National Performance Management Measures NPRM

Assessing *Performance* of the National Highway System, *Freight Movement* on the Interstate System, and the *Congestion Mitigation and Air Quality* Improvement Program

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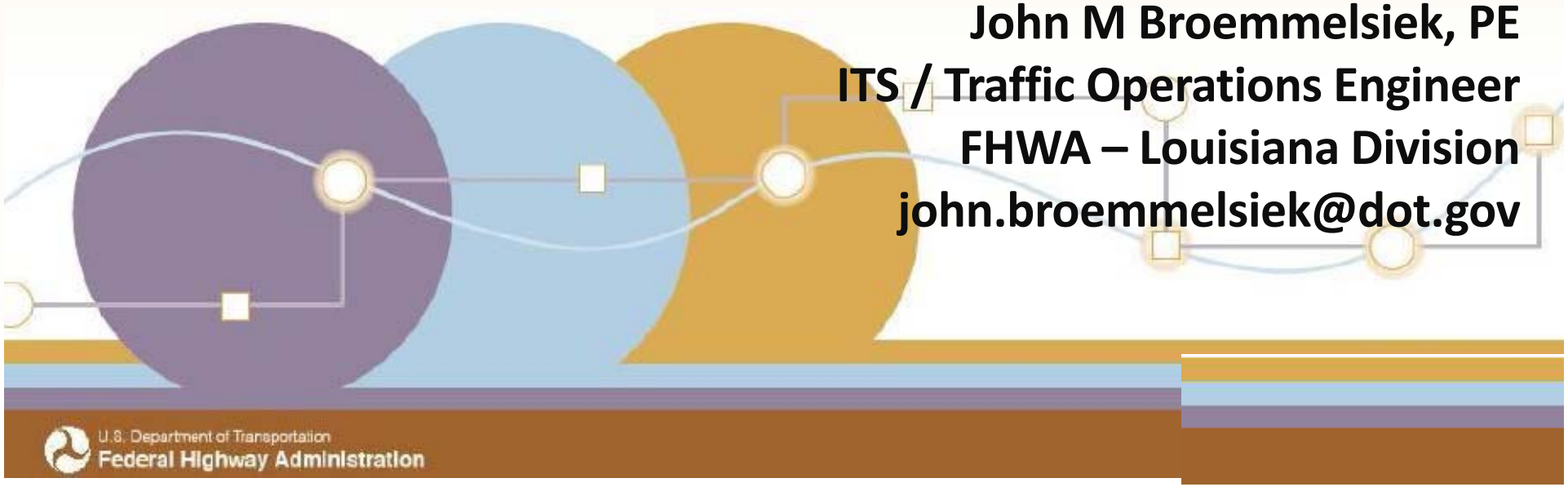

Agenda

- What are the Measures?
- Calculating Performance Measures
- Measures & Metrics
- Data Sources
- Admin Information

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Summary of Proposed New 23 CFR Part 490

Subpart A:	General Information, Target Establishment, Reporting, and NHPP and NHFP Significant Progress Determination Measures
Subpart B:	to Assess the Highway Safety Improvement Program (HSIP)
Subpart C:	Measures to Assess Pavement Condition
Subpart D:	Measures to Assess Bridge Condition
Subpart E:	**Measures to Assess Performance of the National Highway System (NHS)**
Subpart F:	**Measures to Assess Freight Movement on the Interstate**
Subpart G:	**System Measure to Assess the CMAQ Program – Traffic**
Subpart H:	**Congestion Measures to Assess the CMAQ Program – On-Road Mobile Source Emissions**

Subpart E: Proposed Measures, Metrics and Applicability

Part 490 Subpart	Measure	Metric	Applicability
Subpart E - Performance of the National Highway System	Percent of the Interstate System providing for Reliable Travel Times	Level of Travel Time Reliability (LOTTR)	Interstate System mileage within the State or each MPA
	Percent of the non-Interstate NHS providing for Reliable Travel Times	Level of Travel Time Reliability (LOTTR)	Non-Interstate NHS within the State or each MPA
	Percent of the Interstate System where Peak Hour Travel Times meet expectations	Peak Hour Travel Time Ratio (PHTTR)	Interstate System mileage within each urbanized area with a population over 1 million
	Percent of the non-Interstate NHS where Peak Hour Travel Times meet expectations	Peak Hour Travel Time Ratio (PHTTR)	Non-Interstate NHS mileage within each urbanized area with a population over 1 million

Subpart F: Proposed Measures, Metrics and Applicability

Part 490 Subpart	Measure	Metric	Applicability
Subpart F - Freight Movement on the Interstate System	Percent of the Interstate System mileage providing for Reliable Truck Travel Times	Truck Travel Time Reliability (TTTR)	Interstate System mileage within the State or each MPA
	Percent of the Interstate System Mileage Uncongested	Average Truck Speed	Interstate System mileage within the State or each MPA

Subparts G & H: Proposed Measures Metrics, and Applicability

Part 490 Subpart	Measure	Metric	Applicability
Subpart G – CMAQ – Traffic Congestion	Annual Hours of Excessive Delay Per Capita	Total Excessive Delay	NHS roads in urbanized area with a population over 1 million are, all or in part, designated as nonattainment or maintenance areas for ozone (O_3), carbon monoxide (CO), or particulate matter (PM)
Subpart H – CMAQ - On-Road Mobile Source Emissions	2- and 4-year Total Emission Reductions for each applicable criteria pollutant and precursor	Annual Tons of Emission Reductions by project for each applicable criteria pollutant and precursor	All projects funded by CMAQ program in areas designated as nonattainment or maintenance for O_3, CO, or PM

