall)
- Pushbutton actuated
- Other

Priority: Critical

HPMS/Tool Requirements: None

159. Pedestrian Signal Special Features

Definition: Special features for pedestrian signals for crossing this approach.

Attributes:

- None
- Accessible pedestrian signal (i.e., audible tones/messages for blind or low-vision pedestrians)
- Countdown pedestrian signal
- Both accessible and countdown features
- Other

Priority: Value added

HPMS/Tool Requirements: None

160. Crossing Pedestrian Count/Exposure

Definition: Count or estimate of average daily pedestrian flow crossing this approach (Note: only applicable to approaches with vehicular traffic).

Attributes:

- Numeric

Priority: Critical

HPMS/Tool Requirements: None

161. Left/Right Turn Prohibitions

Definition: Signed left or right turn prohibitions on this approach.

Attributes:

- No left turns permitted at any time
- No left turn permitted during certain portions of the day
- No right turns permitted at any time
- No right turns permitted during certain portions of the day
- No right or left turns permitted at any time
- No right or left turns permitted during certain portions of the day
- No U-turns

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Optional)

162. Right Turn-On-Red Prohibitions

Definition: Prohibition of right turns-on-red (RTOR) from this approach.

Attributes:

- RTOR allowed at all times
- RTOR prohibited at all times
- RTOR prohibited during certain portions of the day

Priority: Critical

HPMS/Tool Requirements: HSM/IHSDM (Required)

163. Left Turn Counts/Percent

Definition: Count or estimate of average daily left turns, or percent of total approach traffic turning left. (Note: This could also be captured for peak-periods only or by hour of day.)

Attributes:

- Count or percent

Priority: Value added

HPMS/Tool Requirements: SafetyAnalyst (Optional)

164. Year of Left Turn Counts/Percent

Definition: Year of count or estimate of average daily left turns or percent of total approach traffic turning left.

Attributes:

- Year

Priority: Value added

HPMS/Tool Requirements: SafetyAnalyst (Optional)

165. Right Turn Counts/Percent

Definition: Count or estimate of average daily right turns, or percent of total approach traffic turning right. (Note: This could also be captured for peak-periods only or by hour of day.)

Attributes:

- Count or percent

Priority: Value added

HPMS/Tool Requirements: SafetyAnalyst (Optional)

166. Year of Right Turn Counts/Percent

Definition: Year of count or estimate of average daily right turns or percent of total approach traffic turning right.

Attributes:

- Year

Priority: Value added

HPMS/Tool Requirements: SafetyAnalyst (Optional)

167. Transverse Rumble Strip Presence

Definition: Presence of transverse rumble strips on approach.

Attributes:

- Yes
- No

Priority: Value added

HPMS/Tool Requirements: None

168. Circular Intersection - Entry Width

Definition: Full width of entry on this approach where it meets the inscribed circle.

Attributes:

- Feet

See Figure 9 on page 99 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None

169. Circular Intersection - Number of Entry Lanes

Definition: Number of entry lanes into circular intersection on this approach, not including right turn only or auxiliary lanes.

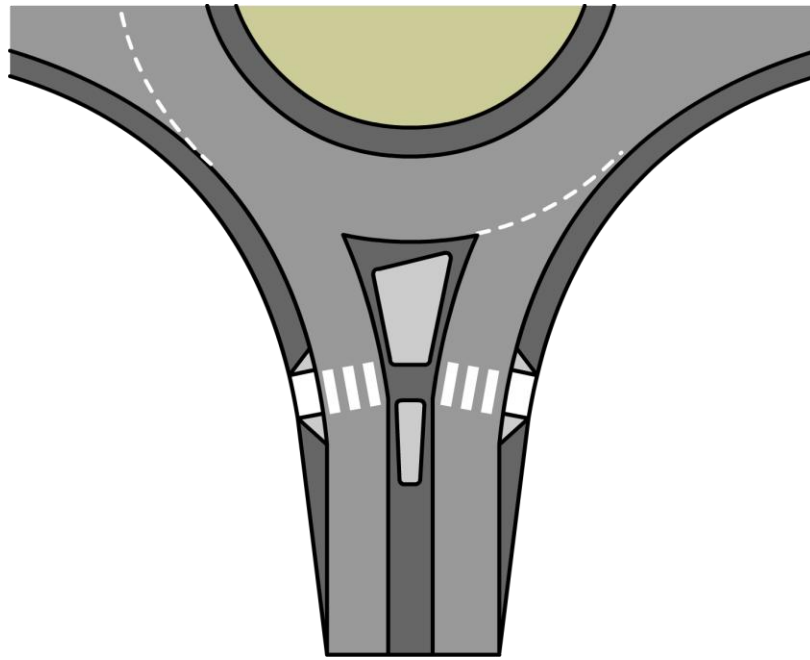
Attributes:

- Numeric

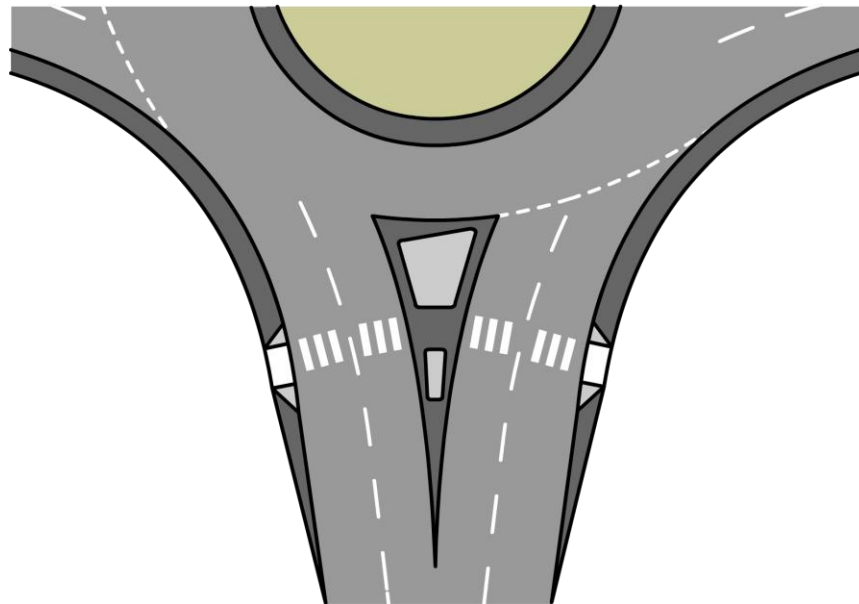
See Figure 15 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None



One Lane



Two Lanes

Figure 15. Illustration of Circular Intersection Exit and Entry Lanes.

170. Circular Intersection – Presence/Type of Exclusive Right Turn Lane

Definition: Presence and type of exclusive right turn lane(s) on this approach.

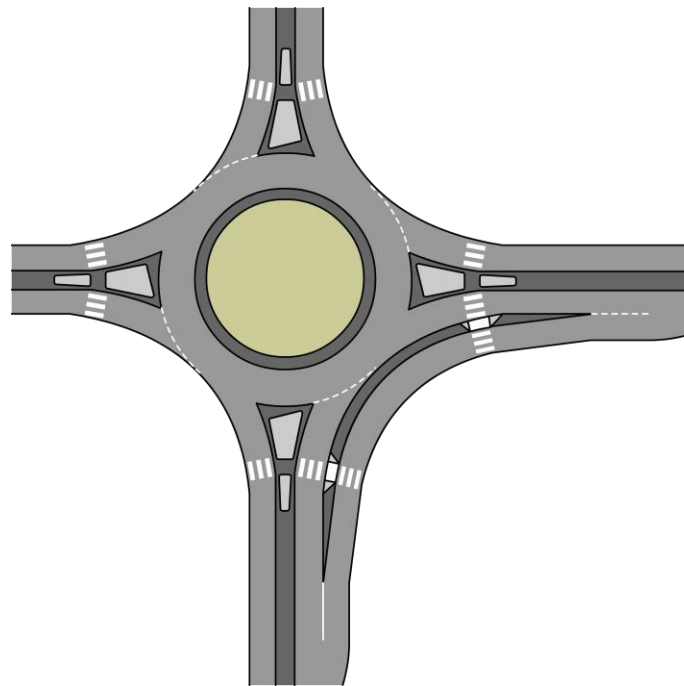
Attributes:

- None
- Exclusive right turn bypass/slip lane with separating island
- Exclusive right turn bypass/slip lane without separating island

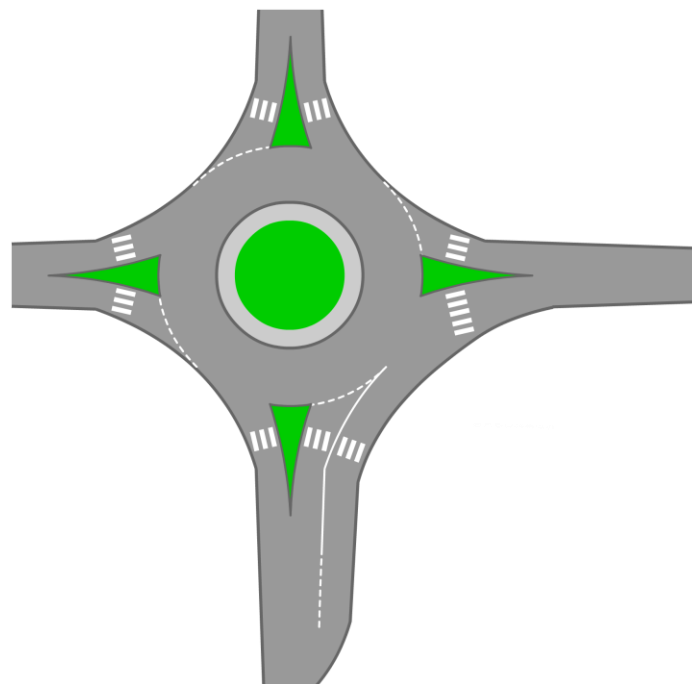
See Figure 16 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None



With Island



Without Island

Figure 16. Illustration of Circulatory Intersection Exclusive Right Turn Lanes.

