

# PM2 Pavement SOP Overview

HIGHWAY  
INFORMATION  
SEMINAR 2017



# 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 carry out 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

## Entire Applicable Network

### 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

### 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

$$\frac{1,000 \text{ lane-miles Good}}{2,000 \text{ total* lane-miles}} = 50.0 \% \text{ Good}$$

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



# 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**



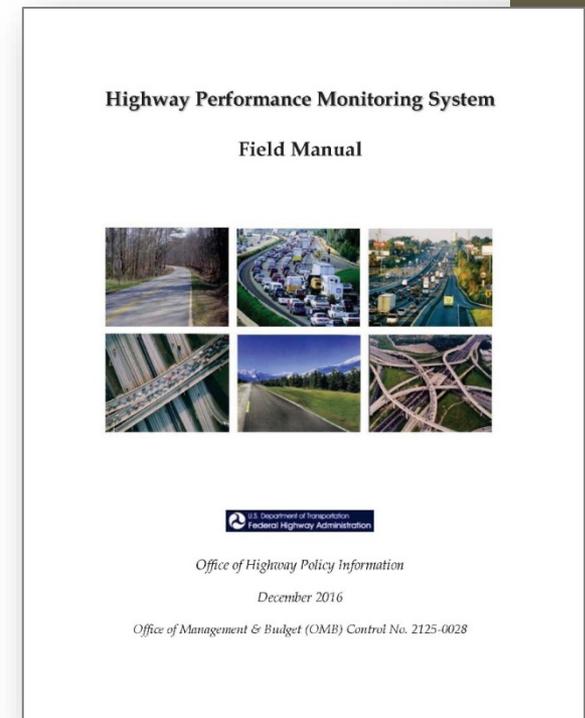
# Measure: Pavement Condition (PM2)

- 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 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 to Calculate 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 to Calculate 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**

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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**

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

MIU= Missing, Invalid, Unresolved



# Non-Interstate Pavement Condition Measures

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

LM of NIN Pavement in **Good**

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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**

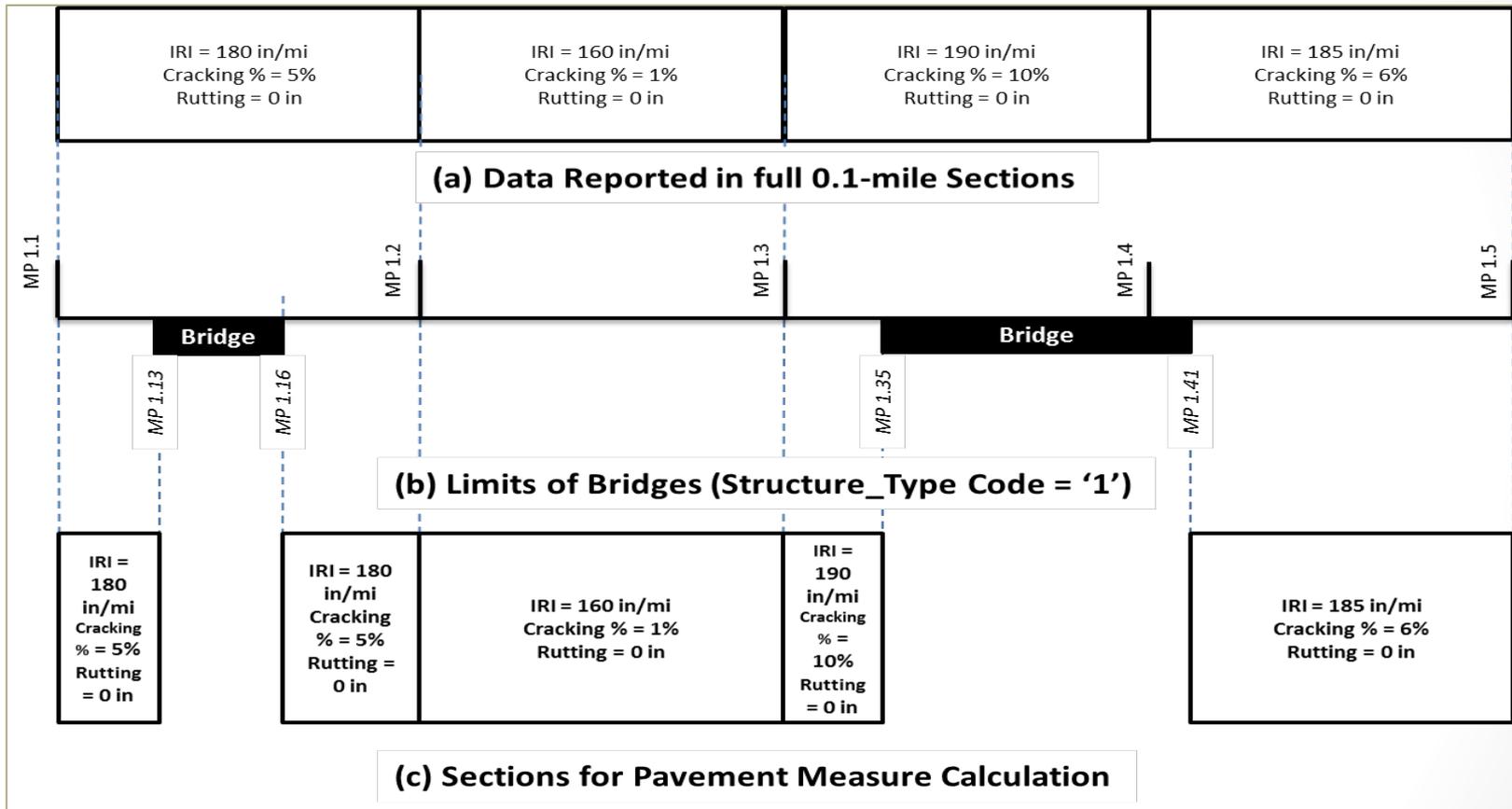
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LM of NIN – LM of Bridges – LM Unpaved Other Surface – LM MIU