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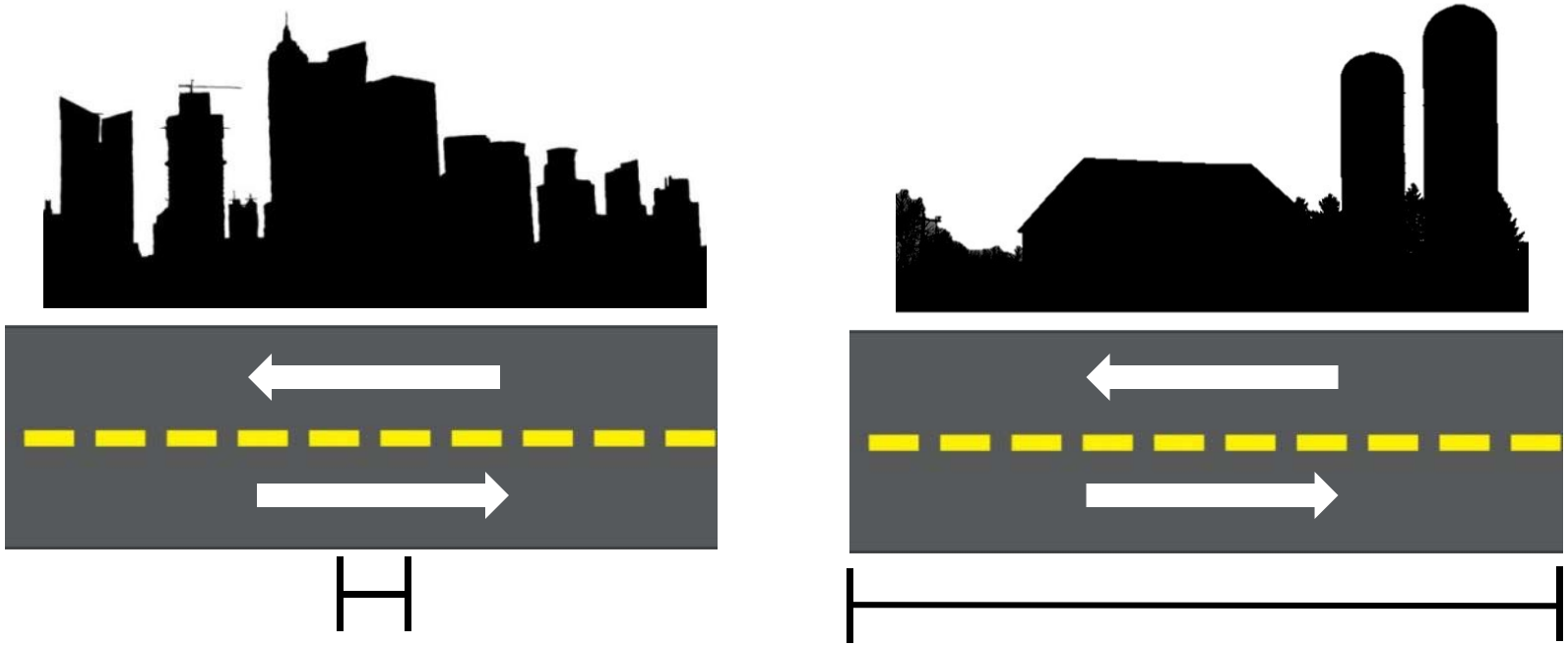
Reporting Segments – Mainline NHS



Maximum
Urban Length
½ mile*

Maximum
Rural Length
10 miles*

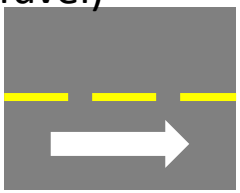
**Unless an individual Travel Time Segment is longer*

What is the National Performance Management Research Data Set (NPMRDS)?

- Is a data set provided by FHWA **monthly to State DOTs and MPOs**
- Includes **travel times derived from all traffic using the highway system**, in 5-minute bins
- Includes a breakdown of travel times of **freight vehicles** and **all traffic (freight and passenger vehicles)**
- Uses travel times that are reported via vehicle probes on **contiguous segments of roadway** covering the entire mainline NHS
- **Uses vehicle probes** that could include mobile phones, vehicle transponders, and portable navigation devices

Example of NPMRDS Travel Times

Single Road Segment (eastbound travel)



All 5-min bins in a 24-hour period

Full Year (Jan 1-Dec 31)

5-minute bins (105,120 per year)		Avg Travel Time (EB)	
		Freight Vehicles (sec)	All Traffic (sec)
Feb 3	6:00 – 6:05am	32	31
Feb 3	6:05 – 6:10am	31	30
Feb 3	6:10 – 6:15am	--	--
Feb 3	6:15 – 6:20am	37	36
Feb 3	6:20 – 6:25am	36	37
Nov 7	7:25 – 7:30pm	29	29
Nov 7	7:30 – 7:35pm	--	28
Nov 7	7:35 – 7:40pm	30	30
Nov 7	7:40 – 7:45pm	29	29
Nov 7	7:45 – 7:50pm	31	31

Metrics, Thresholds, and Measures

	Each Reporting Segment		Entire Applicable Network
	METRIC **A quantifiable indicator of performance or condition**	**THRESHOLD** **The level of performance for a specific reporting segment that would determine its inclusion in the measure**	**MEASURE** **An expression based on a metric, used to establish targets and to assess progress towards achieving the established target**
Example	Average truck speed = **52.30 mph**	Uncongested = **Avg truck speed > 50.00 mph**	2,510 uncongested miles 3,000 total miles = **83.7% uncongested**

