



COLORADO

Department of
Transportation

National Performance Measure Target Recommendations

March 2018



TC Workshop Review of National Performance Measures

PURPOSE: Transportation Commission must adopt National Performance Measure Targets in April 2018 before the mandated federal deadline for state DOTs to set targets for infrastructure condition and system performance measures.

Today: The workshop will provide the Transportation Commission an overview of the Federal requirements for infrastructure condition and system performance measures and staff recommendation for target setting. Staff are seeking Transportation Commission feedback on the target recommendations.



Overview of National Highway Performance Program (NHPP)

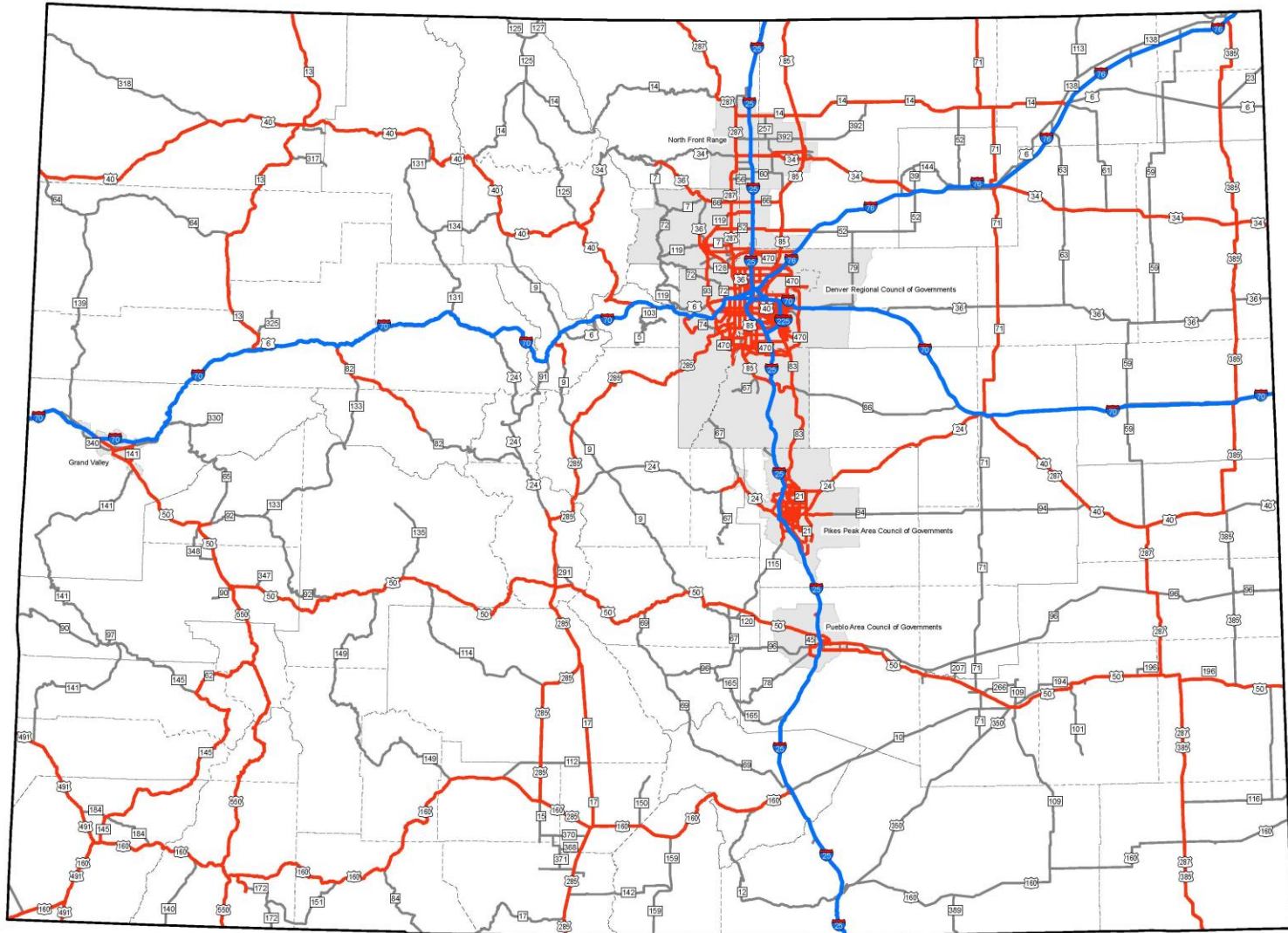
MAP-21 (2012) and the FAST Act (2015) established provisions for federal performance measures for the Interstate and National Highway System.

