

PM2 Pavement SOP Overview

RPUG 2017

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U.S. Department of Transportation
Federal Highway Administration
Office of Highway Policy Information

(1)

Introduction/Overview

- **SOP Background**
- **Metrics, Thresholds, and Measures**
- **Targets and Measures**
- **Required HPMS Data Elements**
- **Bridge Exclusion**
- **Timelines**



PM2 Standard Operating Procedures (SOP)

- Document to describe FHWA steps to process performance measures from time when data sets are available to time of publication of calculated measures.
- Guide to ensure consistency and transparency in measure calculation and progress evaluation to effectively carryout requirements per the law.
- Serves as reference describing FHWA roles and responsibilities to implement the law.
- Reflects the issued final rule.
- Detailed and illustrated guide of complete step-by-step process



Metrics, Thresholds & Measures

Each Pavement Section or Reporting Segment

METRIC
A quantifiable indicator of performance or condition

THRESHOLD
As used in the rule, the level for a segment that would determine condition rating or its inclusion in the measure

Entire Applicable Network

MEASURE
An expression based on a metric, used to establish targets and to assess progress toward achieving the established target

Example

IRI, RUTTING,
FAULTING,
CRACKING_PERCENT,

Good = IRI <95 &
RUTTING <0.20 &
CRACKING <5

1,000 lane-miles Good
2,000 total* lane-miles
= 50.0 % Good

*Bridge, missing/invalid/unresolved data, & unpaved/other surface type excluded for Pavement measures

Reference: 23 CFR 490.101



Targets & Measures

Established by: FHWA

MEASURE

An expression used to establish targets and to assess progress toward achieving the established target

Percentage of pavements of the Interstate System in Good condition

Established by: State DOTs & MPOs

TARGET

A quantifiable level of performance or condition, as a value for a measure, to be achieved within a time period required by FHWA

Target: 80.0%
Actual: 83.7%
✓ **Target Achieved**

Example



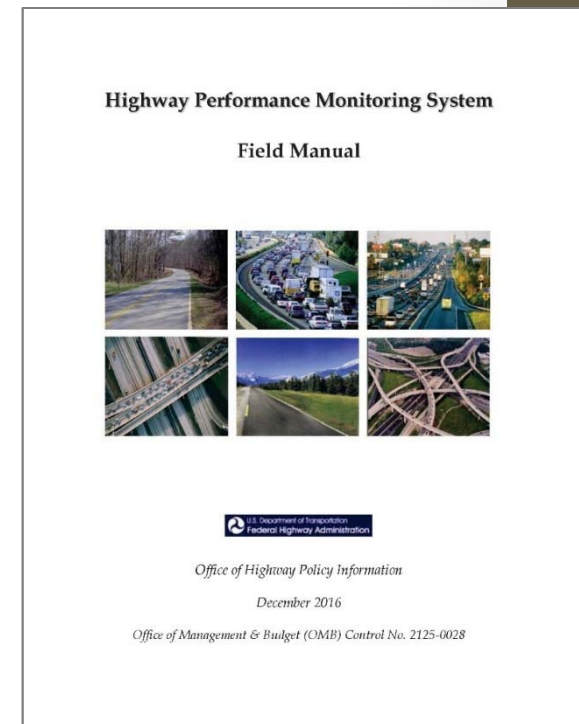
Measure: Pavement Condition (PM2)

- Percentage of Interstate pavements in Good Condition
- Percentage of Interstate pavements in Poor Condition
- Percentage of non-Interstate NHS pavements in Good Condition
- Percentage of non-Interstate NHS pavements in Poor Condition



Supporting Data Systems: HPMS

- Official Federal source of data on the extent, condition, performance, use and operating characteristics of the nation's highways
- Populated by States using each State's linear referencing system
- Data requirements in the *HPMS Field Manual, December 2016* version



Data Needed for Calculating the National Pavement Measures

Inventory Data:

- NHS
- Facility Type
- Through lanes*
- Functional system
- Surface type
- Structure type
- Urban code

* Directional Through lanes for dual-carriage reporting for Interstates



Data Needed for Calculating the National Pavement Measures

Condition Data:

- Roughness (IRI) (MRI)
- Rutting (asphalt pavements only)
- Cracking Percent
- Faulting (concrete pavements only)
- Can use Present Serviceability Rating (PSR) only where speed limit < 40 mph



Interstate Pavement Condition Measures

- “Percentage of pavements of the Interstate System in **Good** condition”

LM of IS Pavement in **Good**

LM of IS – LM of Bridges – LM Unpaved Other Surface – LM MIU

- “Percentage of pavements of the Interstate System in **Poor** condition”

LM of IS Pavement in **Poor**

LM of IS – LM of Bridges – LM Unpaved Other Surface – LM MIU

Note: MIU= Missing, Invalid, Unresolved



Non-Interstate NHS Pavement Condition Measures

- “Percentage of pavements of the Non-Interstate NHS in **Good** condition”

LM of NIN Pavement in **Good**

LM of NIN – LM of Bridges – LM Unpaved Other Surface – LM MIU

- “Percentage of pavements of the Non-Interstate NHS in **Poor** condition”

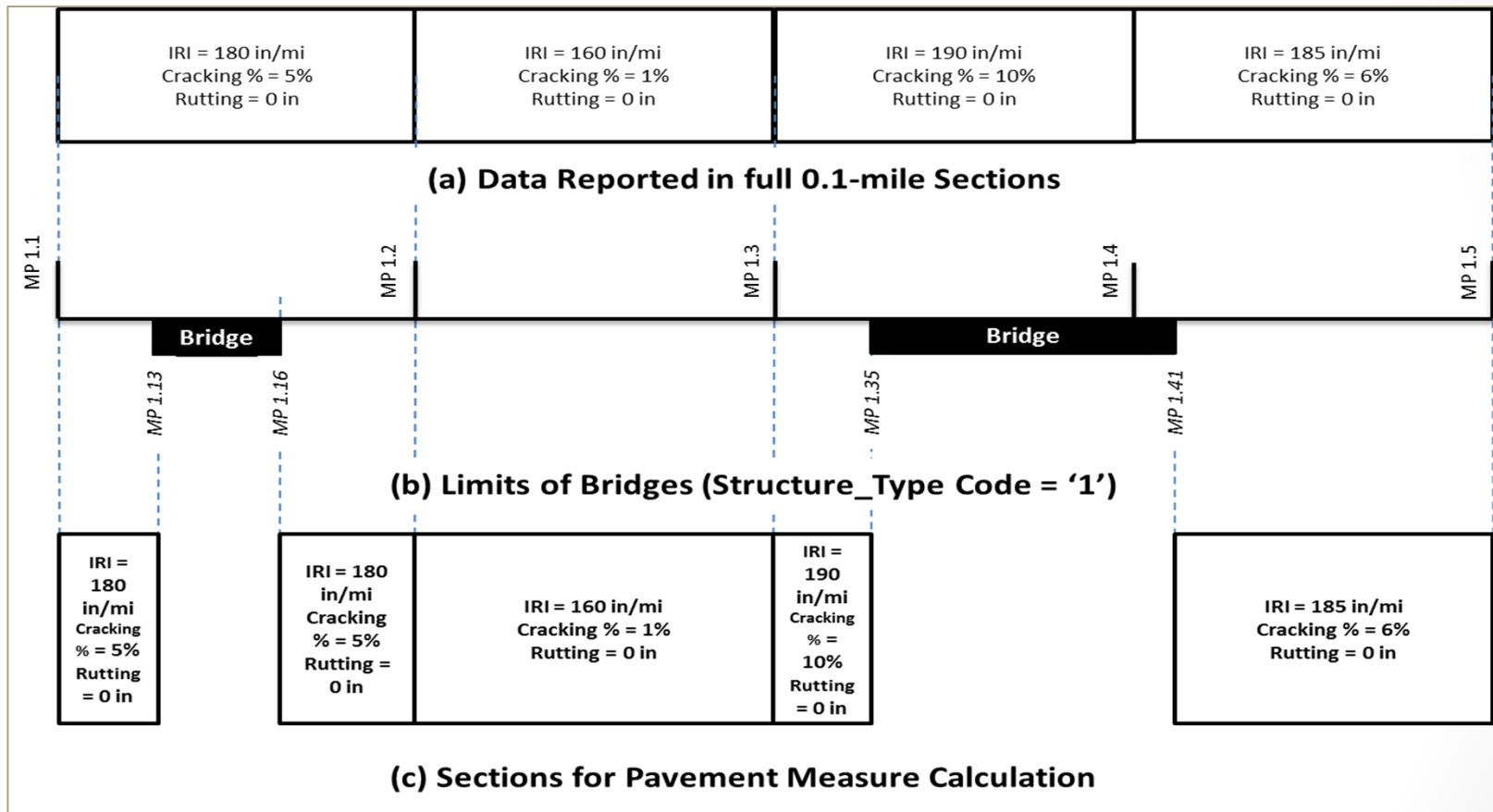
LM of NIN Pavement in **Poor**

LM of NIN – LM of Bridges – LM Unpaved Other Surface – LM MIU

Note: MIU= Missing, Invalid, Unresolved