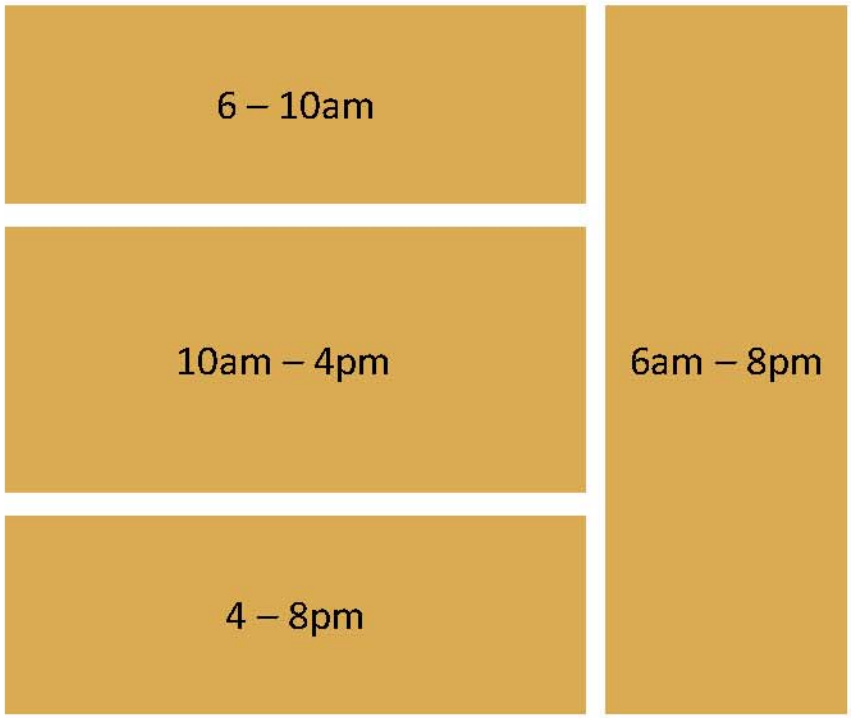
Measures vs. Targets

Entire Applicable Network

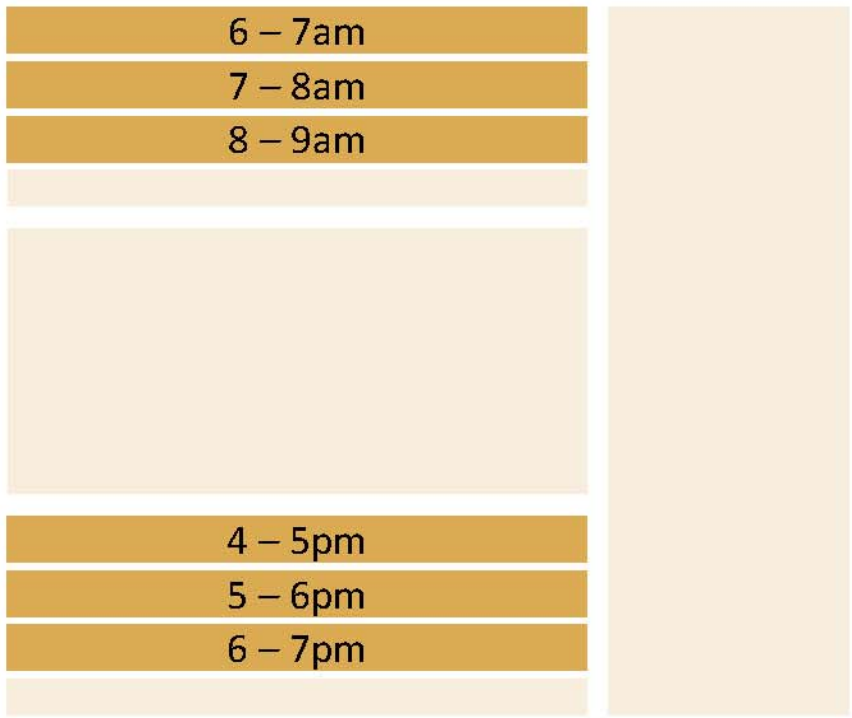
	MEASURE	**TARGET**
	An expression based on a metric, used to establish targets and to assess progress towards achieving the established target	**A quantifiable level of performance or condition, as a value for a measure, to be achieved within a time period required by FHWA**
Example	**83.7% total Interstate miles uncongested**	Target: 80.0% Uncongested Actual: 83.7% Uncongested ✓ **Target Achieved**

Data Requirements for the Measures

Travel Time Reliability:



Peak Hour Travel Time:



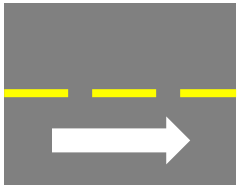
Measures to Assess Performance of the NHS – Travel Time Reliability

	Each Reporting Segment		Entire Applicable Network
	METRICS **Level of Travel Time Reliability (LOTTR) of each time period of each reporting segment for the full extent:** **1. Interstate System** **2. Non-Interstate NHS**	**THRESHOLD** **LOTTR < 1.50 for the reporting segment = reliable**	**MEASURES** **Percent of system providing for reliable travel times.** **1. Interstate System** **2. Non-Interstate NHS**
Interstate Example	30 sec (80th percentile)/ 15 sec (50th percentile) **LOTTR = 2.00**	2.00 > 1.50 = **Not Reliable**	8,125 reliable miles/ 10,000 total Interstate miles = **81.3% reliable**

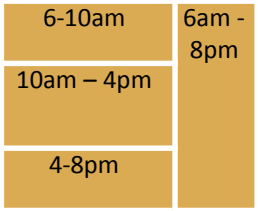
Calculating Level of Travel Time Reliability Metrics

Assemble travel times in 5-minute bins, for each segment and each period, for the full year

0.500 mi. segment (eastbound travel)