171. Circular Intersection - Entry Radius

Definition: Minimum radius of curvature of the curb on the right side of the entry.

Attributes:

- Feet

See Figure 9 on page 99 for additional detail.

Priority: Value added

HPMS/Tool Requirements: None

172. Circular Intersection - Exit Width

Definition: Full width of exit on this approach where it meets the inscribed circle.

Attributes:

- Feet

See Figure 9 on page 99 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None

173. Circular Intersection - Number of Exit Lanes

Definition: Number of exit lanes from roundabout on this approach leg.

Attributes:

- Numeric

See Figure 15 on page 120 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None

174. Circular Intersection - Exit Radius

Definition: Minimum radius of curvature of the curb on the left side of the approach, when facing the intersection.

Attributes:

- Feet

See Figure 9 on page 99 for additional detail.

Priority: Value added

HPMS/Tool Requirements: None

175. Circular Intersection - Pedestrian Facility

Definition: Type of facility for pedestrians crossing this approach.

Attributes:

- Marked crosswalk with raised island
- Marked crosswalk with flush island
- Marked crosswalk with no island
- Unmarked crosswalk with raised island
- Unmarked crosswalk with flush island
- Unmarked crosswalk with no island
- Pedestrian crossing prohibited at this approach
- Other

Priority: Critical

HPMS/Tool Requirements: None

176. Circular Intersection - Crosswalk Location

Definition: Location of marked pedestrian crosswalk line (measured as the distance between the yield line and crosswalk markings closest to the intersection).

Attributes:

- Feet

See Figure 9 on page 99 for additional detail.

Priority: Value added

HPMS/Tool Requirements: None

177. Circular Intersection – Island Width

Definition: Width of raised or painted island separating entry and exit legs (measured at the inscribed circle). If no island is present, record width as zero.

Attributes:

- Feet

See Figure 9 on page 99 for additional detail.

Priority: Value added

HPMS/Tool Requirements: None

III.b. Interchange and Ramp Descriptors

III.b.1. General Interchange Descriptors

178. Unique Interchange Identifier

Definition: A unique identifier for each interchange.

Attributes:

- User defined (e.g., node number, LRS of primary route, exit numbers, etc.)

Priority: Critical

HPMS/Tool Requirements: None

179. Location Identifier for Road 1 Crossing Point

Definition: Location of midpoint of interchange (e.g., crossing route) on the first intersecting route (e.g. route-milepost, spatial coordinates). Note that if the Junction File is a spatial data file, this would be the coordinates and would be the same for all crossing roads.

Attributes:

- Route and location descriptors (e.g., route and milepoint or spatial coordinates). Must be consistent with other MIRE files for linkage.

See point A in Figure 17 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None

180. Location Identifier for Road 2 Crossing Point

Definition: Location of midpoint of interchange (e.g., crossing route) on the second intersecting route (e.g. route-milepost). Note that if the Interchange File is a spatial data file, this would be the same coordinates as in 179. *Location Identifier For Road 1 Crossing Point*, the previous element.

Attributes:

- Route and location descriptors (e.g., route and milepoint or spatial coordinates). Must be consistent with other MIRE files for linkage.

See point A in Figure 17 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None

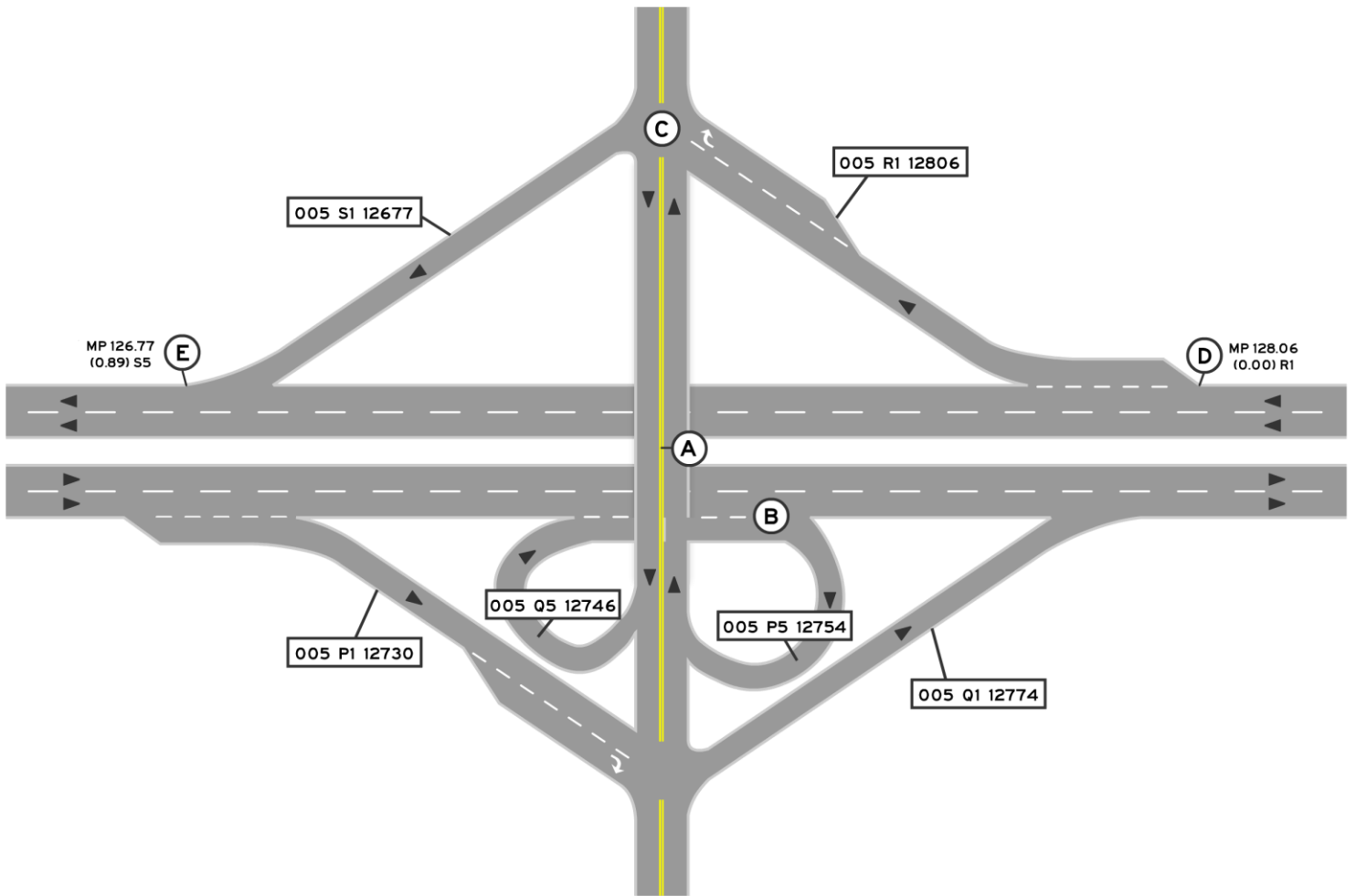


Figure 17. Illustration of Ramp Configurations.

Note: “Beginning” and “ending” of ramp is based on ramp traffic flow direction in this illustration. Agencies may choose to use another naming convention (e.g. direction of inventory).

181. Location Identifier for Additional Road Crossing Points

Definition: Location on the third and subsequent intersecting route (e.g. route-milepost). Note that if the Interchange File is a spatial data file, this would be the same coordinates as in Element 180 for all additional routes.

Attributes:

- Route and location descriptors (e.g., route and milepoint or spatial coordinates). Must be consistent with other MIRE files for linkage.

Priority: Critical

HPMS/Tool Requirements: None

182. Interchange Type

Definition: Type of interchange.

Attributes:

- Diamond
- Full cloverleaf
- Partial cloverleaf
- Trumpet
- Three-leg directional
- Four-leg all-directional
- Semi-directional
- Single entrances and/or exits (partial interchange)
- Single point interchange (SPI)
- Other (e.g., double crossover diamond, displaced left turn, diverging diamond)

See Figure 18 for additional detail.