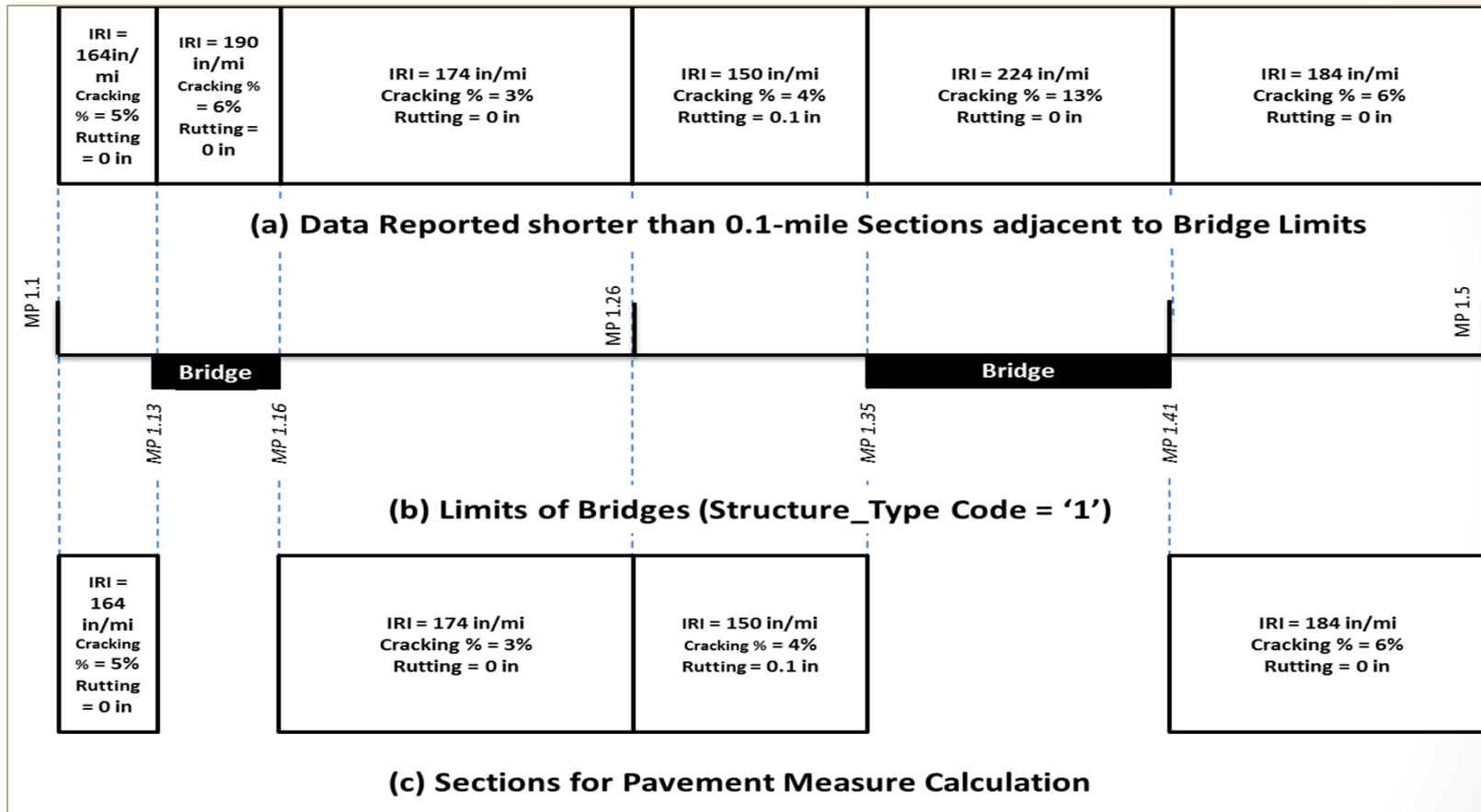


Bridge Exclusion



An example of 0.10 mile pavement section with data measured in full 0.10 mile sections

Bridge Exclusion



An example of < 0.10 mile pavement sections adjacent to bridge limits where data is measured separately for each section

Determining Condition for a Section

- Evaluate each of the metrics for the section to determine whether the section is good, fair or poor with respect to:
 - Asphalt: IRI, rutting, cracking %
 - JCP: IRI, faulting, cracking %
 - CRCP: IRI, cracking %
- Determine overall condition for the section based on the number of metrics that are good, fair and poor



Pavement Condition Thresholds

	Good	Fair	Poor
IRI (inches/mile)	<95	95-170	>170
Rutting (inches)	<0.20	0.20-0.40	>0.40
Faulting (inches)	<0.10	0.10-0.15	>0.15
Cracking (%)	<5	5-20 (asphalt) 5-15 (JCP) 5-10 (CRCP)	>20 (asphalt) >15 (JCP) >10 (CRCP)



Calculation of Pavement Measures

Overall Section Condition Rating	Pavements with Speed Limit less than 40 MPH	Measures
Good	$PSR \geq 4.0$	% of lane-miles in "Good" condition
Poor	$PSR \leq 2.0$	% of lane-miles in "Poor" condition
Fair	$2.0 < PSR < 4.0$	

Pavement Sections*

- **Spatial Coincidence of Metric Data**

- 23 CFR 490.309: States DOTs must report condition metrics (CRACKING_PERCENT, FAULTING, IRI and RUTTING) for each pavement section. HPMS Field Manual: CRACKING_PERCENT (Data Item 52), FAULTING (Data Item 51), and RUTTING (Data Item 50) is to be reported for mile-point limits that are consistent with those reported for IRI (Data Item 47).
 - Asphalt: CRACKING_PERCENT, IRI and RUTTING
 - Jointed Concrete: CRACKING_PERCENT, FAULTING, and IRI
 - CRCP: CRACKING_PERCENT and IRI

Reference: 23 CFR 490.311

- **Section Length**

- 23 CFR 490.309(b) and 23 CFR 490.311(c): State DOTs to collect condition metrics (CRACKING_PERCENT, FAULTING, IRI, PSR, and RUTTING) continuously in a manner that will allow for reporting in nominally uniform pavement section lengths of 0.10 mile with 0.11-mile maximum length of “pavement sections.” Shorter pavement sections are permitted only at the beginning of a route, the end of a route, at bridges, or other locations where a section length of 0.1 mile is not achievable.