- Measures are established in 3 performance areas

Performance Area	State Targets Due	MPO Targets Due	Evaluation Period
Safety	8/31/2017	2/27/2018	Annual
Infrastructure Condition – Pavement and Bridge	5/20/2018	11/15/2018	Biennial
System Performance – System Reliability, Freight, and CMAQ	5/20/2018	11/15/2018	Biennial

- Safety targets were developed in August 2017
- State DOTs must set 2-year and 4-year targets for infrastructure condition and system performance by May 20, 2018**

National Highway System and MPO Boundaries





Pavement - Drivability Life vs. National Good/Fair/Poor

Drivability Life

- Pavement distresses
 - IRI - International Roughness Index
 - Rutting
 - Cracking
 - Faulting
- To have a low (0) DL segment, **one** distress must fall below an acceptable threshold

National Pavement G/F/P

- Pavement distresses
 - IRI - International Roughness Index
 - Rutting
 - Cracking
 - Faulting
- To have a poor segment, **two** distresses must fall below an acceptable threshold

National Pavement G/F/P

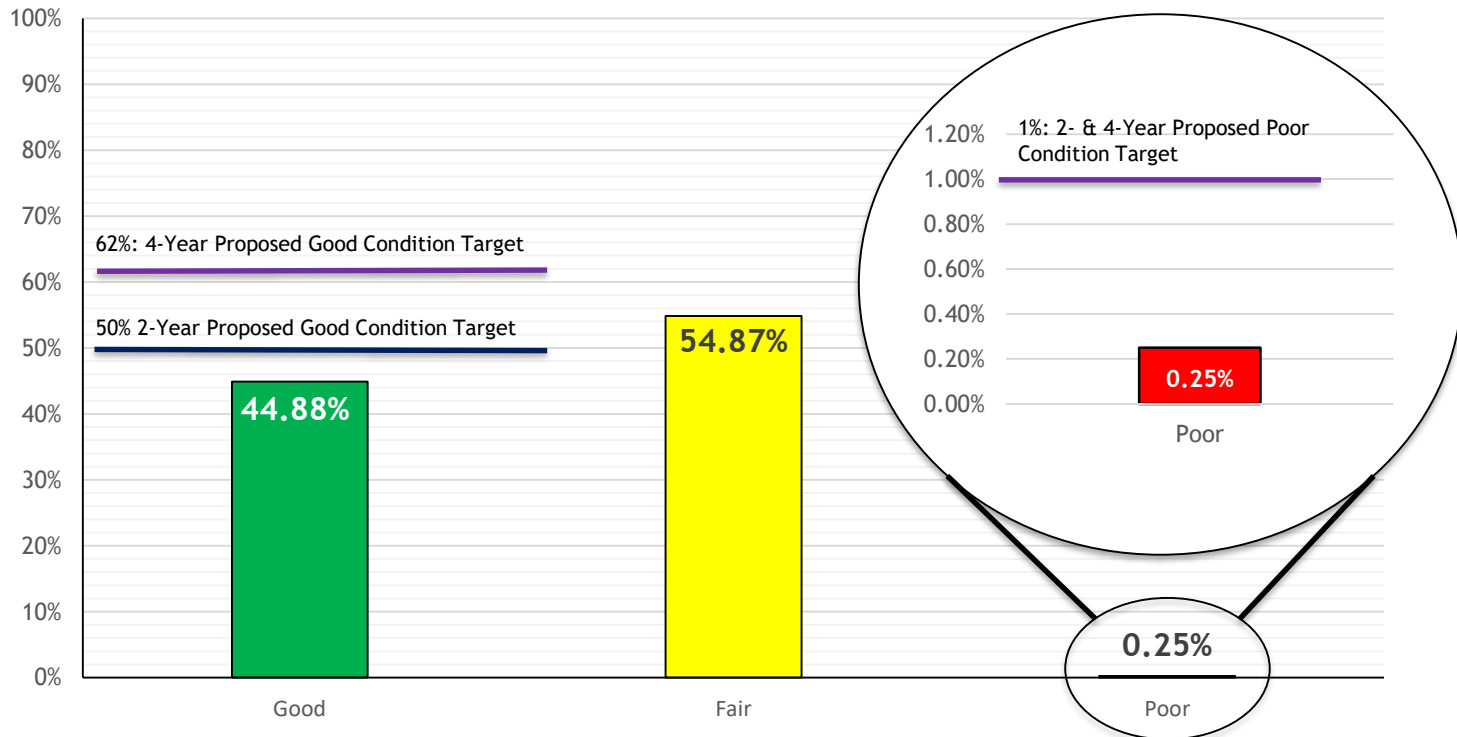
Poor segments = the worst sections of pavement