MIU= Missing, Invalid, Unresolved



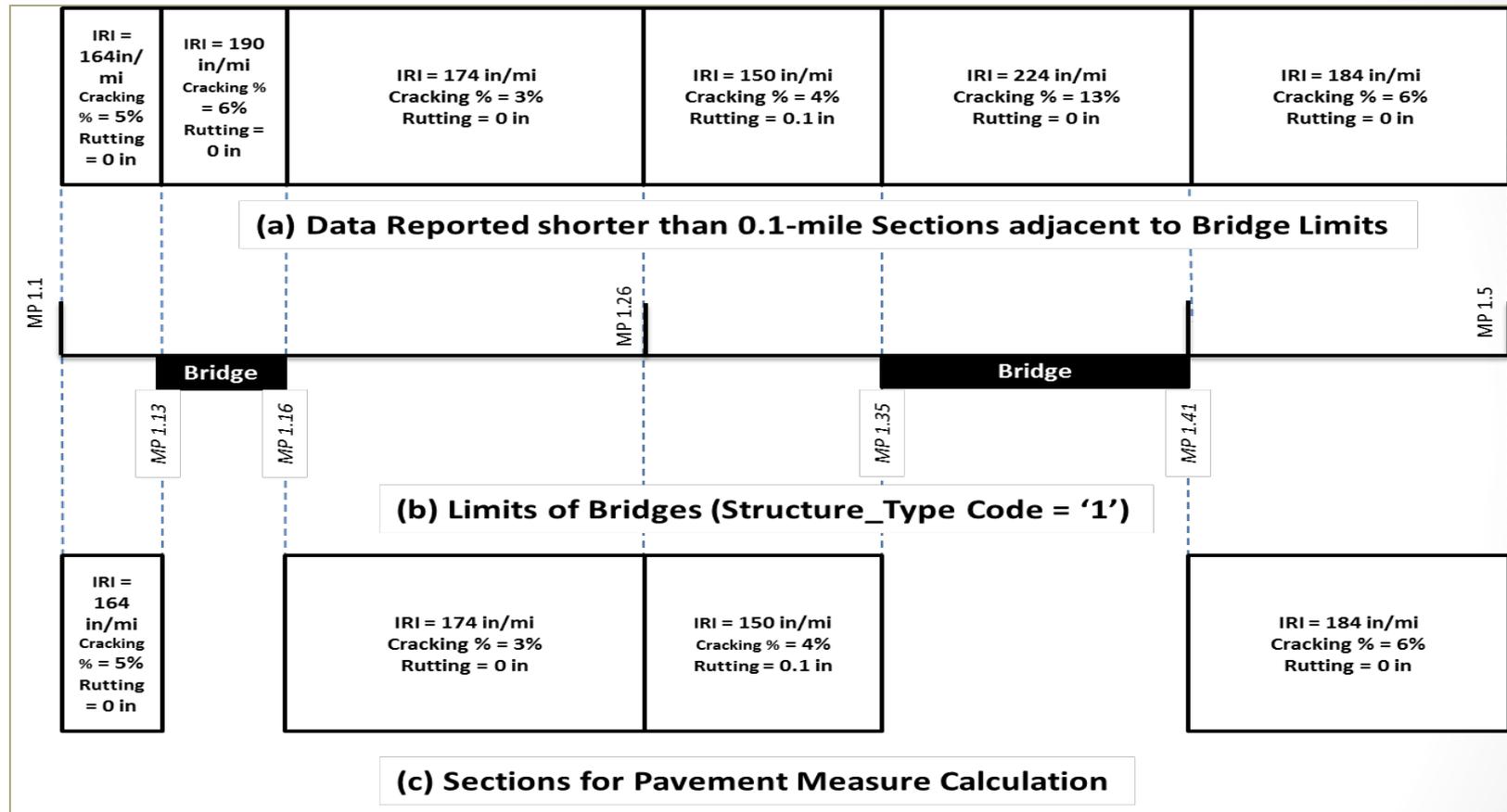
# Bridge Exclusion



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

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