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Required)

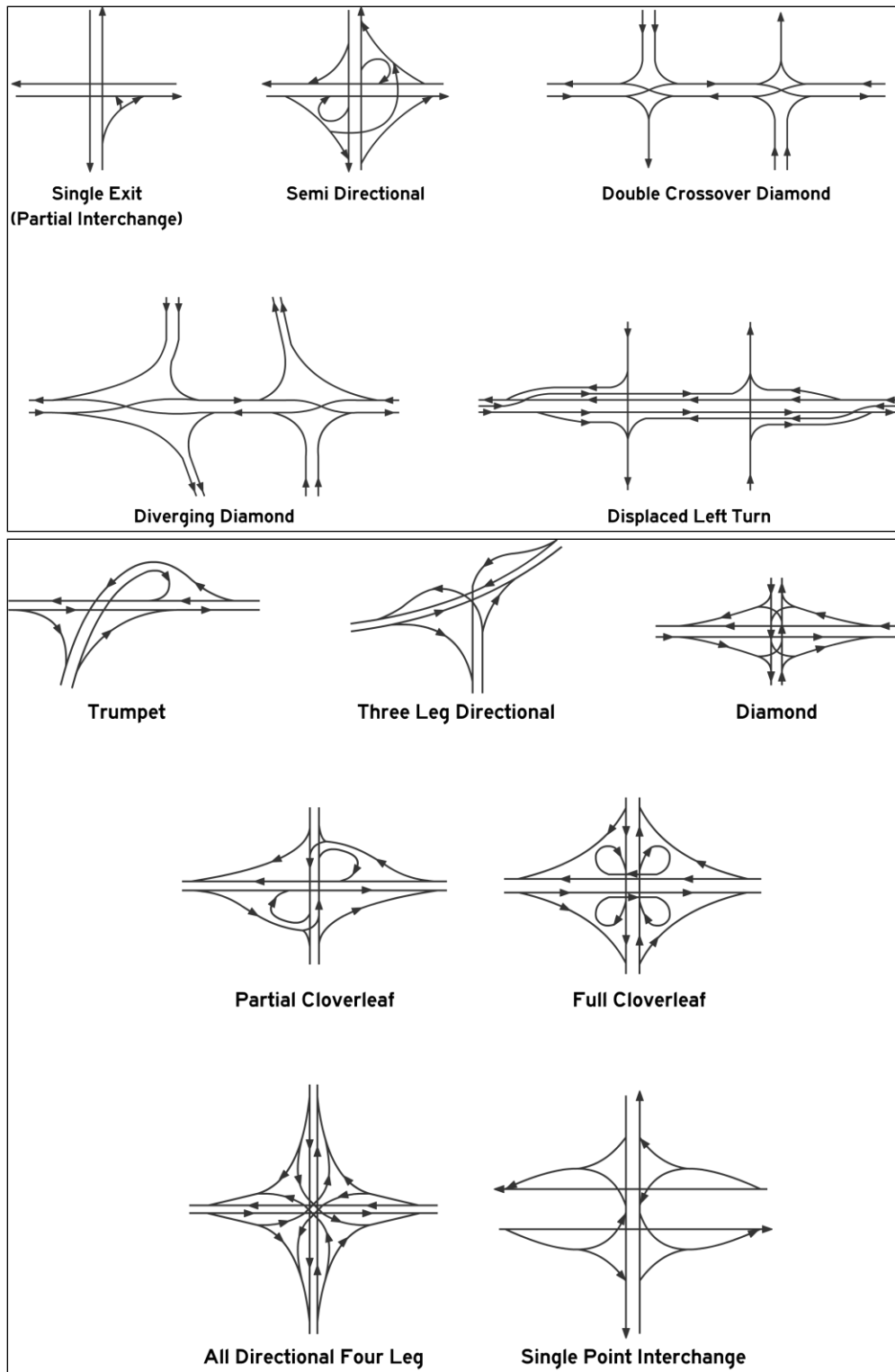


Figure 18. Illustration of Types of Interchanges.

183. Interchange Lighting

Definition: Type of interchange lighting.

Attributes:

- None
- Full interchange-area lighting (high mast)
- Full interchange-area lighting (other)
- Partial interchange lighting
- Other

Priority: Critical

HPMS/Tool Requirements: None

184. Interchange Entering Volume

Definition: Sum of entering volumes for all routes entering interchange. For each entering route, this would be counted at a point prior to the first exit ramp.

Attributes:

- Average daily volume

Priority: Critical

HPMS/Tool Requirements: None

III.b.2. Interchange Ramp Descriptors

185. Interchange Identifier for this Ramp

Definition: The unique numeric identifier assigned to the interchange that this ramp is part of. See Element 178. *Unique Interchange Identifier* above. This provides linkage to the basic interchange information and to all other ramps.

Attributes:

- The interchange identifier entered in Element 178. *Unique Interchange Identifier*.

Priority: Critical

HPMS/Tool Requirements: None

186. Unique Ramp Identifier

Definition: An identifier for each ramp that is part of a given interchange. This defines which ramp the following elements are describing.

Attributes:

- Alphanumeric (e.g., each set of interchange ramps could begin with “1” or “A”, each ramp could be identified by its route and exit number, etc.).

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Required)

187. Ramp Length

Definition: Length of ramp. In the case of ramp connecting to an at-grade intersection, this would be measured from painted nose of gore to intersection curb line. In the case of ramp connecting to another ramp or a freeway, this would be measured from painted nose of gore to painted nose of gore.

Attributes:

- Feet

See Figure 19 for additional detail.

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Required)

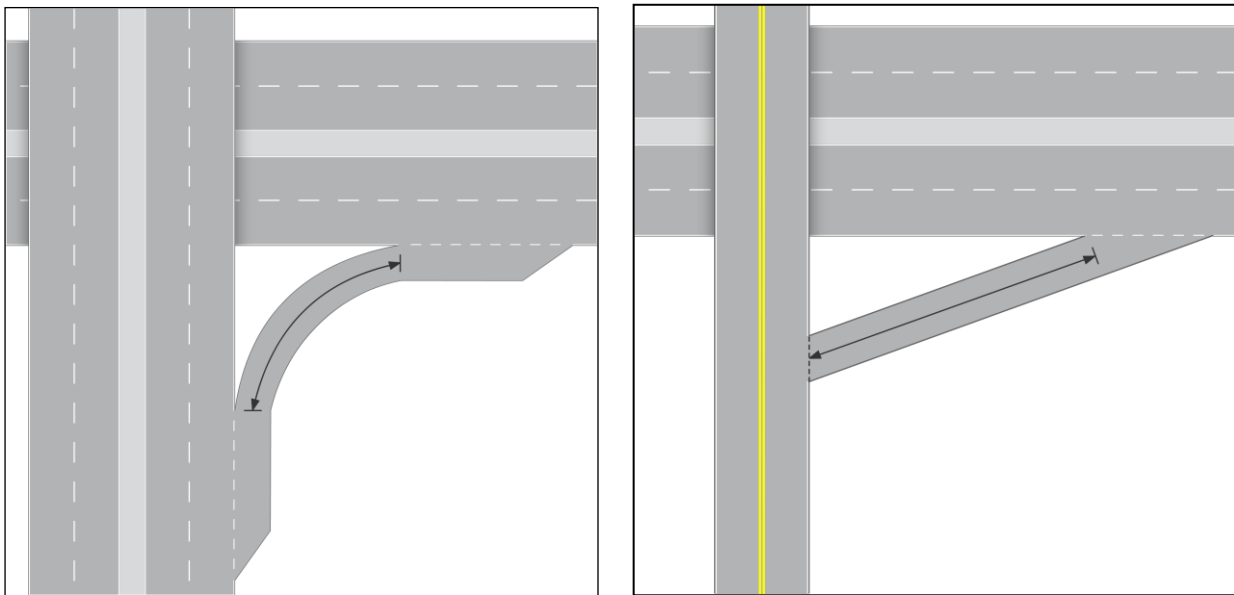


Figure 19. Illustration of Ramp Length for Freeway and Intersection Ramp Connections.

188. Ramp Acceleration Lane Length

Definition: Length of acceleration lane, not including taper. For tapered ramps, this would be measured from point of tangency of the last ramp curve to the point where the ramp lane width becomes less than 12 feet. For parallel ramps, this would be measured from nose of painted gore to beginning of taper.

Attributes:

- Feet

See Figure 20 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None

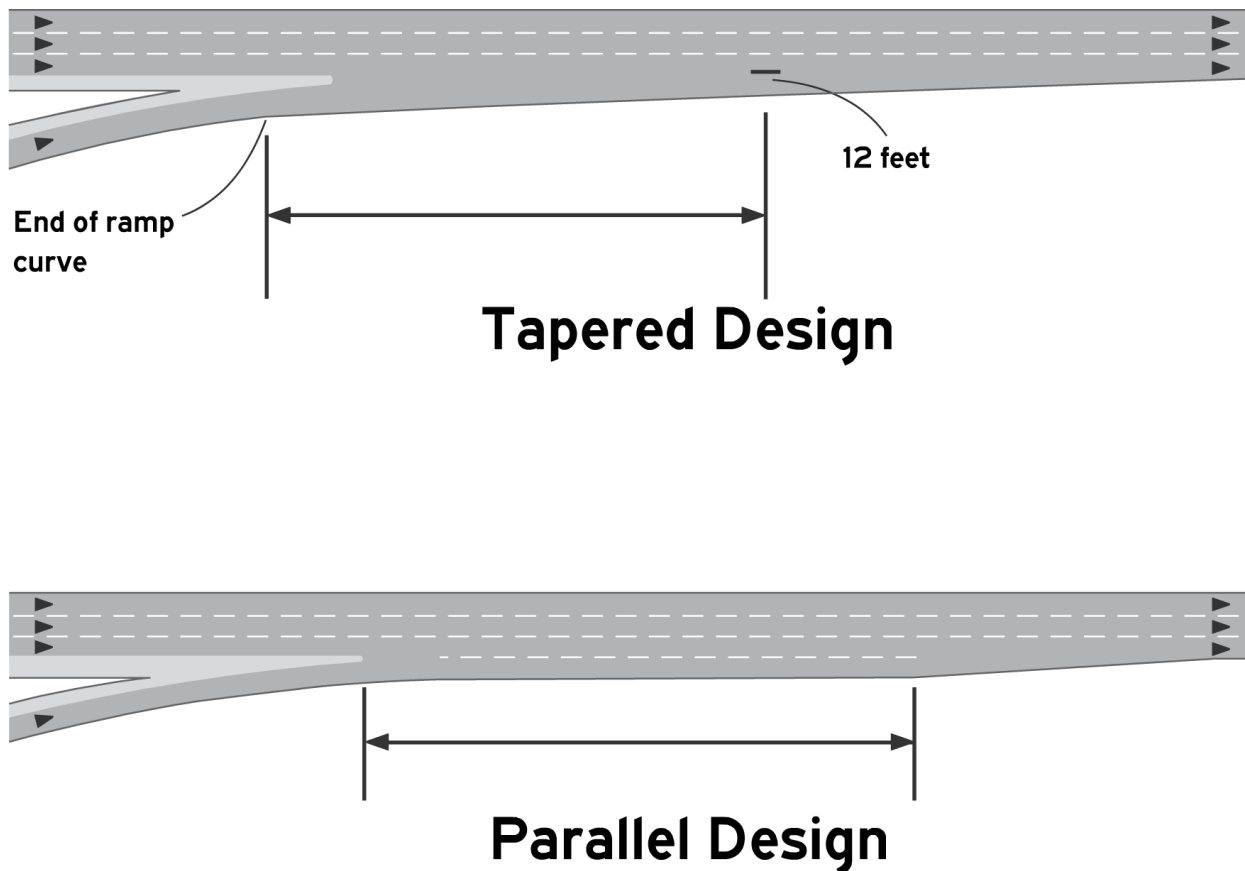


Figure 20. Illustration of Acceleration Lane Length for Tapered and Parallel Designs.

189. Ramp Deceleration Lane Length

Definition: Length of deceleration lane, not including taper. For tapered ramps, this would be measured from the point where the ramp lane width becomes 12 feet to the point of curvature of the initial ramp curve. For parallel ramps, this would be measured from end of taper to nose of painted gore.

Attributes:

- Feet

See Figure 21 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None

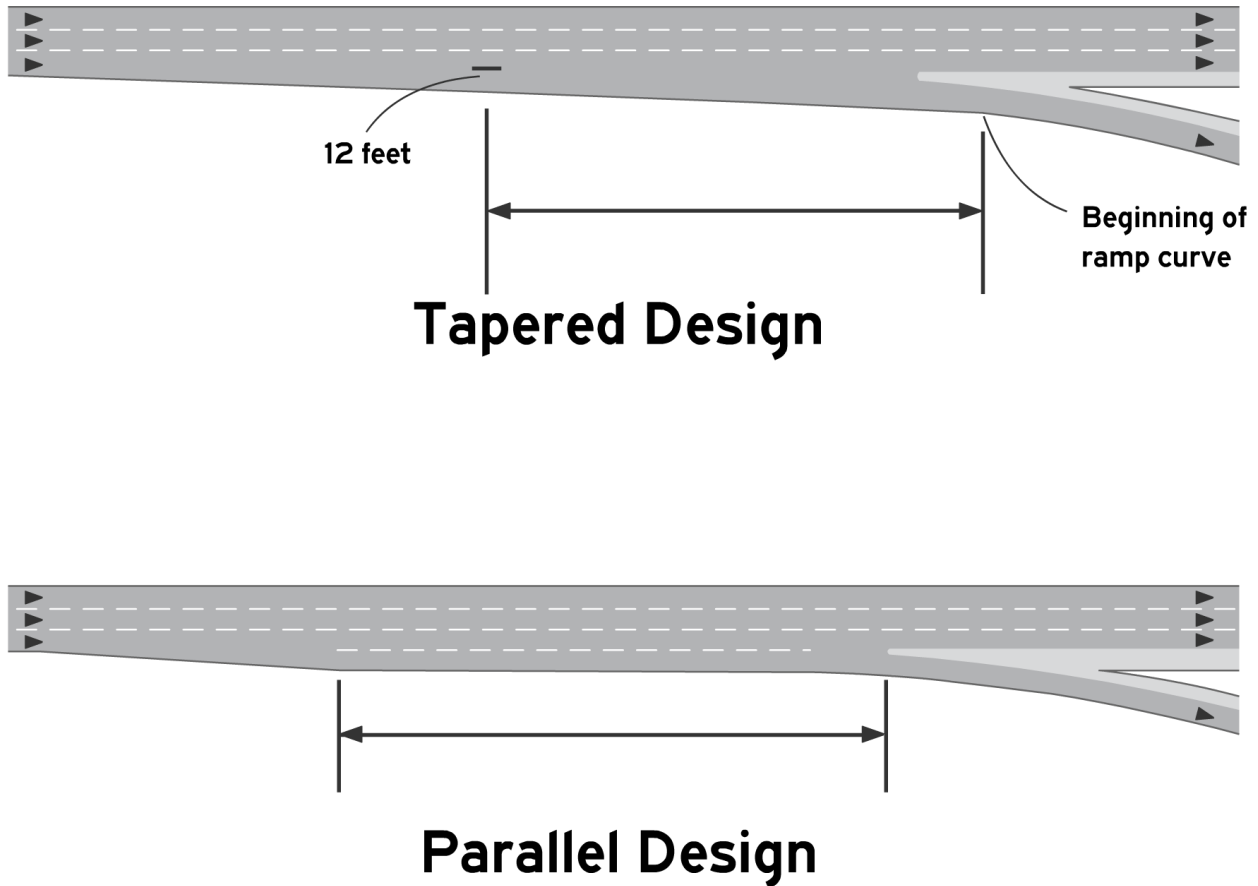


Figure 21. Illustration of Deceleration Lane Length for Tapered and Parallel Designs.

190. Ramp Number Of Lanes**Definition:** Maximum number of lanes on ramp.**Attributes:**

- Numeric

Priority: Critical**HPMS/Tool Requirements:** SafetyAnalyst (Optional)***191. Ramp AADT*****Definition:** AADT on ramp.**Attributes:**

- Numeric

Priority: Critical**HPMS/Tool Requirements:** SafetyAnalyst (Required)***192. Year Of Ramp AADT*****Definition:** Year of AADT on ramp.**Attributes:**

- Year

Priority: Critical**HPMS/Tool Requirements:** SafetyAnalyst (Required)

193. Ramp Metering

Definition: The presence and type of any metering of traffic entering mainline.

Attributes:

- Pretimed
- Traffic actuated
- No metering
- Not applicable (i.e., ramp does not feed into mainline)

Priority: Critical

HPMS/Tool Requirements: None

194. Ramp Advisory Speed Limit

Definition: The advisory speed limit on the ramp.

Attributes:

- Numeric
- No advisory limit (i.e., limit will be the same as on the connecting roadways)

Priority: Critical

HPMS/Tool Requirements: None

195. Roadway Type at Beginning Ramp Terminal

Definition: A ramp is described by a beginning and ending ramp terminal in the direction of ramp traffic flow or the direction of inventory. This element describes the type of roadway intersecting with the ramp at the beginning terminal.

Attributes:

- Freeway
- Non-freeway (surface street)
- Other Ramp
- Frontage road
- Other

See point B in Figure 17 on page 128 for additional detail. For Ramp 005 P5 12754, Roadway Type at Beginning Ramp Terminal = Freeway.

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Required)

196. Roadway Feature at Beginning Ramp Terminal

Definition: The feature found at the beginning terminal of the ramp.

Attributes:

- Acceleration Lane
- Deceleration Lane
- Weaving lane (e.g., the weaving area joining two ramps under an overpass in a cloverleaf interchange)
- Signalized intersection
- Stop/yield controlled intersection
- Uncontrolled intersection
- Another ramp
- Other

See point B in Figure 17 on page 128 for additional detail. For Ramp 005 P5 12754, Roadway Feature at Beginning Ramp Terminal = Weaving Lane.

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Required)

197. Location Identifier for Roadway at Beginning Ramp Terminal

Definition: Location on the roadway at the beginning ramp terminal (e.g. route-milepost for that roadway) if the ramp connects with a roadway at that point.

Attributes:

- Route and location descriptors (e.g., route and milepoint or spatial coordinates) for the roadway intersected at the beginning ramp terminal. Must be consistent with other MIRE files for linkage.

See point D in Figure 17 on page 128 for additional detail. In this example the Location Identifier for Roadway at Beginning Ramp Terminal = MP 128.06.

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Required)

198. Location of Beginning Ramp Terminal Relative to Mainline Flow

Definition: Ramps can intersect with the traffic flow of a divided or undivided roadway on either of two sides. This defines the side of the roadway flow intersected by the ramp.

Attributes:

- Right side with respect to mainline traffic flow at intersecting point.
- Left side with respect to mainline traffic flow at intersection point.
- Ramp does not intersect mainline at this point (e.g., ramp intersects another ramp).