Statewide Interstate Pavement Condition Summary

Measure Area	Performance Measures
National Performance Management Measures to Assess Pavement Condition (Subpart C)	Percentage of pavements of the Interstate System in Good Condition
	Percentage of pavements of the Interstate System in Poor Condition

Interstate System Pavement Condition Summary - 2017

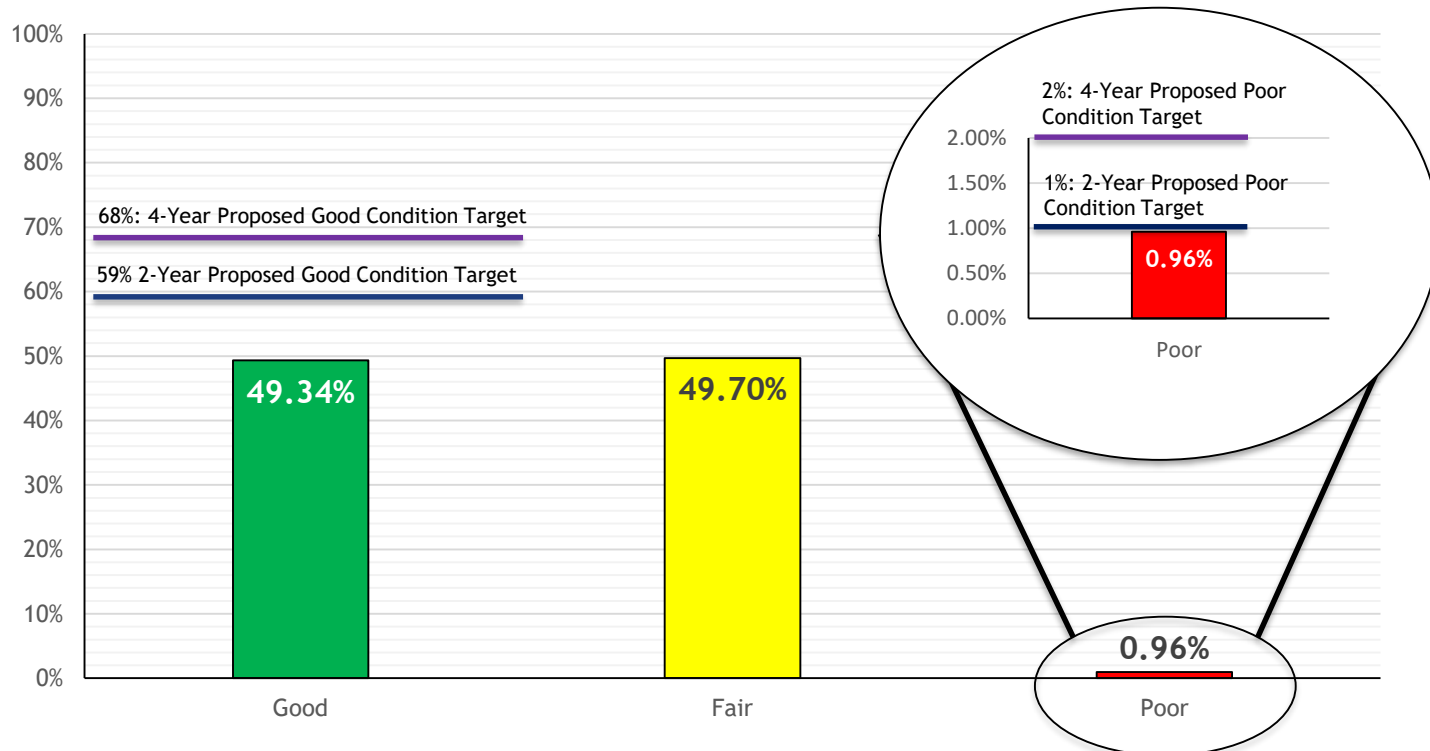




Statewide Non-Interstate NHS Pavement Condition Summary

Measure Area	Performance Measures
National Performance Management Measures to Assess Pavement Condition (Subpart C)	Percentage of pavements of the non-Interstate NHS in Good Condition