Pavement Sections

- **Violate Spatial Coincidence (example)**

2018|##|Route AAA|**0.000**|**0.100**|IRI|0.050|60| |01/2018|

2018|##|Route AAA|**0.100**|**0.200**|IRI|0.100|65| |01/2016|

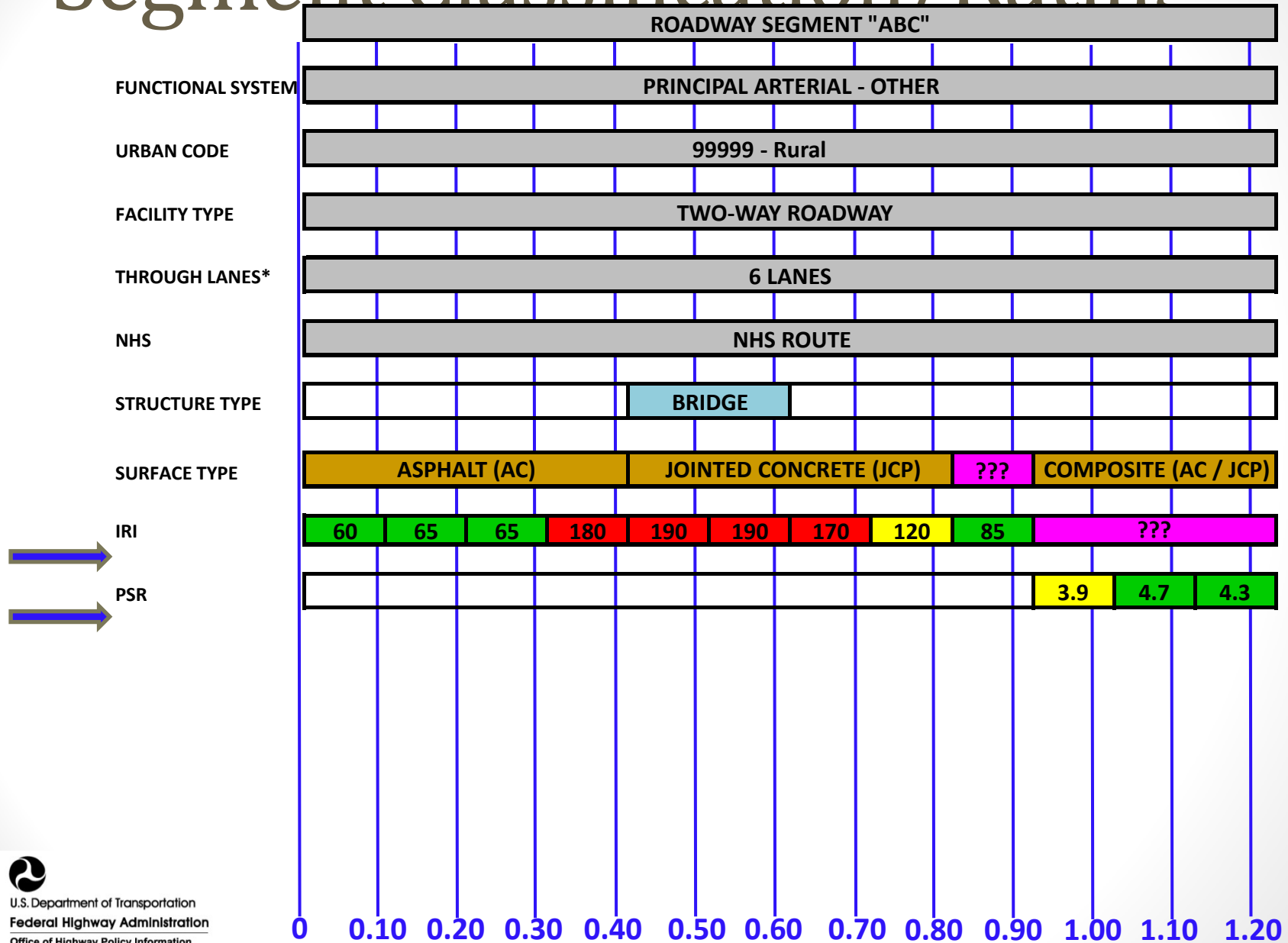
2018|##|Route AAA|**0.000**|**0.200**|**RUTTING**|0.150|0.20|
|01/2018|