All 5-min bins, 4 time periods

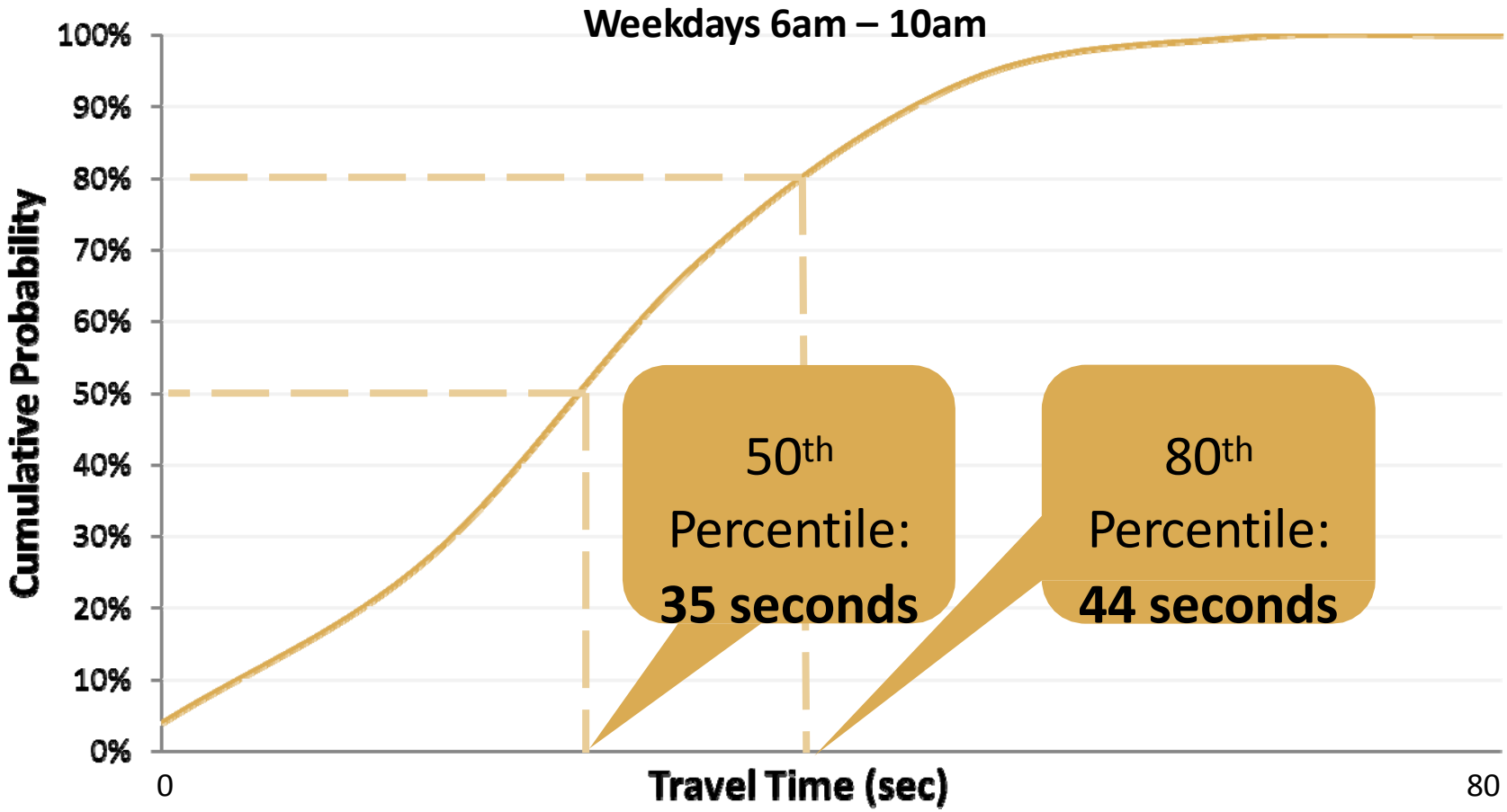


Full Year (Jan 1-Dec 31)

5-minute bins (up to 61,488 per year)		Avg Travel Time (EB)
		All Traffic (sec)
Feb 3	6:00 – 6:05am	26
Feb 3	6:05 – 6:10am	28
Feb 3	6:10 – 6:15am	36
Feb 3	6:15 – 6:20am	37
Feb 3	6:20 – 6:25am	36
Nov 7	6:25 – 6:30pm	27
Nov 7	6:30 – 6:35pm	--
Nov 7	6:35 – 6:40pm	26
Nov 7	6:40 – 6:45pm	25
Nov 7	6:45 – 6:50pm	26