	Percentage of pavements of the non-Interstate NHS in Poor Condition

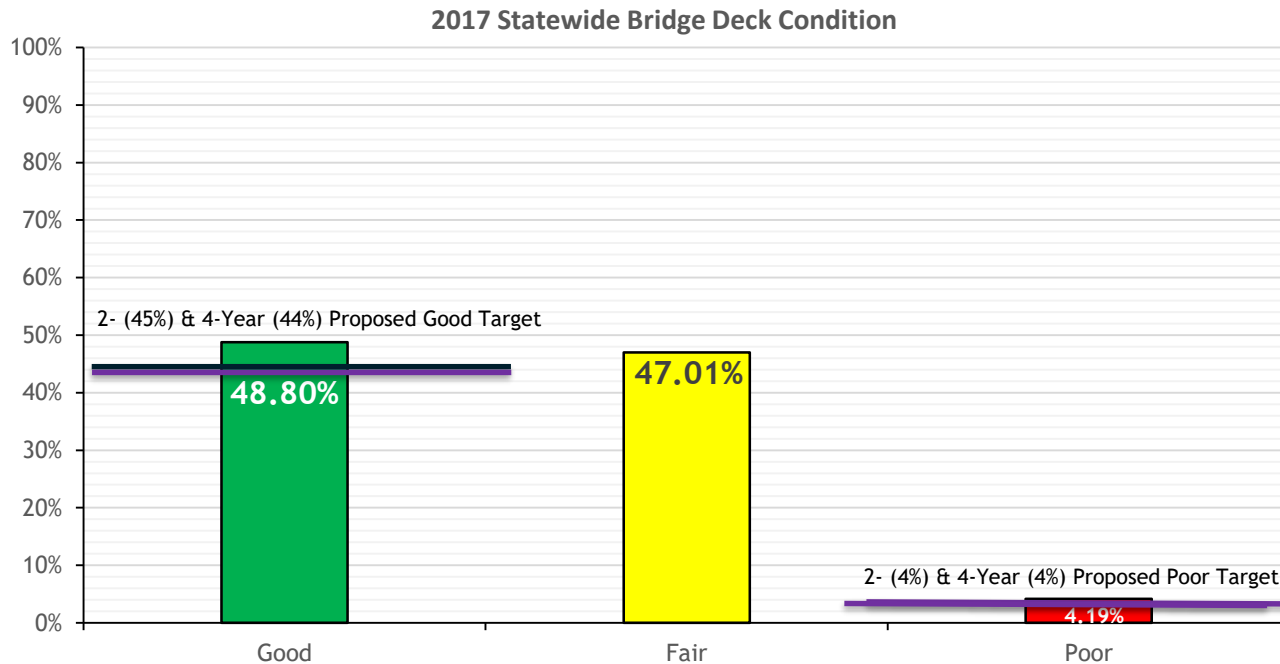
Non-Interstate NHS System Pavement Condition – 2017





Statewide Bridge Condition Summary

Measure Area	Performance Measures
National Performance Management Measures to Assess Bridge Condition (Subpart D)	Percentage of NHS bridges, by deck area, classified in good condition
	Percentage of NHS bridges, by deck area, classified in poor condition



As of 2017 Colorado NHS has 2,630 NHS bridges, with a total deck area of 30,102,799 square feet.