# Pavement Measures Calculation

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|

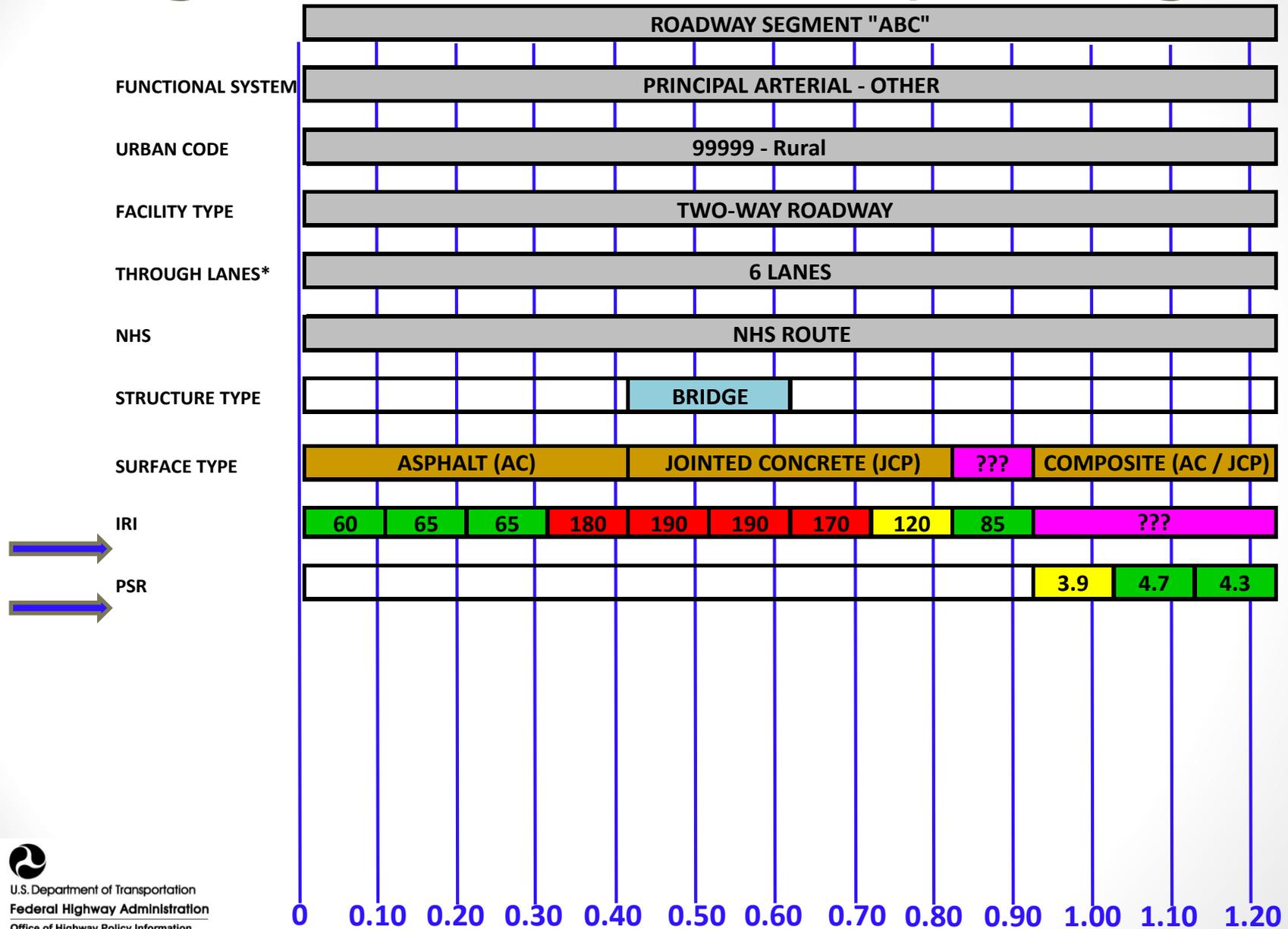
2018|##|Route AAA|**0.000**|**0.200**|**RUTTING**|0.150|0.20|  
|01/2018|