Calculating Level of Travel Time Reliability Metrics

Note the normal (50th percentile) and longer (80th percentile) travel times



Calculating Level of Travel Time Reliability Metrics

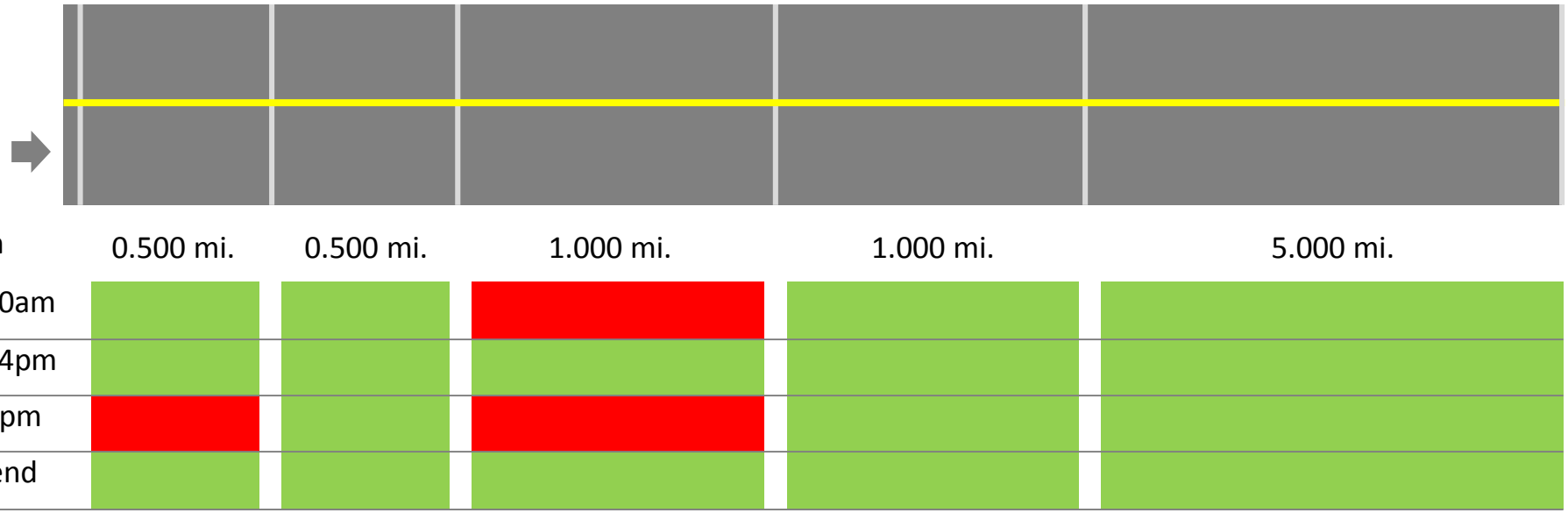
Determine the LOTTR Metric for each time period

$$\frac{\text{Longer Travel Time (80th)}}{\text{Normal Travel Time (50th)}} = \frac{\text{\# seconds}}{\text{\# seconds}} = \text{Level of Travel Time Reliability Ratio}$$

Level of Travel Time Reliability (LOTTR) *(Single Segment, Interstate Highway System)*		
Monday – Friday	6am – 10am	$\text{LOTTR} = \frac{44 \text{ sec}}{35 \text{ sec}} = 1.26$
	10am – 4pm	LOTTR = 1.39
	4pm – 8pm	LOTTR = 1.54
Weekends	6am – 8pm	LOTTR = 1.31
Must exhibit LOTTR below 1.50 during **all** of the time periods		**Segment does not provide for reliable travel times**

Calculating Travel Time Reliability Measure

Calculate the percentage of all reporting segments providing for reliable travel times



$$\frac{6.500 \text{ reliable miles}}{8.000 \text{ total miles}} = \mathbf{81.3\% \text{ Reliable}}$$

Measure vs. Target

Entire Applicable Network

	MEASURES	TARGETS
	Percent of system providing for reliable travel times. **Threshold: < 1.50** **1. Interstate System** **2. Non-Interstate NHS**	**1. % of Interstate System provides reliable travel times;** **2. % of non-Interstate NHS provides reliable travel times**
Interstate Example	**81.3%** Interstate miles providing for reliable travel times	Target: 80.0 % Actual: 81.3 % ✓ **Target Achieved**

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- What are the Measures?
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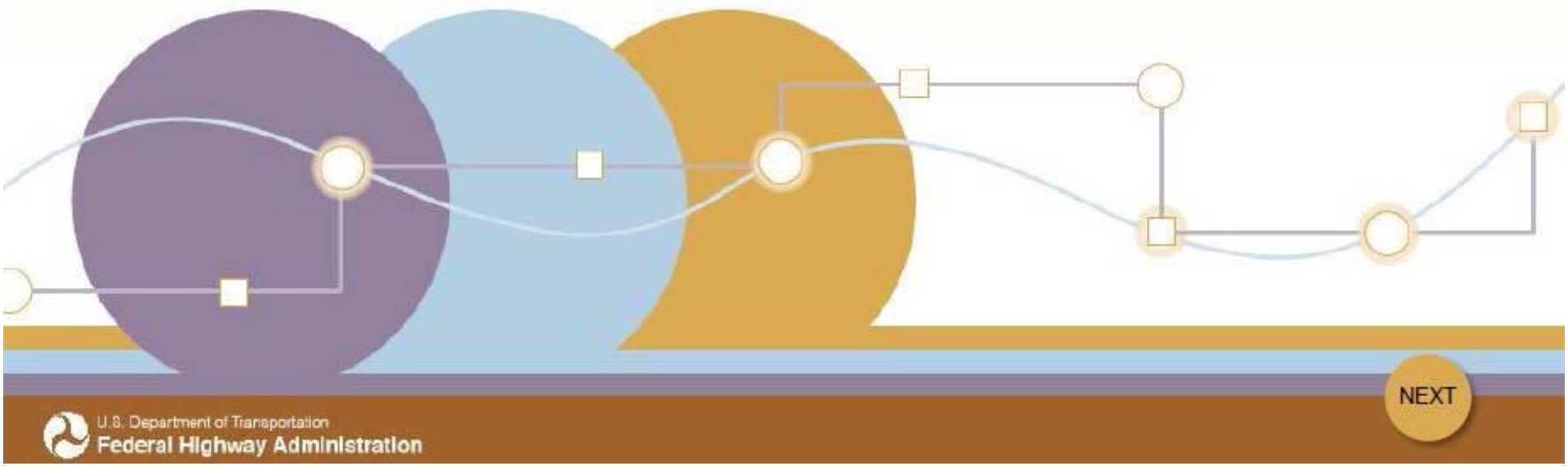
Proposed Performance of the NHS, Freight, and CMAQ Measures