See Figure 22 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None

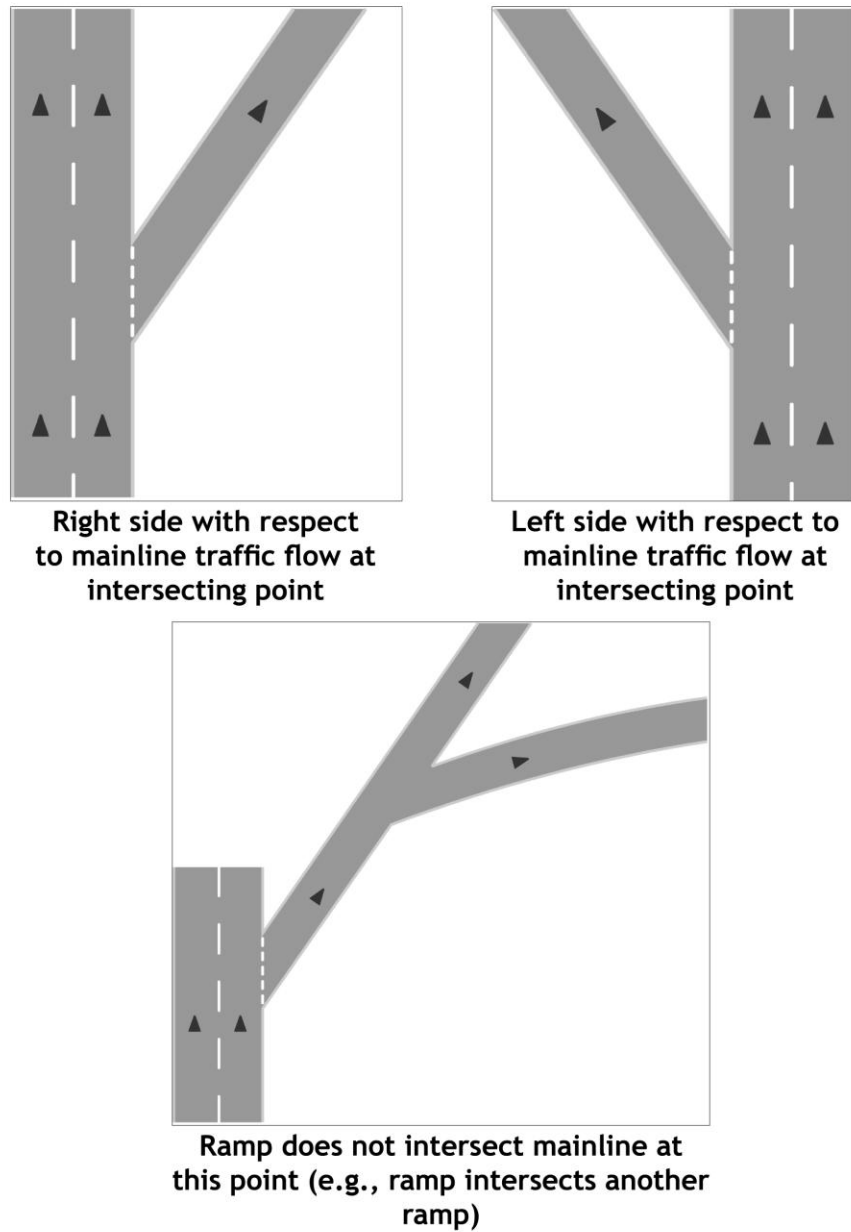


Figure 22. Illustration of Locations of Beginning Ramp Terminal Relative to Mainline Flow.

199. Roadway Type at Ending Ramp Terminal

Definition: A ramp is described by a beginning and ending ramp terminal in the direction of inventory. This element describes the type of roadway intersecting with the ramp at the ending terminal.

Attributes:

- Freeway
- Non-freeway (surface street)
- Other Ramp
- Frontage road
- Other

See point C in Figure 17 on page 128 for additional detail. For Ramp 005 R1 12806, Roadway Type at Ending Ramp Terminal = Non-freeway.

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Required)

200. Roadway Feature at Ending Ramp Terminal

Definition: The feature found at the ending terminal of the ramp.

Attributes:

- Acceleration Lane
- Deceleration Lane
- Weaving lane (e.g., the weaving area joining two ramps under an overpass in a cloverleaf interchange)
- Signalized intersection
- Stop/yield controlled intersection
- Uncontrolled intersection
- Another ramp
- Other

See point C in Figure 17 on page 128 for additional detail. For Ramp 005 R1 12806, Roadway Feature at Ending Ramp Terminal = Signalized Intersection.

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Required)

201. Location Identifier for Roadway at Ending Ramp Terminal

Definition: Location on the roadway at the ending ramp terminal (e.g. route-milepost for that roadway) if the ramp connects with a roadway at that point.

Attributes:

- Route and location descriptors (e.g., route and milepoint or spatial coordinates) for the roadway intersected at the ending ramp terminal. Must be consistent with other MIRE files for linkage.

See point E in Figure 17 on page 128 for additional detail. In this example the Location Identifier for Roadway at Ending Ramp Terminal = MP 126.77.

Priority: Critical

HPMS/Tool Requirements: SafetyAnalyst (Required Conditionally)

202. Location of Ending Ramp Terminal Relative to Mainline Flow

Definition: Ramps can intersect with the traffic flow of a divided or undivided roadway on either of two sides. This defines the side of the roadway flow intersected by the ramp.

Attributes:

- Right side with respect to mainline traffic flow at intersecting point.
- Left side with respect to mainline traffic flow at intersection point.
- Ramp does not intersect mainline at this point (e.g., ramp intersects another ramp).

See Figure 23 for additional detail.

Priority: Critical

HPMS/Tool Requirements: None

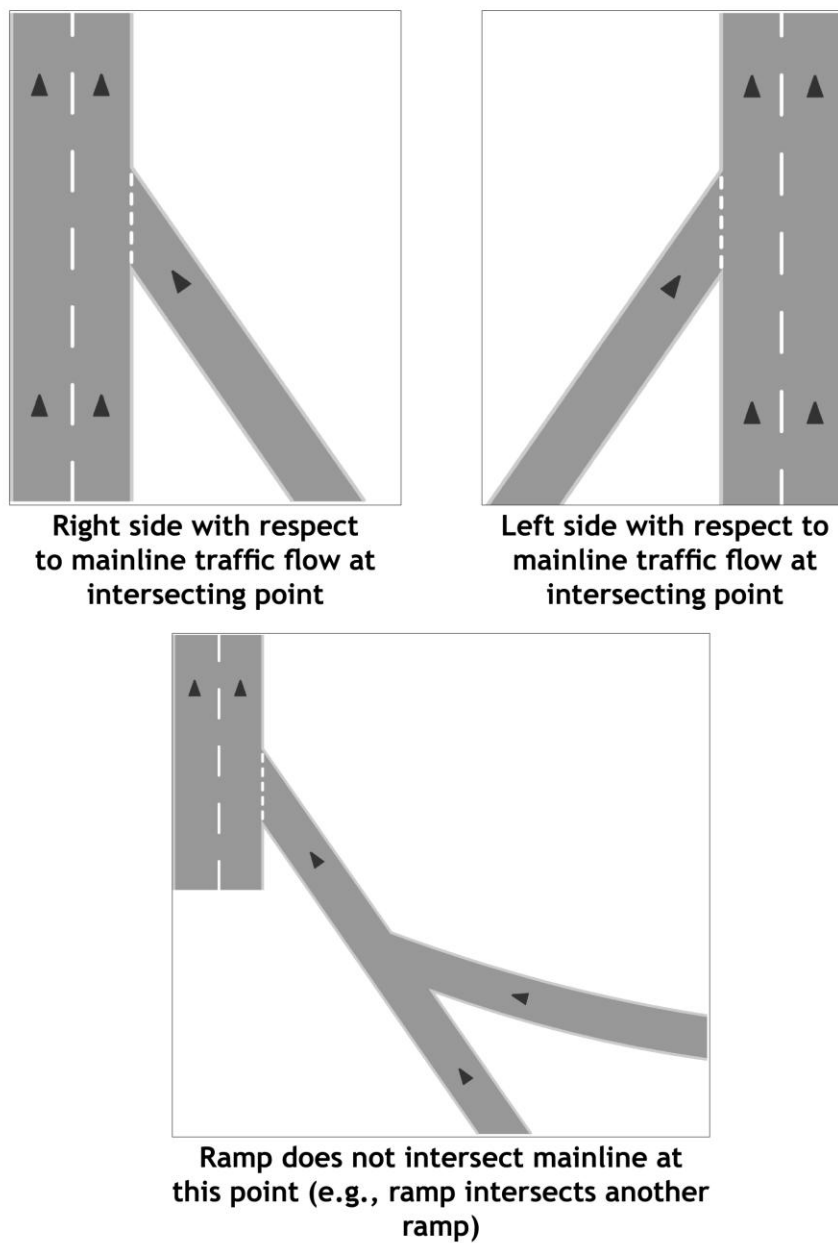


Figure 23. Illustration of Locations of Ending Ramp Terminal Relative to Mainline Flow.