- **Violate Section Length (length)**

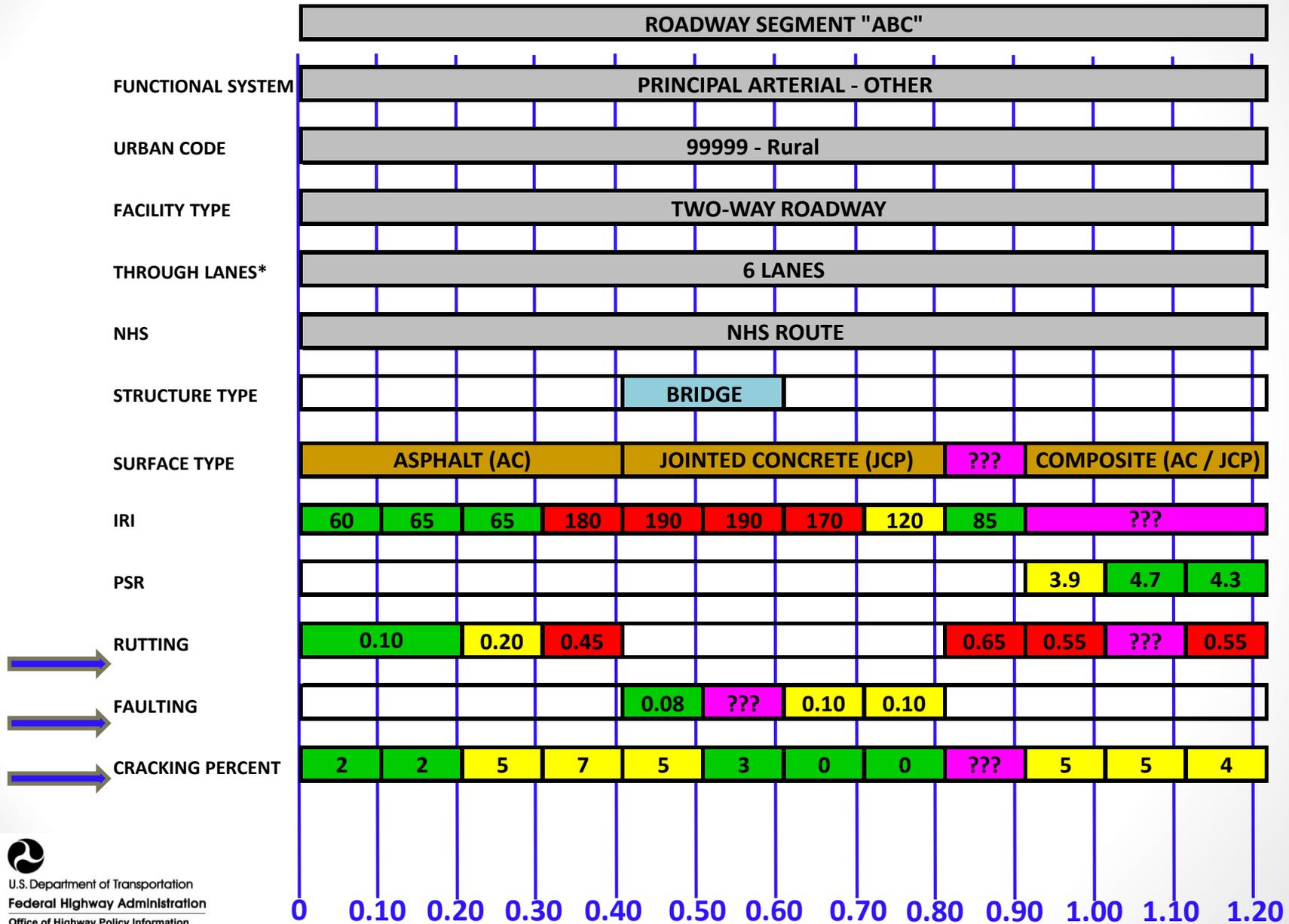
2018|##|Route AAA|**0.000**|**0.200**|**RUTTING**|**0.200**|0.1|  
|01/2018|