Subpart E: Measures to Assess Performance of the NHS
Subpart F: Measures for Assessing Freight Movement on the Interstate System
Subpart G: Measures to Assess CMAQ – Traffic Congestion
Subpart H: Measures to Assess CMAQ – On-Road Mobile Source Emissions



Subpart E: Measures to Assess Performance of the NHS

	Interstate System	Non-Interstate NHS
Travel Time Reliability	1 Percent of the Interstate System providing for Reliable Travel Times	2 Percent of the non-Interstate NHS providing for Reliable Travel Times
Peak Hour Travel Time	3 Percent of the Interstate System in urbanized areas over 1M in population where Peak Hour Travel Times meet expectations	4 Percent of the non-Interstate NHS in urbanized areas over 1M in population where Peak Hour Travel Times meet expectations

Subpart F: Measures to Assess Freight Movement on the Interstate System

1 **Truck Travel Time Reliability**	Percent of the Interstate System Mileage providing for Reliable Truck Travel Times
2 **Mileage Uncongested**	Percent of the Interstate System Mileage Uncongested

Measures to Assess Freight Movement on the Interstate System – Truck Travel Time Reliability

Each Reporting Segment		Entire Applicable Network
METRIC **Truck Travel Time Reliability (TTTR) for each segment on the Interstate System**	**THRESHOLD** **TTTR < 1.50 for the reporting segment = reliable**	**MEASURE** **Percent of the Interstate System mileage providing for reliable truck travel times**
Example 60 (95th percentile)/ 42 (50th percentile) **TTTR = 1.43**	1.43 < 1.50 **Reliable**	2,492 reliable miles / 3,000 total miles = **81.3% reliable**

Measure vs. Target

Entire Applicable Network

	MEASURE	TARGET
	Percent of the Interstate System mileage providing for reliable truck travel times	**Percent of the Interstate System mileage providing for reliable truck travel times, during a calendar year**
Example	**81.3%** Interstate miles providing for reliable truck travel times	Target: 80.0% reliable miles Actual: 81.3% reliable miles ✓ **Target Achieved**

Measures to Assess Freight Movement on the Interstate System – Mileage Uncongested

Each Reporting Segment		Entire Applicable Network
METRIC	**THRESHOLD**	**MEASURE**
Average Truck Speed for each travel time segment on the Intestate System for a calendar year	**Average truck speed > 50 mph for the segment = uncongested**	**Percent of the Interstate System mileage uncongested**
Example		
Average truck speed **= 52.30 mph**	52.30 mph > 50.00 mph = **Uncongested**	2,250 uncongested miles / 3,000 total miles = **75.0% uncongested**

Measure vs. Target

Entire Applicable Network

	MEASURE	TARGET
	Percent of the Interstate System mileage uncongested	**Percent of the Interstate System mileage uncongested, for a calendar year**
Example	**75.0%** Interstate miles uncongested	Target: 75.0% uncongested Actual: 75.0% uncongested ✓ **Target Achieved**

Subparts G and H: Measures to Assess the CMAQ Program

1 **CMAQ – Traffic Congestion (Subpart G)**	Annual Hours of Excessive Delay Per Capita
2 **CMAQ – On-Road Mobile Source Emissions (Subpart H)**	2- and 4-year Total Emission Reductions for each applicable criteria pollutant and precursor

Measure to Assess CMAQ – Traffic Congestion (Subpart G)

Each Reporting Segment		Entire Applicable Network
METRIC **Total excessive delay (vehicle-hours) for each reporting segment on the NHS**	**THRESHOLD** **Excessive delay travel time at threshold speed:** **a) Interstates/highways/ expressways: 35 mph** **b) Principal arterials and all other roads: 15 mph**	**MEASURE** **Annual hours of excessive delay per capita**
Example Total excessive delay, single 0.5 mi. Interstate segment: **863.025 vehicle-hours**	Threshold for 0.5 mi. Interstate segment: **51 seconds**	4.46M hrs excessive delay/ 1.05M population = **4.3 hours per capita**

Measure vs. Target

Entire Applicable Network

	MEASURE	TARGET
	Annual hours of excessive delay per capita	**Annual hours of excessive delay per capita, as established by the State DOT or MPO**
Example	**4.3 vehicle-hours** excessive delay per capita	Target: 5.0 hours/capita Actual: 4.3 hours/capita ✓ **Target Achieved**

Measure to Assess CMAQ – On-Road Mobile Source Emissions (Subpart H)

METRIC

Conversion of emission reductions from kg/day to short tons per year

MEASURE

Total emission reductions:

- **2-year cumulative emission reductions**
- **4-year cumulative emission reductions**

Example

2.127 kg/day × 0.4026 =

0.856 short tons CO per year

2-year emission reductions, all CO projects

1.796 short tons

Measure vs. Target

Example for CO Emissions, 2 Fiscal Years (2018-2019)

	MEASURE	**TARGET**
	Total reduction in CO emissions for 2 years	**Total reduction in CO emissions for 2 years, as established by the State DOT**
Example	Total 2-year reduction in CO emissions: **1.796 tons**	2-year target: 1.500 tons 2 year reduction: 1.796 tons ✓ **Target Achieved**

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Summary of Data Sources and Requirements