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APPENDIX B: HPMS and Tools Matrix by MIRE Elements

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I. ROADWAY SEGMENT DESCRIPTORS			
I.a. Segment Location/Linkage Elements			
1. County Name	Full Extent	Required	Required Conditionally
2. County Code	Full Extent		
3. Highway District			Optional
4. Type of Governmental Ownership	Full Extent		
5. Specific Governmental Ownership			
6. City/Local Jurisdiction Name			Optional
7. City/Local Jurisdiction Urban Code			
8. Route Number	Full Extent	Required	Required
9. Route/Street Name	Full Extent		Required Conditionally
10. Begin Point Segment Descriptor	Full Extent	Required	Required
11. End Point Segment Descriptor	Full Extent	Required	Required
12. Segment Identifier	Full Extent	Required	Required
13. Segment Length	Full Extent	Required	Required
14. Route Signing	Full Extent		Required
15. Route Signing Qualifier	Full Extent		
16. Coinciding Route Indicator			
17. Coinciding Route - Minor Route Information			Required
18. Direction of Inventory		Required	Required Conditionally
I.b. Segment Classification			
19. Functional Class	Full Extent and Ramps	Required	Required
20. Rural/Urban Designation	Full Extent and Ramps	Required	Required
21. Federal Aid/ Route Type	Full Extent and Ramps		
22. Access Control	Full Extent and Ramps*, Sample*		Required
I.c. Segment Cross Section			
I.c.1. Surface Descriptors			
23. Surface Type	Sample	Required	
24. Total Paved Surface Width			
25. Surface Friction			
26. Surface Friction Date			

MIRE Version 1.0 Element	Highway Performance Monitoring System (HPMS)	Highway Safety Manual (HSM)/ Interactive Highway Safety Design Model (IHSDM)	SafetyAnalyst
27. Pavement Roughness/Condition	Full Extent and Ramps*, Sample*		
28. Pavement Roughness Date	Full Extent and Ramps*, Sample *		
29. Pavement Condition (Present Serviceability Rating)	Sample		
30. Pavement Condition (PSR) Date	Sample		
I.c.2. Lane Descriptors			
31. Number of Through Lanes	Full Extent and Ramps	Required	Required
32. Outside Through Lane Width		Required	Optional
33. Inside Through Lane Width		Required	Optional
34. Cross Slope		Required	
35. Auxiliary Lane Presence/Type		Required	Required
36. Auxiliary Lane Length		Required	
37. HOV Lane Presence/Type	Full Extent		
38. HOV Lanes	Full Extent		
39. Reversible Lanes			
40. Presence/Type of Bicycle Facility			Optional
41. Width of Bicycle Facility			
42. Number of Peak Period Through Lanes	Sample		
I.c.3. Shoulder Descriptors			
43. Right Shoulder Type	Sample	Required	Optional
44. Right Shoulder Total Width	Sample	Required	Optional
45. Right Paved Shoulder Width		Required	
46. Right Shoulder Rumble Strip Presence/Type			
47. Left Shoulder Type		Required	Optional
48. Left Shoulder Total Width	Sample	Required	Optional
49. Left Paved Shoulder Width		Required	
50. Left Shoulder Rumble Strip Presence/Type			
51. Sidewalk Presence			
52. Curb Presence			
53. Curb Type			
I.c.4. Median Descriptors			
54. Median Type	Sample	Required	Required
55. Median Width	Sample	Required	Optional
56. Median Barrier Presence/Type	Sample		

MIRE Version 1.0 Element	Highway Performance Monitoring System (HPMS)	Highway Safety Manual (HSM)/ Interactive Highway Safety Design Model (IHSDM)	SafetyAnalyst
57. Median (Inner) Paved Shoulder Width			Optional
58. Median Shoulder Rumble Strip Presence/Type			
59. Median Sideslope			
60. Median Sideslope Width			
61. Median Crossover/Left Turn Lane Type			
I.d. Segment Roadside Descriptors			
62. Roadside Clear zone Width			
63. Right Sideslope		Required	
64. Right Sideslope Width			
65. Left Sideslope		Required	
66. Left Sideslope Width			
67. Roadside Rating		Required	
68. Major Commercial Driveway Count		Required	Optional
69. Minor Commercial Driveway Count		Required	Optional
70. Major Residential Driveway Count		Required	Optional
71. Minor Residential Driveway Count		Required	Optional
72. Major Industrial/Institutional Driveway Count		Required	Optional
73. Minor Industrial/Institutional Driveway Count		Required	Optional
74. Other Driveway Count		Required	Optional
I.e. Other Segment Descriptors			
75. Terrain Type	Sample		Optional
76. Number of Signalized Intersections in Segment	Sample		
77. Number of Stop-Controlled Intersections in Segment	Sample		
78. Number of Uncontrolled/Other Intersections in Segment	Sample		
I.f. Segment Traffic Flow Data			
79. Annual Average Daily Traffic (AADT)	Full Extent and Ramps	Required	Required
80. AADT Year	Full Extent and Ramps	Required	Required
81. AADT Annual Escalation Percentage			Optional

MIRE Version 1.0 Element	Highway Performance Monitoring System (HPMS)	Highway Safety Manual (HSM)/ Interactive Highway Safety Design Model (IHSDM)	SafetyAnalyst
82. Percent Single Unit Trucks or Single Truck AADT	Full Extent and Ramps*, Sample*		
83. Percent Combination Trucks or Combination Truck AADT	Full Extent and Ramps*, Sample*		
84. Percentage Trucks or Truck AADT			Optional
85. Total Daily Two-Way Pedestrian Count/Exposure			
86. Bicycle Count/Exposure			
87. Motorcycle Count or Percentage	Full Extent		
88. Hourly Traffic Volumes (or Peak and Off-Peak AADT)			Optional
89. K-Factor	Sample		
90. Directional Factor	Sample		
I.g. Segment Traffic Operations/Control Data			
91. One/Two-Way Operations	Full Extent and Ramps	Required	Required
92. Speed Limit	Sample	Required	Optional
93. Truck Speed Limit			
94. Nighttime Speed Limit			
95. 85th Percentile Speed			
96. Mean Speed			
97. School Zone Indicator			
98. On-Street Parking Presence		Required	
99. On-Street Parking Type	Sample	Required	
100. Roadway Lighting		Required	
101. Toll Facility	Full Extent		
102. Edgeline Presence/Width			
103. Centerline Presence/Width			
104. Centerline Rumble Strip Presence/Type		Required	
105. Passing Zone Percentage		Required	
I.h. Other Supplemental Segment Descriptor			
106. Bridge Numbers for Bridges in Segment			
II. Roadway Alignment Descriptors			
II.a. Horizontal Curve Data			
107. Curve Identifiers and Linkage Elements		Required	
108. Curve Feature Type		Required	

MIRE Version 1.0 Element	Highway Performance Monitoring System (HPMS)	Highway Safety Manual (HSM)/ Interactive Highway Safety Design Model (IHSDM)	Safety Analyst
109. Horizontal Curve Degree or Radius	Sample*	Required	
110. Horizontal Curve Length		Required	
111. Curve Superelevation		Required	
112. Horizontal Transition/Spiral Curve Presence		Required	
113. Horizontal Curve Intersection/Deflection Angle			
114. Horizontal Curve Direction			
II.b. Vertical Grade Data			
115. Grade Identifiers and Linkage Elements		Required	
116. Vertical Alignment Feature Type		Required	
117. Percent of Gradient	Sample*	Required	
118. Grade Length		Required	
119. Vertical Curve Length			
III. Roadway Junction Descriptors			
III.a. At-Grade Intersection/Junctions			
III.a.1. General Descriptors			
120. Unique Junction Identifier		Required	Required
121. Type of Intersection/Junction		Required	Required
122. Location Identifier for Road 1 Crossing Point		Required	Required
123. Location Identifier for Road 2 Crossing Point		Required	Required Conditionally
124. Location Identifier for Additional Road Crossing Points		Required	Required Conditionally
125. Intersection/Junction Number of Legs		Required	
126. Intersection/Junction Geometry		Required	Required
127. School Zone Indicator			
128. Railroad Crossing Number			
129. Intersecting Angle		Required	
130. Intersection/Junction Offset Distance			Optional
131. Intersection/Junction Traffic Control		Required	Required
132. Signalization Presence/Type			Required
133. Intersection/Junction Lighting		Required	

MIRE Version 1.0 Element	Highway Performance Monitoring System (HPMS)	Highway Safety Manual (HSM)/ Interactive Highway Safety Design Model (IHSDM)	Safety Analyst
134. Circular Intersection - Number of Circulatory Lanes			
135. Circular Intersection - Circulatory Lane Width			
136. Circular Intersection—Inscribed Diameter			
137. Circular Intersection—Bicycle Facility			
III.a.2. At Grade Intersection/Junction Descriptors (Each Approach)			
138. Intersection Identifier for this Approach		Required	
139. Unique Approach Identifier		Required	Required
140. Approach AADT		Required	Required Conditionally
141. Approach AADT Year		Required	Required Conditionally
142. Approach Mode			
143. Approach Directional Flow		Required	Optional
144. Number of Approach Through Lanes		Required	Optional
145. Left Turn Lane Type			
146. Number of Exclusive Left Turn Lanes		Required	Optional
147. Amount of Left Turn Lane Offset			
148. Right Turn Channelization		Required	
149. Traffic Control of Exclusive Right Turn Lanes			
150. Number of Exclusive Right Turn Lanes		Required	Optional
151. Length of Exclusive Left Turn Lanes			
152. Length of Exclusive Right Turn Lanes			
153. Median Type at Intersection			Optional
154. Approach Traffic Control			
155. Approach Left Turn Protection		Required	Required
156. Signal Progression			
157. Crosswalk Presence/Type			
158. Pedestrian Signalization Type			
159. Pedestrian Signal Special Features			
160. Crossing Pedestrian Count/Exposure			