- 14,691,259 square feet were rated "Good" (48.80%).
- 14,151,670 square feet were rated "Fair" (47.01%)
- 1,259,870 square feet were rated "Poor" (4.19%)



Level of Travel Time Reliability Calculation (LOTTR) - Example

Measure Area	Performance Measures
Performance of the National Highway System (Subpart E)	Interstate Travel Time Reliability Measure: Percent of person-miles traveled on the Interstate that are reliable
	Non-Interstate Travel Time Reliability Measure: Percent of person-miles traveled on the non-Interstate NHS that are reliable

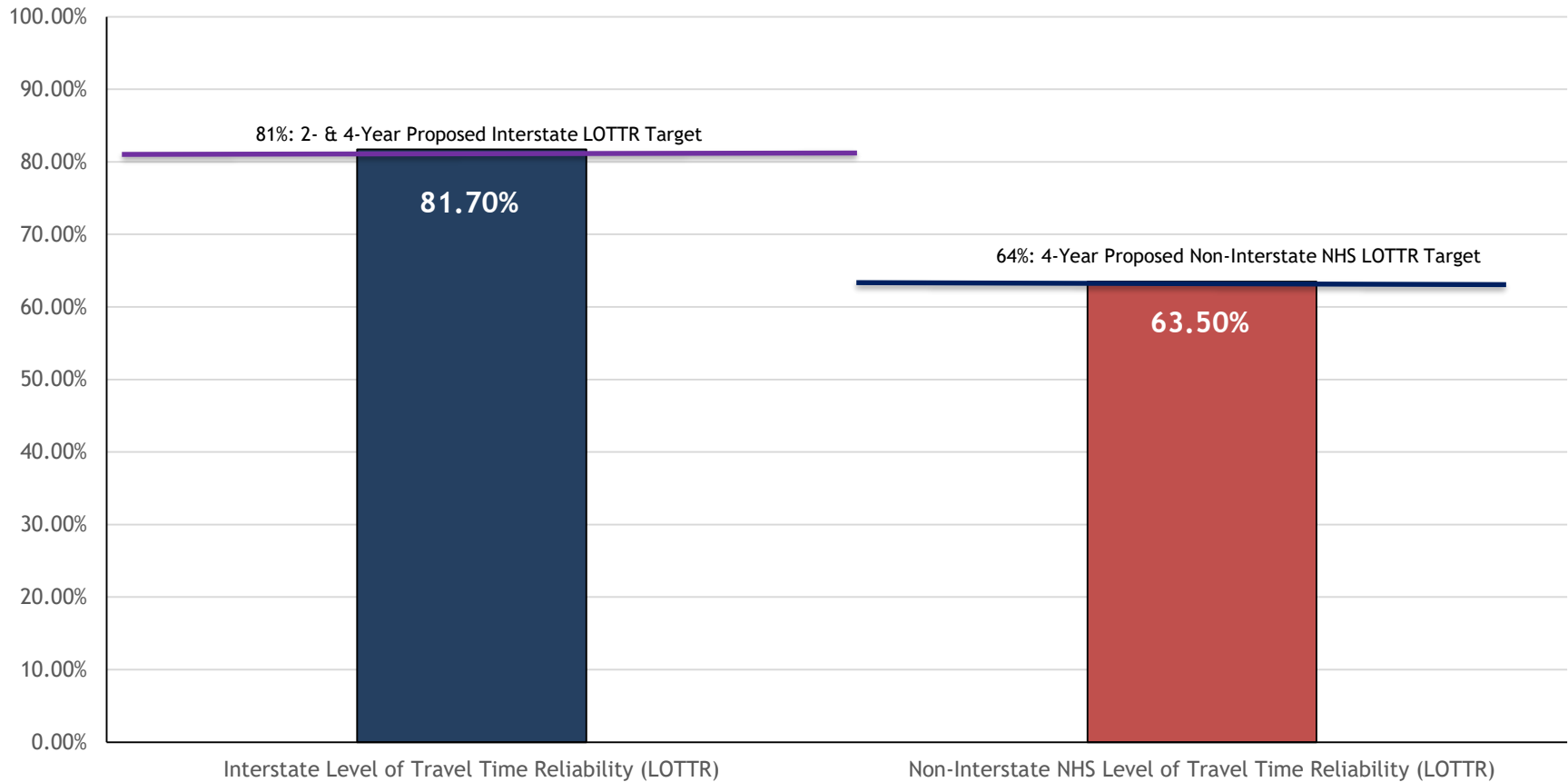
$$\frac{\text{Longer travel time} = 80^{\text{th}} \text{ percentile during time periods}}{\text{Shorter travel time} = 50^{\text{th}} \text{ percentile during time periods}} = \frac{\# \text{ seconds}}{\# \text{ seconds}} = \text{Level of Travel Time Reliability Ratio}$$