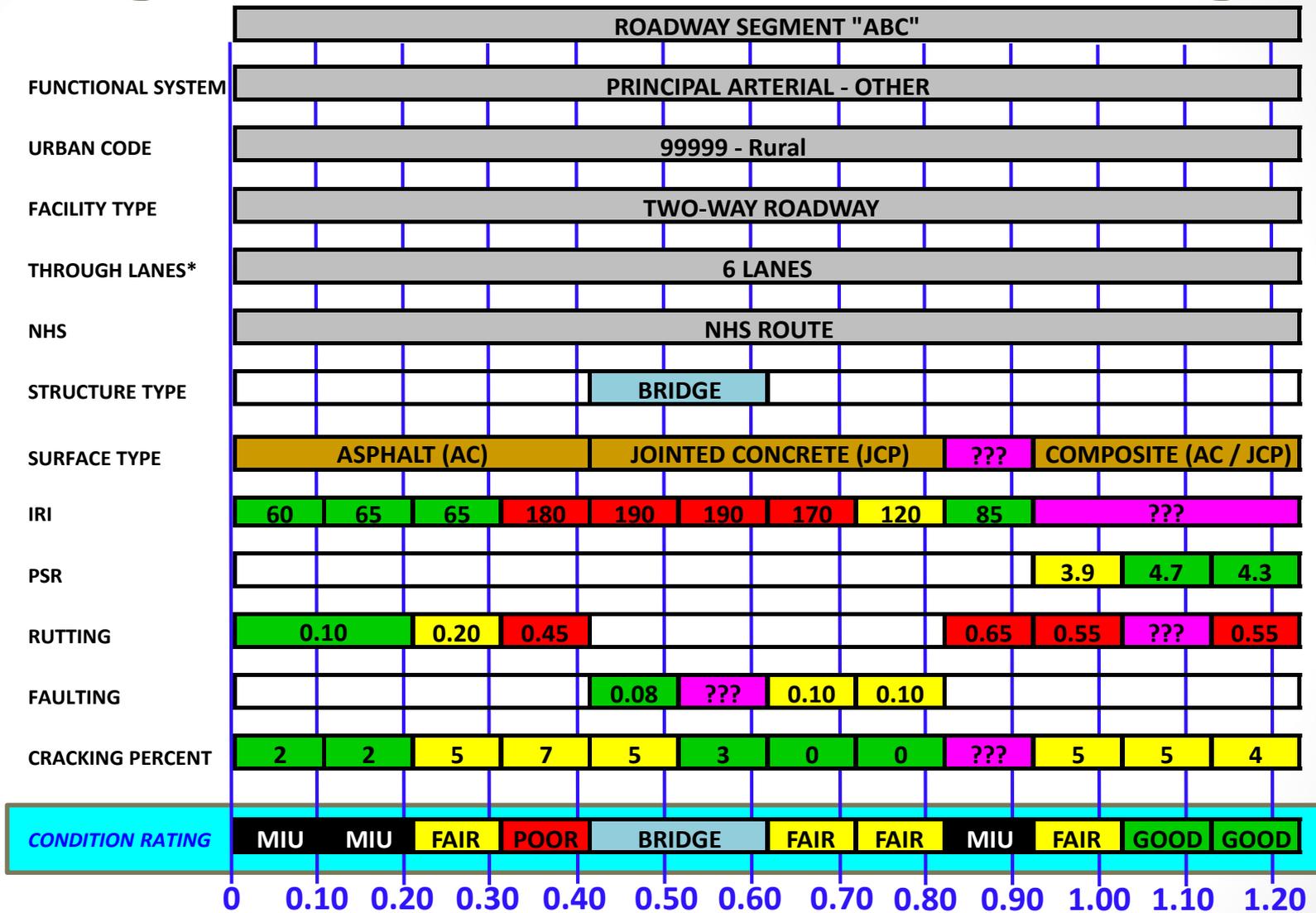
# Segment Classification/Rating



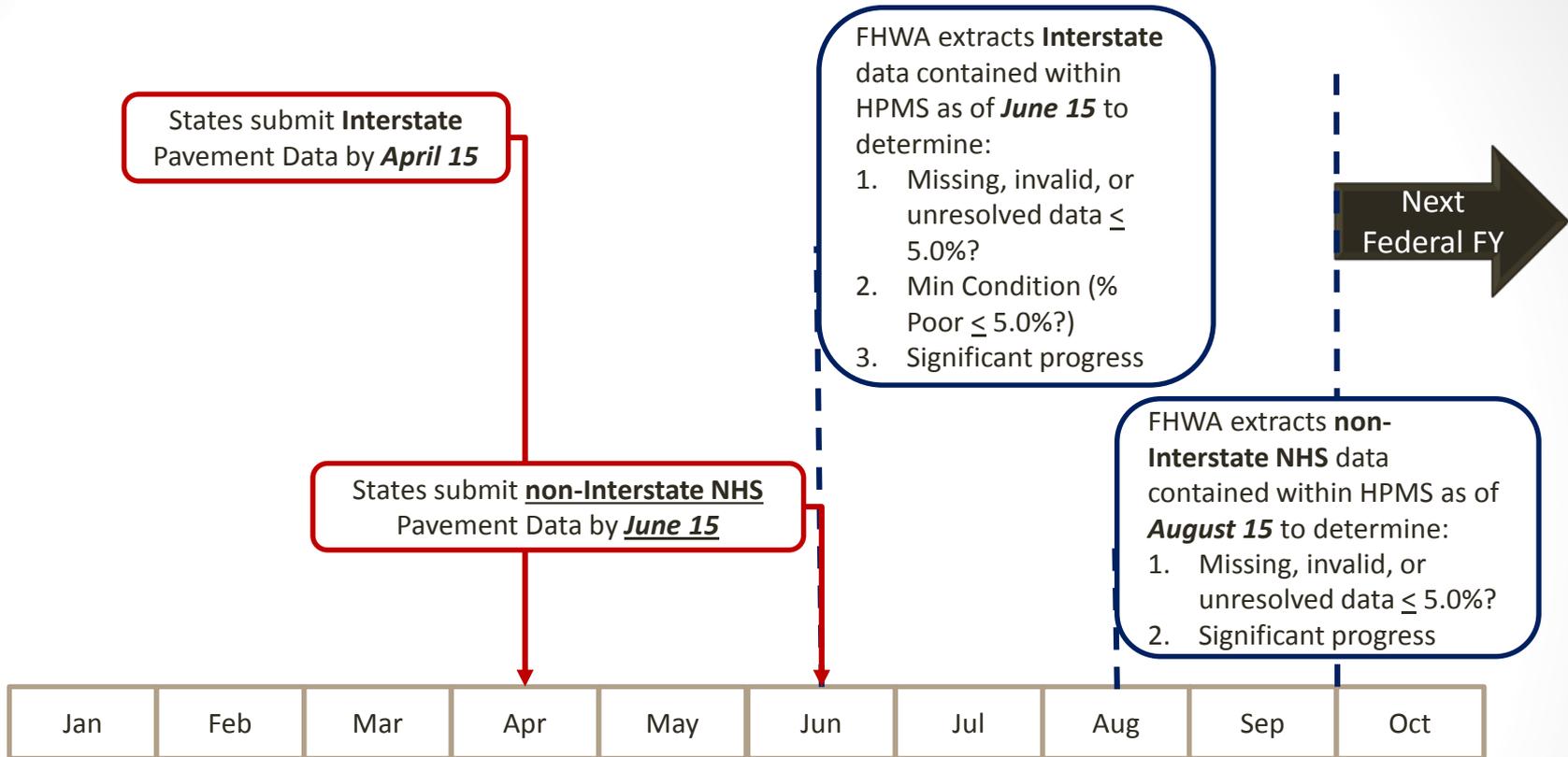
# Segment Classification/Rating



# 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**

# QUESTIONS