- **Violate Section Length (length)**

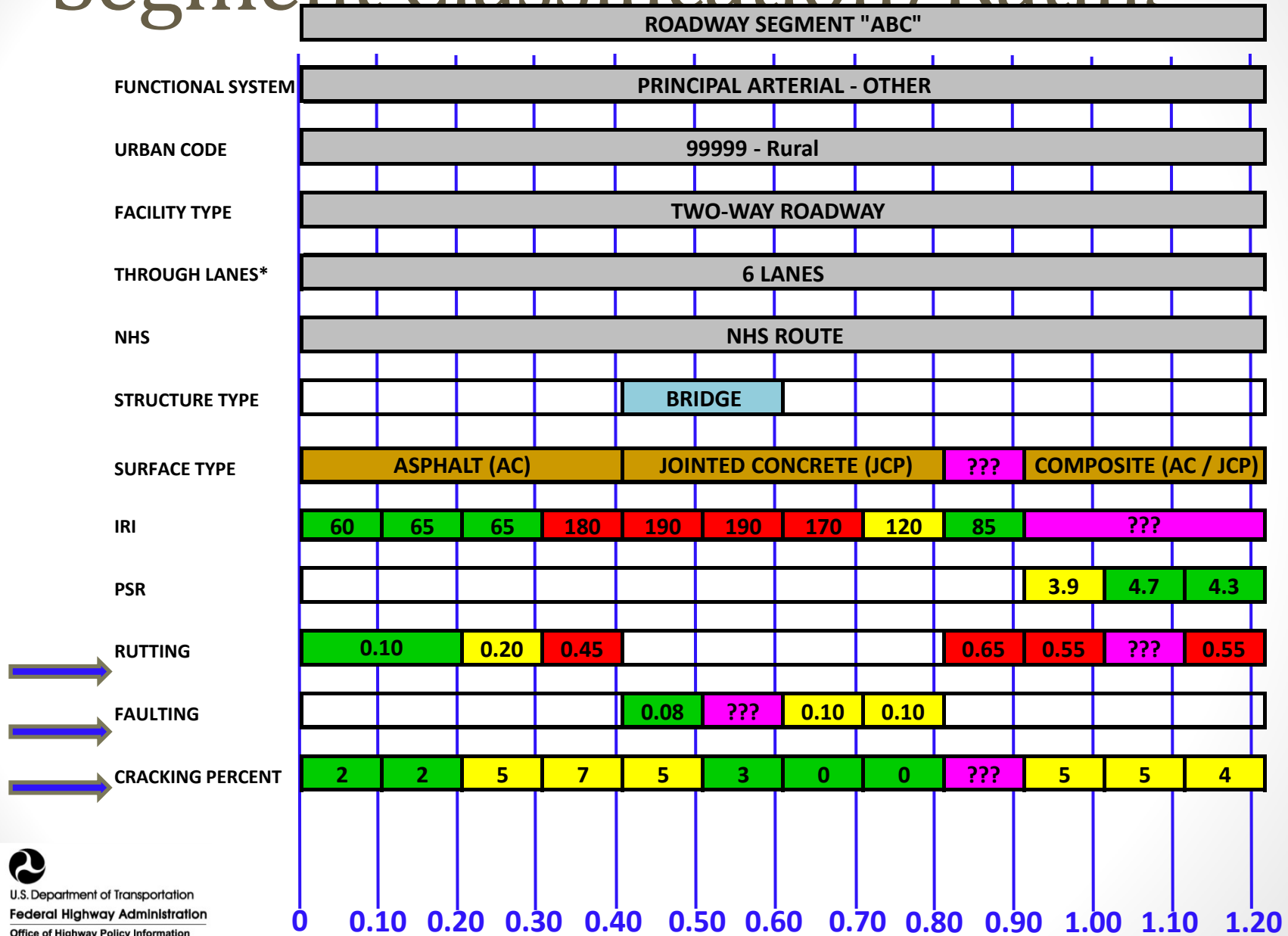
2018|##|Route AAA|**0.000**|**0.200**|**RUTTING**|**0.200**|0.1|
|01/2018|