Level of Travel Time Reliability (LOTTR) <i>(Single Segment, Interstate Highway System)</i>		
Monday – Friday	6am – 10am	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 is not reliable



Statewide System Reliability Condition Summary

Percent of Person-Miles Traveled in Colorado Rated Reliable (LOTTR)
2016 Performance



Segments of highway are rated reliable if the travel time index is less than 1.50 for all of the applicable time periods. The graph above indicates the percent of person-miles traveled which are considered reliable based on segment reliability, total length of roadway segments, annual traffic volumes, and occupancy factors.



Truck Travel Time Reliability (TTTR) Calculation - Example

Measure Area	Performance Measures
Freight Movement on the Interstate System (Subpart F)	Freight Reliability Measure: Truck Travel Time Reliability (TTTR) Index

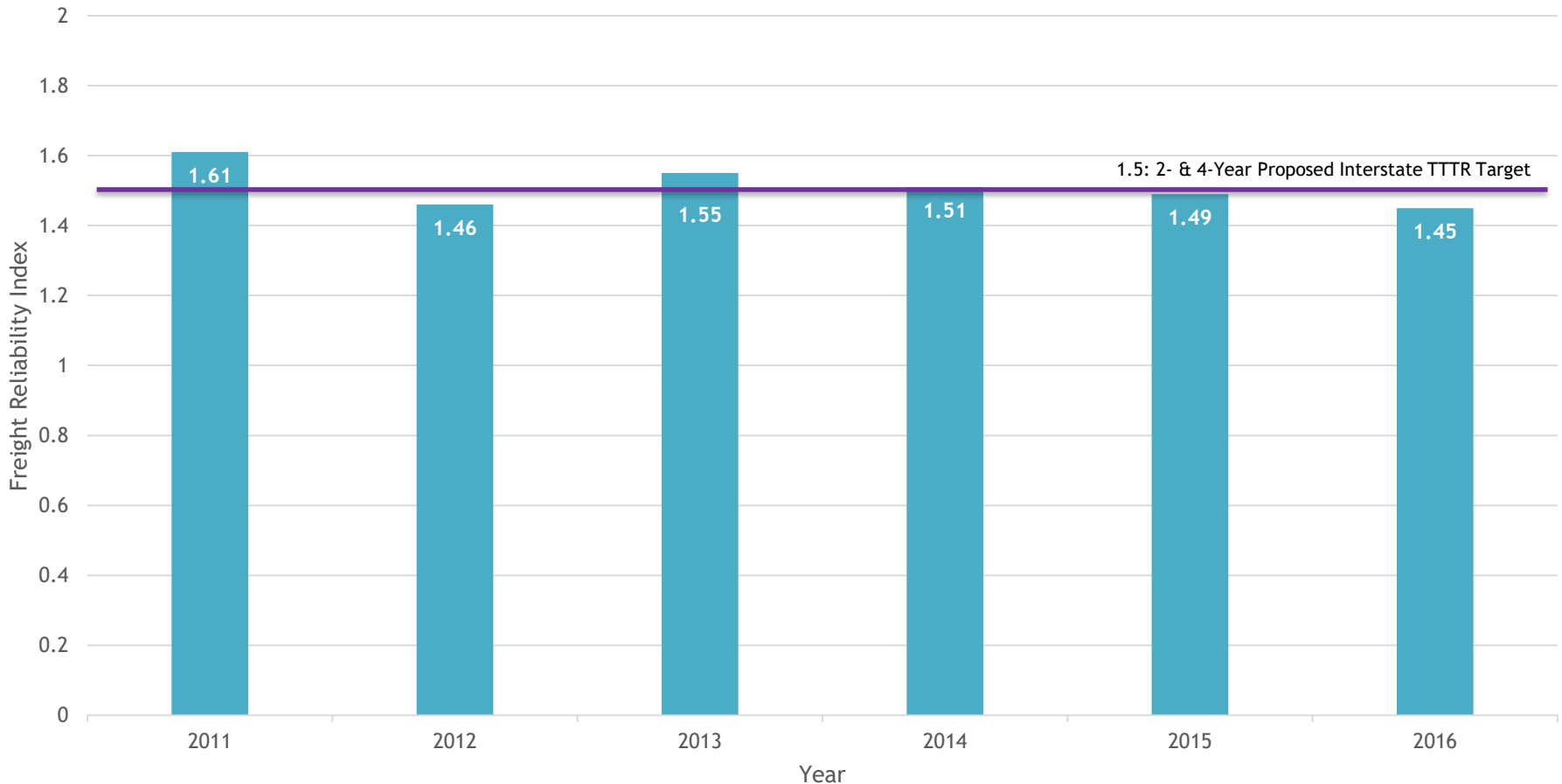
$$\frac{\text{Longer travel time} = 95^{\text{th}} \text{ percentile during time periods}}{\text{Shorter travel time} = 50^{\text{th}} \text{ percentile during time periods}} = \frac{\# \text{ seconds}}{\# \text{ seconds}} = \text{Truck Travel Time Reliability (TTTR) Ratio}$$