MIRE Version 1.0 Element	Highway Performance Monitoring System (HPMS)	Highway Safety Manual (HSM)/ Interactive Highway Safety Design Model (IHSDM)	Safety Analyst
161. Left/Right Turn Prohibitions			Optional
162. Right Turn-On-Red Prohibitions		Required	
163. Left Turn Counts/Percent			Optional
164. Year of Left Turn Counts/Percent			Required
165. Right Turn Counts/Percent			Optional
166. Year of Right Turn Counts/Percent			Required
167. Transverse Rumble Strip Presence			
168. Circular Intersection—Entry Width			
169. Circular Intersection—Number of Entry Lanes			
170. Circular Intersection—Presence/Type of Exclusive Right Turn Lane			
171. Circular Intersection—Entry Radius			
172. Circular Intersection—Exit Width			
173. Circular Intersection—Number of Exit Lanes			
174. Circular Intersection—Exit Radius			
175. Circular Intersection—Pedestrian Facility			
176. Circular Intersection—Crosswalk Location (Distance From Yield Line)			
177. Circular Intersection—Island Width			
III.b. Interchange and Ramp Descriptors			
III.b.1. General Interchange Descriptors			
178. Unique Interchange Identifier			
179. Location Identifier for Road 1 Crossing Point			
180. Location Identifier for Road 2 Crossing Point			
181. Location Identifier for Additional Road Crossing Points			
182. Interchange Type			Required
183. Interchange Lighting			
184. Interchange Entering Volume			
III.b.2. Interchange Ramp Descriptors			

MIRE Version 1.0 Element	Highway Performance Monitoring System (HPMS)	Highway Safety Manual (HSM)/ Interactive Highway Safety Design Model (IHSDM)	SafetyAnalyst
185. Interchange Identifier for this Ramp			
186. Unique Ramp Identifier			Required
187. Ramp Length			Required
188. Ramp Acceleration Lane Length			
189. Ramp Deceleration Lane Length			
190. Ramp Number of Lanes			Optional
191. Ramp AADT			Required
192. Year of Ramp AADT			Required
193. Ramp Metering			
194. Ramp Advisory Speed Limit			
195. Roadway Type at Beginning Ramp Terminal			Required
196. Roadway Feature at Beginning Ramp Terminal			Required
197. Location Identifier For Roadway at Beginning Ramp Terminal			Required
198. Location of Beginning Ramp Terminal Relative to Mainline Flow			
199. Roadway Type at Ending Ramp Terminal			Required
200. Roadway Feature at Ending Ramp Terminal			Required
201. Location Identifier for Roadway at Ending Ramp Terminal			Required Conditionally
202. Location of Ending Ramp Terminal Relative to Mainline Flow			

*Collection requirements differ based on functional class.

APPENDIX C: Supplementary SafetyAnalyst Matrix

THE FOLLOWING MATRIX PROVIDES INFORMATION LINKING MIRE VARIABLES TO REQUIRED, REQUIRED CONDITIONALLY, AND OPTIONAL VARIABLES IN SAFETYANALYST. THE COMMENTS ARE PARTICULARLY RELEVANT TO THE REQUIRED CONDITIONALLY VARIABLES.

MIRE Element	SafetyAnalyst Category	SafetyAnalyst Variable	SafetyAnalyst Description	Required	Comment
1. County Name	Geographic Description	county	County	Required conditionally	Required when location system is Route/County/Milepost
3. Highway District	Geographic Description	district	District	Optional	When available, can be used in site list query
6. City/Local Jurisdiction Name	Geographic Description	city	City/Town	Optional	When available, can be used in site list query
7. City/Local Jurisdiction Name	Geographic Description	jurisdiction	Jurisdiction	Optional	When available, can be used in site list query
8. Route Number	Roadway Segment	routeDisplayName	Route Number Display Value	Optional	Used for display/ information only
8. Route Number	Geographic Description	routeName	Route Name	Required	Required during data import
8. Route Number	Intersection	routeDisplayName	Route Number Display Value	Optional	Used for display/ information only
9. Route/Street Name	Geographic Description	majorRoadName	Major Road Name	Optional	Used for display/ information only
9. Route/Street Name	Intersection	minorRoadName	Minor Road Name	Required conditionally	Required unless user assigns Segment ID to each crash
10. Begin Point Segment Descriptor	Roadway Segment	location	Start Location	Required	Required during data import
11. End Point Segment Descriptor	Roadway Segment	end	End Location	Required	Required during data import
12. Segment Identifier	Roadway Segment	agencyID	Segment ID	Required	Required during data import

MIRE Element	SafetyAnalyst Category	SafetyAnalyst Variable	SafetyAnalyst Description	Required	Comment
12. Segment Identifier	Intersection Leg	segmentID	Segment ID	Required	Required during data import
13. Segment Length	Roadway Segment	segmentLength	Segment Length	Required	Required for post-processing (Site list query)
14. Route Signing	Geographic Description	routeType	Route Type	Required	Required during data import
17. Coinciding Route - Minor Route Information	Alternate Route Name	routeName	Route Name	Required	Required during data import
18. Direction of Inventory	Roadway Segment	travelDirection	Direction of Travel	Required conditionally	Required unless user assigns Segment ID to each crash
19. Functional Class	Roadway Segment	roadwayClass1	Roadway Class Level 1	Required	Required for post-processing site subtype assignment
20. Rural/Urban Designation	Geographic Description	areaType	Area Type	Required	Required for post-processing site subtype assignment
22. Access Control	Roadway Segment	accessControl	Access Control	Required	Required for post-processing site subtype assignment
31. Number of Through Lanes	Directional Attributes	numThruLane	Number of Through Lanes	Required	Required for post-processing site subtype assignment
32. Outside Through Lane Width 33. Inside Through Lane Width	Directional Attributes	avgLaneWidth	Average Lane Width	Optional	When available, will be used by some AMFs in Module 3
35. Auxiliary Lane Presence/Type	Auxiliary Lane	auxLaneType	Auxiliary Lane Type	Required	The number of auxiliary is used in Module 3
40. Presence/Type of Bicycle Facility	Directional Attributes	bikeway	Bikeway	Optional	When available, will be used by some AMFs in Module 3
43. Right Shoulder Type 47. Left Shoulder Type	Directional Attributes	shoulderTypeOut	Shoulder Type - Outside	Optional	When available, will be used by some AMFs in Module 3
44. Right Shoulder Total Width 48. Left Shoulder Total Width	Directional Attributes	avgShoulderWidthOut	Average Shoulder Width - Outside	Optional	When available, will be used by some AMFs in Module 3
54. Median Type	Roadway Segment	medianType1	Median Type Level 1	Required	Required for post-processing site subtype assignment

MIRE Element	SafetyAnalyst Category	SafetyAnalyst Variable	SafetyAnalyst Description	Required	Comment
55. Median Width	Roadway Segment	medianWidth	Median Width	Optional	When available, considered in homogeneous segment aggregation
57. Median (Inner) Paved Shoulder Width	Directional Attributes	avgShoulderWidthIn	Average Shoulder Width - Inside	Optional	When available, will be used by some AMFs in Module 3
57. Median (Inner) Paved Shoulder Width	Directional Attributes	shoulderTypeIn	Shoulder Type - Inside	Optional	When available, will be used by some AMFs in Module 3
68. Major Commercial Driveway Count 69. Minor Commercial Driveway Count 70. Major Residential Driveway Count 71. Minor Residential Driveway Count 72. Major Industrial/Institutional Driveway Count 73. Minor Industrial/Institutional Driveway Count 74. Other Driveway Count	Roadway Segment	drivewayDensity	Driveway Density	Optional	When available, considered in homogeneous segment aggregation
75. Terrain Type	Roadway Segment	terrain	Terrain	Optional	When available, considered in homogeneous segment aggregation
79. Annual Average Daily Traffic (AADT)	Annual Traffic	aadtVPD	AADT	Required	Required during data import
79. Annual Average Daily Traffic (AADT)	Major Road Annual Traffic	aadtVPD	AADT	Required	Required during data import
79. Annual Average Daily Traffic (AADT)	Minor Road Annual Traffic	aadtVPD	AADT	Required	Required during data import
80. AADT Year	Annual Traffic	calendarYear	Year	Required	Required during data import
80. AADT Year	Major Road Annual Traffic	calendarYear	Year	Required	Required during data import
80. AADT Year	Minor Road Annual Traffic	calendarYear	Year	Required	Required during data import