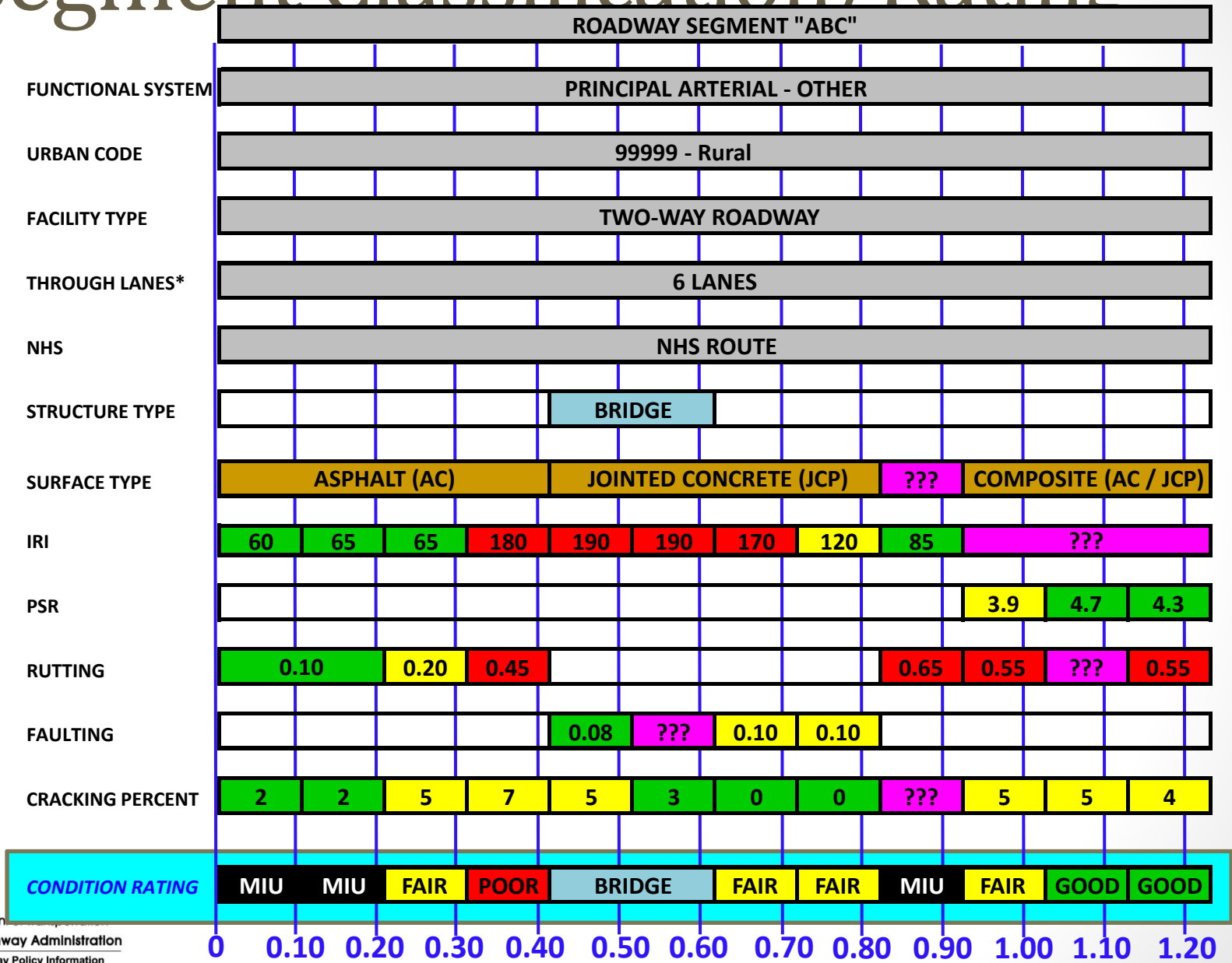
Segment Classification/Rating



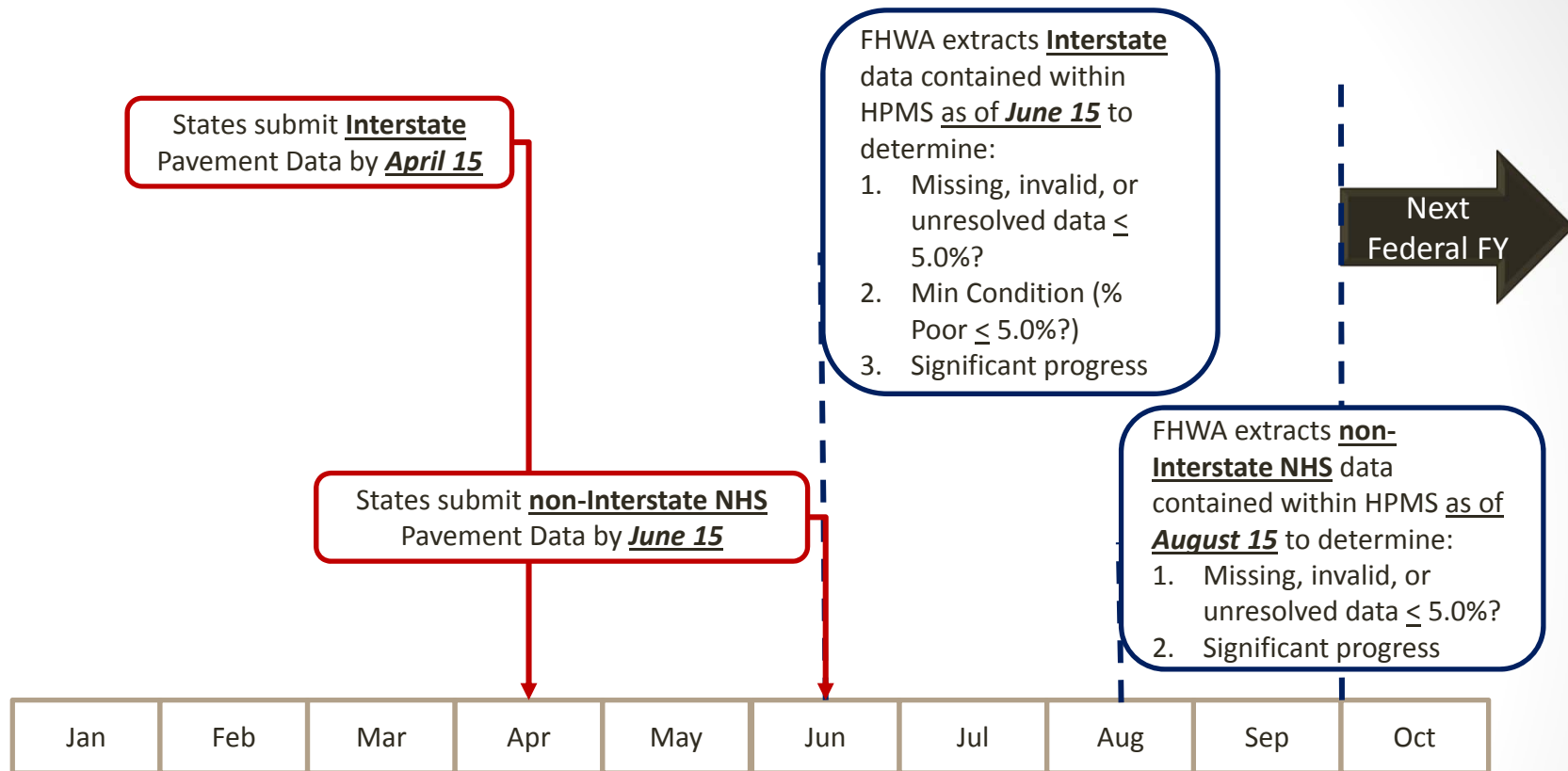
Segment Classification/Rating



Segment Classification/Rating



Performance Data Timeline



Consequence of not submitting data by Due Date

- Interstate System will be considered as not meeting the minimum requirements (23 CFR 490.313(b)(4)(ii))

Measure Computation

- Calculation of overall pavement conditions ... will be based only on sections containing data reported in the HPMS Submittal as of the submission dates (April 15 & June 15) 23 CFR 490.313(b)(4)(ii)
- Computed, if the Missing, invalid, or unresolved data \leq 5.0% requirement is met (23 CFR 490.313(f))

Missing, invalid, or unresolved data > 5.0%?

- a State DOT has not made significant progress toward the achievement of target (23 CFR 490.109(e)(4)(ii)&(iii))

Reference: 23 CFR 490.315

Conclusion / Contact

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