Truck Travel Time Reliability (TTTR) (Single Segment, Interstate Highway System)		
Monday – Friday	6am – 10am	$\text{TTTR} = \frac{72 \text{ sec}}{50 \text{ sec}} = 1.44$
	10am – 4pm	TTTR = 1.39
	4pm – 8pm	TTTR = 1.49
Weekends	6am – 8pm	TTTR = 1.31
Overnight	8pm – 6am	TTTR = 1.20
Maximum TTTR		1.49



Statewide Freight Reliability Summary

Truck Travel Time Reliability (TTTR) Index
Interstates in the State of Colorado

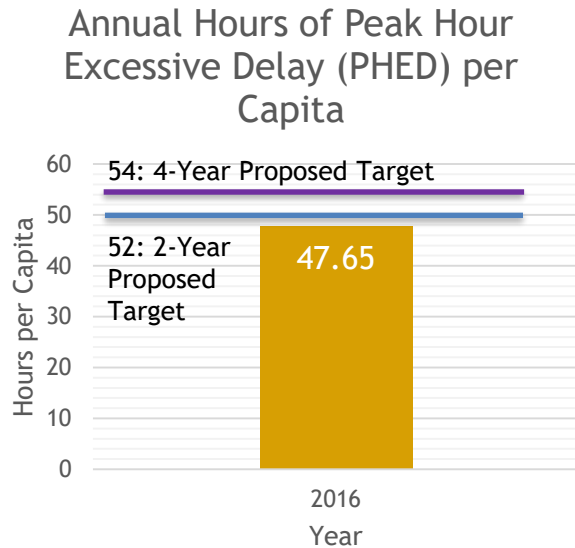


Truck Travel Time Reliability Index is a ratio of the actual observed truck travel time divided by the normal, expected truck travel time for a segment of roadway. The maximum calculated TTTR of the applicable time periods is used for the total system calculation. The graph above details the combined ratio for all segments on the Interstate System.