Proposed Data Sources

Data Sources	Applicable Measures (Proposed 23 CFR §490)
Highway Performance Monitoring System (HPMS)	• Pavement Condition Performance Measures • Performance of the NHS • Freight Movement on the Interstate System • CMAQ – Traffic Congestion
National Performance Management Research Data Set (NPMRDS) or equivalent data set	• Performance of the NHS • Freight Movement on the Interstate System • CMAQ – Traffic Congestion
EPA Green Book	• CMAQ – Traffic Congestion • CMAQ – On-Road Mobile Source Emissions
CMAQ Public Access System	• CMAQ – On-Road Mobile Source Emissions
Population Data from US Decennial Census	• Performance of the NHS – Peak Hour Travel Time Only • CMAQ – Traffic Congestion
Urbanized Area Boundary from US Decennial Census or Adjusted Boundary reported to HPMS	• Performance of the NHS – Peak Hour Travel Time Only • CMAQ – Traffic Congestion

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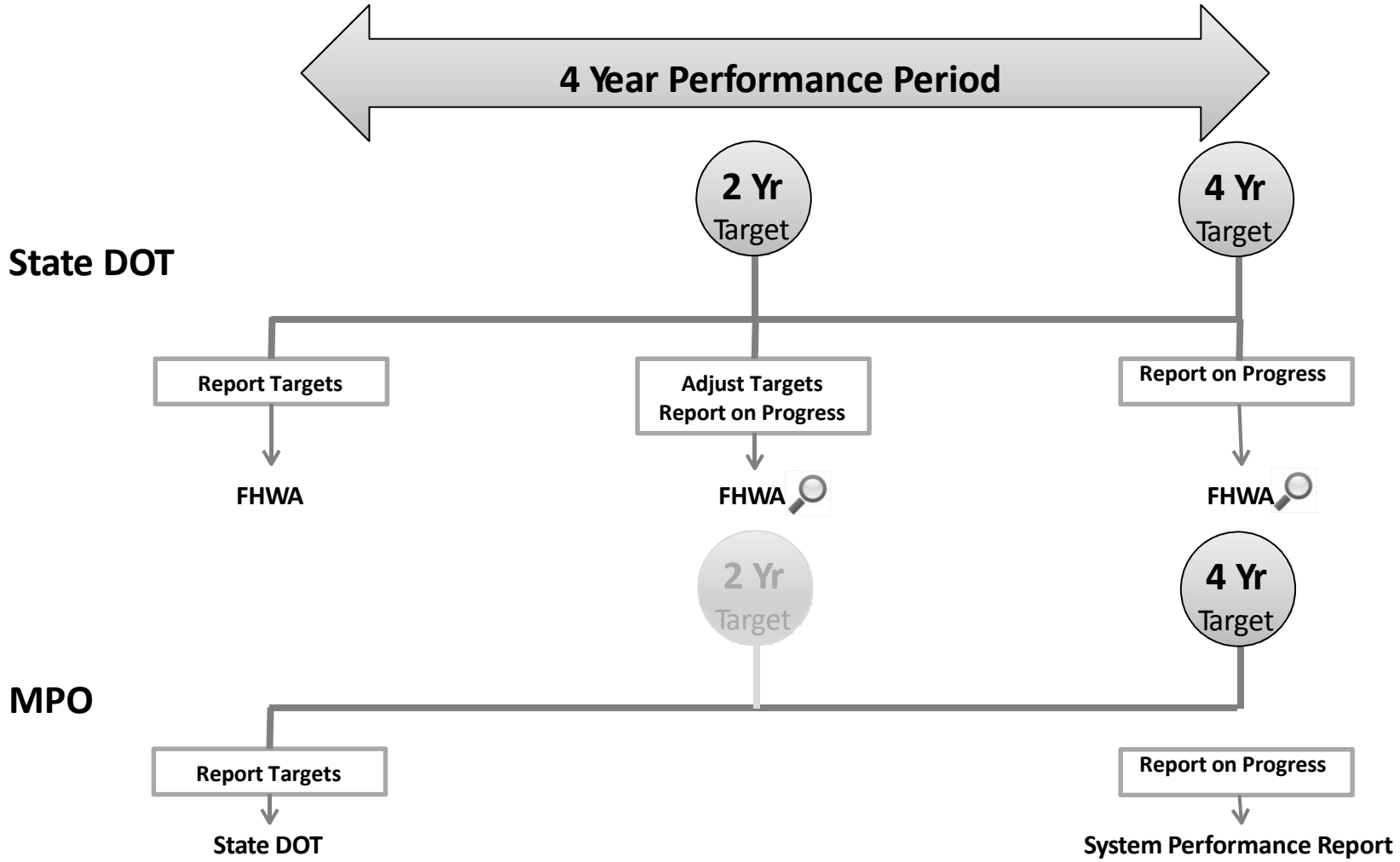
Target Setting

Overview


4 Year Performance Period
State DOT
2 Yr Target
4 Yr Target
Report Targets
Adjust Targets Report on Progress
Report on Progress
FHWA
FHWA
FHWA
MPO
2 Yr Target
4 Yr Target
Report Targets
Report on Progress
State DOT
System Performance Report

Reporting

State DOT Reporting on Performance Targets

Baseline Performance Period Report

- NHS limits
- Adjusted urbanized area boundaries and population data
- Nonattainment and maintenance areas and MPOs' CMAQ Performance Plan*
- Baseline performance
- 2-year and 4-year targets
- Discussion of congestion at freight bottle necks.
- Relationship to other plans, including freight

Mid Performance Period Progress Report

- 2-year performance
- Progress discussion
- Investment strategy effectiveness
- Adjusted 4-year targets (optional)*
- Extenuating circumstances*
- Target achievement discussion*
- MPOs' CMAQ Performance Plans*

*Only include when applicable

Full Performance Period Progress Report

- Same content as Mid Performance Period Progress Report, except:
  - Reporting on 4-year performance
  - No option for adjusted targets

MPO Reporting on Performance Targets

System Performance Report

- Part of MPO's Metropolitan Transportation Plan (MTP)
- Report baseline performance and progress toward achieving targets