MIRE Element	SafetyAnalyst Category	SafetyAnalyst Variable	SafetyAnalyst Description	Required	Comment
81. AADT Annual Escalation Percentage	Roadway Segment	growthFactor	Growth Factor	Optional	If available, used in post processing to estimate missing traffic volume
81. AADT Annual Escalation Percentage	Intersection	growthFactor	Growth Factor	Optional	If available, used in post processing to estimate missing traffic volume
84. Percentage Trucks or Truck AADT	Annual Traffic	percentHeavyVehicles	Heavy Vehicles	Optional	
88. Hourly Traffic Volumes (or Peak and Off-Peak AADT)	Annual Traffic	peakHourlyVolume	Peak or Design Volume	Optional	
91. One/Two-Way Operations	Roadway Segment	operationWay	Two-Way vs. One-Way Operation	Required	Required for post-processing site subtype assignment
92. Speed Limit	Roadway Segment	postedSpeed	Speed Limit	Optional	
92. Speed Limit	Intersection Leg	postedSpeed	Speed Limit	Optional	
120. Unique Junction Identifier	Intersection	agencyID	Intersection ID	Required	Required during data import
121. Type of Intersection/ Junction	MIRE "Type of Junction/Intersection" is required to identify roadway to roadway intersections for SafetyAnalyst		Required		
122. Location Identifier for Road 1 Crossing Point	Intersection	location	Location	Required	Required during data import
122. Location Identifier for Road 1 Crossing Point	Intersection Leg	location	Leg Location	Optional	If available, used in post processing for accident site assignment
123. Location Identifier for Road 2 Crossing Point 124. Location Identifier for Additional Road Crossing Points	Intersection	minorLocation	Minor Road Location	Required conditionally	Required unless user assigns Segment ID to each crash

MIRE Element	SafetyAnalyst Category	SafetyAnalyst Variable	SafetyAnalyst Description	Required	Comment
126. Intersection/Junction Geometry	Intersection	intersectionType1	Intersection Type Level 1	Required	Required for post-processing site subtype assignment
130. Intersection/Junction Offset Distance	Intersection	offsetDistance	Offset Distance	Optional	
130. Intersection/Junction Offset Distance	Intersection	offsetIntersection	Offset Intersection	Optional	
131. Intersection/Junction Traffic Control 132. Signalization Presence/Type 155. Approach Left Turn Protection	Intersection	trafficControl1	Traffic Control Type at Intersection Level 1	Required	Required for post-processing site subtype assignment
131. Intersection/ Junction Traffic Control	Intersection	trafficControl2	Traffic Control Type at Intersection Level 2	Optional	
131. Intersection/ Junction Traffic Control	Intersection	trafficControl3	Traffic Control Type at Intersection Level 3	Optional	
139. Unique Approach Identifier	Intersection Leg	legID	Leg ID	Required	Required during data import
140. Approach AADT	Leg Annual Traffic	aadtVPD	AADT	Required conditionally	Required only if minor/major road AADT is missing
141. Approach AADT Year	Leg Annual Traffic	calendarYear	Year	Required conditionally	Required only if minor/major road AADT is missing
143. Approach Directional Flow	Intersection Leg	operationWay	Operation	Optional	
144. Number of Approach Through Lanes	Intersection Leg	legNumThruLane	Thru Lanes	Optional	When available, will be used in collision diagram viewer
146. Number of Exclusive Left Turn Lanes	Intersection Leg	legNumLeftTurnLane	Lt-Turn Lanes	Optional	
150. Number of Exclusive Right Turn Lanes	Intersection Leg	legNumRightTurnLane	Rt-Turn Lanes	Optional	

MIRE Element	SafetyAnalyst Category	SafetyAnalyst Variable	SafetyAnalyst Description	Required	Comment
153. Median Type at Intersection	Intersection Leg	legMedianType	Median Type	Optional	
155. Approach Left Turn Protection	Intersection Leg	leftTurnPhasing	Left-Turn Phasing	Optional	
161. Left/Right Turn Prohibitions	Intersection Leg	turnProhibitions	Turn Prohibitions	Optional	
163. Left Turn Counts/ Percent	Leg Vehicle Movements	leftTurnVolume	Lt-Turn Volume	Optional	
164. Year of Left Turn Counts/ Percent 166. Year of Right Turn Counts/ Percent	Leg Vehicle Movements	calendarYear	Year	Required	Required during data import
165. Right Turn Counts/ Percent	Leg Vehicle Movements	rightTurnVolume	Rt-Turn Volume	Optional	
182. Interchange Type	Ramp	rampConfiguration	Ramp Configuration	Required	Required for post-processing site subtype assignment
186. Unique Ramp Identifier	Ramp	agencyID	Ramp ID	Required	Required during data import
187. Ramp Length	Ramp	rampLength	Ramp Length	Required	Required for post-processing if ramp end location is not specified
190. Ramp Number of Lanes	Ramp	numOfLanes	Ramp Number of Lanes	Optional	
191. Ramp AADT	Ramp Annual Traffic	aadtVPD	AADT	Required	Required during data import
192. Year of Ramp AADT	Ramp Annual Traffic	calendarYear	Year	Required	Required during data import
195. Roadway Type at Beginning Ramp Terminal 196. Roadway Feature at Beginning Ramp Terminal 199. Roadway Type at Ending Ramp Terminal 200. Roadway Feature at Ending Ramp Terminal	Ramp	rampType	Ramp Type	Required	Required for post-processing site subtype assignment

MIRE Element	SafetyAnalyst Category	SafetyAnalyst Variable	SafetyAnalyst Description	Required	Comment
196. Roadway Feature at Beginning Ramp Terminal	Ramp	rampFreewayConnection	Type of Connection (At Freeway)	Optional	
197. Location Identifier For Roadway at Beginning Ramp Terminal	Ramp	location	Start Location	Required	Required during data import
200. Roadway Feature at Ending Ramp Terminal	Ramp	rampCrossroadConnection	Type of Connection (At Crossroad)	Optional	
201. Location Identifier for Roadway at Ending Ramp Terminal	Ramp	endLocation	End Location	Required conditionally	Required for post-processing if ramp length is not specified
201. Location Identifier for Roadway at Ending Ramp Terminal	Ramp	rampToID	To Segment	Optional	

The following SafetyAnalyst variables are either defined by (and thus known to) the user agency or can be calculated using MIRE variables.

SafetyAnalyst Category	SafetyAnalyst Variable	SafetyAnalyst Description	Required	Known/ Calculated	Comment
Roadway Segment	increasingMileposts	Direction of Increasing Mileposts or Distances	Optional	Known	When available, will be used in collision diagram viewer
Roadway Segment	discontinuity	Discontinuity	Required conditionally	Calculated	Required for use with sliding window and in forming longer homogeneous sections
Roadway Segment	interchangeInfluence	Interchange Influence Area on Mainline Freeway	Required	Calculated	Required for post-processing site subtype assignment
Directional Attributes	direction	Direction	Required	Calculated	Required during data import
Intersection	majorRoadDirection	Major Road Direction	Required conditionally	Calculated	Required unless user assigns Segment ID to each crash
Intersection	majBeginInfluenceZone	Begin Influence Zone - Major Road	Required conditionally	Calculated	Required unless user assigns Segment ID to each crash
Intersection	majEndInfluenceZone	End Influence Zone - Major Road	Required conditionally	Calculated	Required unless user assigns Segment ID to each crash
Intersection	minBeginInfluenceZone	Begin Influence Zone - Minor Road	Required conditionally	Calculated	Required unless user assigns Segment ID to each crash
Intersection	minEndInfluenceZone	End Influence Zone - Minor Road	Required conditionally	Calculated	Required unless user assigns Segment ID to each crash

SafetyAnalyst Category	SafetyAnalyst Variable	SafetyAnalyst Description	Required	Known/ Calculated	Comment
Intersection Leg	influenceZone	Influence Zone	Optional	Calculated	If available, used in post processing for accident site assignment
Leg Vehicle Movements	throughVolume	Thru Volume	Optional	Calculated	

The following SafetyAnalyst variables are not in MIRE Version 1.0. They may be added in later versions.

SafetyAnalyst Category	SafetyAnalyst Variable	SafetyAnalyst Description	Required	Comment
Roadway Segment	gisID	GIS Identifier	Optional	When available, used by GIS interface
Roadway Segment	growthSource	Growth Factor Source	Optional	If available, used in post processing to estimate missing traffic volume
Roadway Segment	openedToTraffic	Date Opened to Traffic	Required conditionally	Required for sections opened after first accident/ADT year
Geographic Description	corridor	Corridor	Optional	If available, used in Module 1 corridor screening
Intersection	openedToTraffic	Date Opened to Traffic	Required conditionally	Required for sections opened after first accident/ADT year
Intersection	agencySiteSubtype	Agency Site Subtype	Optional	When available, can be used in site list query
Intersection	gisID	GIS Identifier	Optional	When available, used by GIS interface
Intersection	growthSource	Growth Factor Source	Optional	If available, used in post processing to estimate missing traffic volume
Intersection Leg	legDirection	Direction	Required conditionally	Only required for collision diagram (Collision Diagram Viewer)
Intersection Leg	legType	Type	Required	Required for post-processing to validate intersection type

SafetyAnalyst Category	SafetyAnalyst Variable	SafetyAnalyst Description	Required	Comment
Ramp	agencySiteSubtype	Agency Site Subtype	Optional	
Ramp	gisID	GIS Identifier	Optional	When available, used by GIS interface
Ramp	growthFactor	Growth Factor	Optional	If available, used in post processing to estimate missing traffic volume
Ramp	growthSource	Growth Factor Source	Optional	If available, used in post processing to estimate missing traffic volume
Ramp	openedToTraffic	Date Opened to Traffic	Required conditionally	Required for ramps opened after first accident/ADT year
Ramp	routeDisplayName	Route Number Display Value	Optional	Used for display/information only