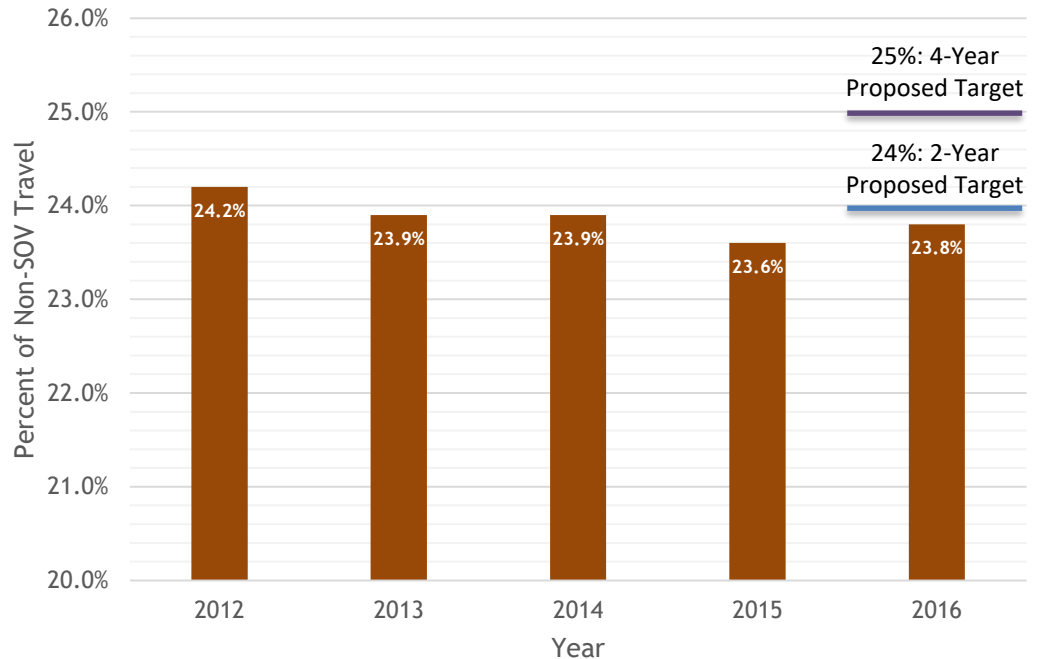


Peak Hour of Excessive Delay (PHED) and Non-SOV Travel Summary

Measure Area	Performance Measures
Measures to Assess the CMAQ Program - Traffic Congestion (Subpart G)	Peak Hour Excessive Delay (PHED) Measure: Annual Hours of Peak Hour Excessive Delay (PHED) Per Capita
	Non-Single Occupancy Vehicle Travel (SOV) Measure: Percent of Non-Single Occupancy Vehicle (SOV) Travel



Denver-Aurora Urbanized Area Non-SOV Travel All Non-SOV Modes



Source: American Community Survey 5-Year Estimates (2012-2016)



On Road Mobile Emissions Target Recommendations

Measure Area	Performance Measures
Measure to Assess the CMAQ Program - On-Road Mobile Source Emissions (Subpart H)	Emissions Measure: Total Emissions Reduction

National Performance Measure	2-Year Target (Year 2020)	4-Year Target (Year 2022)
Emission-reduction benefit for Volatile Organic Compounds - VOC (kg/day)	86	105
Emission-reduction benefit for Particulate Matter, 10 micrometers or greater - PM10 (kg/day)	31	152
Emission-reduction benefit for Carbon Monoxide - CO (kg/day)	1,152	1,426
Emission-reduction benefit for Nitrogen Oxides - NOx (kg/day)	86	105



Next Steps

- **March 2018** - Transportation Commission workshop on Infrastructure Condition and System Performance.
- **April 2018** - Anticipate that the Transportation Commission will adopt target recommendations for Infrastructure Condition & System Performance.
- **May 20, 2018** - Deadline for submitting statewide targets for Infrastructure Condition and System Performance to FHWA
- **October 1, 2018** - CDOT reports baseline performance for Infrastructure Condition and System Performance to FHWA.
- **November 15, 2018** - Deadline for MPOs to support the statewide target or develop their own targets for Infrastructure Condition and System Performance