CMAQ Performance Plan

- Required for MPOs serving a TMA with a population over 1 million with ozone, CO, or PM nonattainment and maintenance areas

Assessing Significant Progress

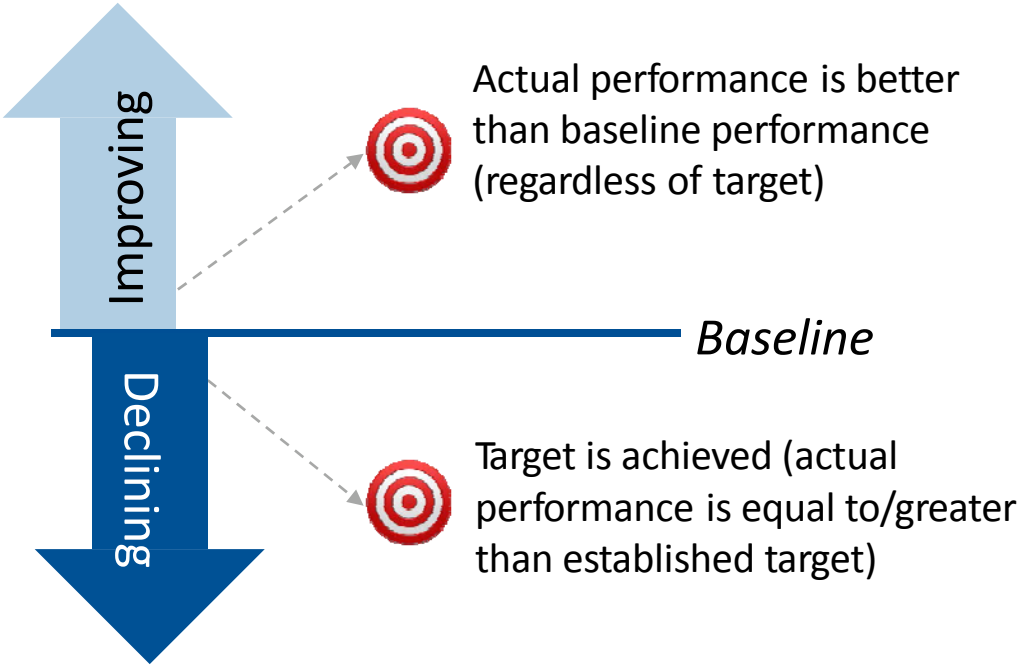
Assessing Significant Progress Toward Achieving NHPP and NHFP Targets

Who	• FHWA determines if a State DOT has made significant progress
What	• Makes determination for each NHPP & NHFP target
When	• Assesses significant progress every 2 years

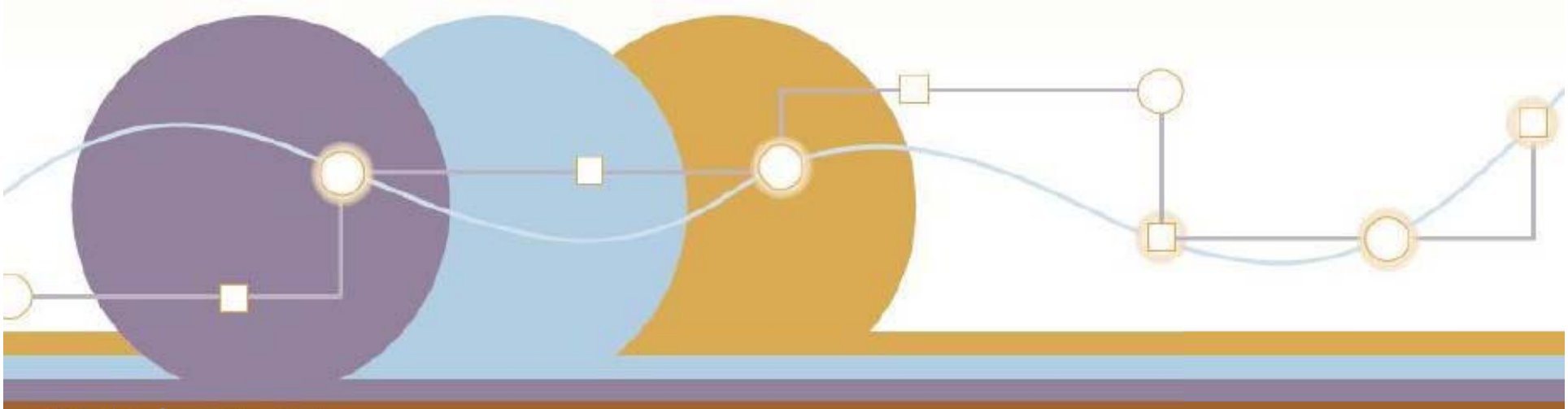
Consequence: For the NHPP and NHFP, the State DOTs are required to achieve or make significant progress toward their targets every biennial reporting period (every 2 years), and are to take additional reporting actions if FHWA determines significant progress is not made.

Assessing Significant Progress Toward Achieving NHPP and NHFP Targets

Significant progress is made when either…



One Last Thought



Consideration of a Greenhouse Gas (GHG) Emissions Measure

The FHWA seeks comment from the public on:

- Whether to establish a GHG emissions measure in the final rule
- If a GHG measure were to be included, FHWA believes that it would be best measured as the total annual tons of CO2 from all on-road mobile sources

Rulemaking Resources

Office of TPM website:

http://www.fhwa.dot.gov/tpm/

Submit Comments to:

www.regulations.gov

FHWA 2013-0054

Comment period closes August 20, 2016

For clarifying questions or more information, please contact:

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