Delaware Transportation Performance Measurement

Travel Time-Based Measures from:
FHWA's System Performance, Freight, and CMAQ Performance Measures Final Rule (PM 3)

December 5, 2018

Background – 17 Total Measures (PM1 to PM3)

Final Rule	Measures
PM1 Safety	• # of fatalities • Rate of fatalities (per MVM) • # of serious injuries • Rate of serious injuries (per MVM) • # of non-motorized fatalities and non-motorized serious injuries
PM2 Infrastructure	• % of pavements of the Interstate System in Good condition • % of pavements of the Interstate System in Poor condition • % of pavements of the non-Interstate NHS in Good condition • % of pavements of the non-Interstate NHS in Poor condition • % of NHS bridges classified as in Good condition • % of NHS bridges classified as in Poor condition
PM3 System Performance, Freight, and CMAQ	• % of person-miles on the Interstate that are Reliable • % of person-miles on the non-Interstate NHS that are Reliable • Truck Travel Time Reliability (TTTR) Index • Annual Hours of Peak Hour Excessive Delay (PHED) per capita • % of Non-Single Occupancy Vehicle (SOV) Travel • Total Emissions Reduction

"2016"

"2017"

"2018"

17 measures per **23 CFR 490**, *excluding a deferred GHG Measure*

PM3 Rule's effective date: May 20, 2017

State DOT targets due: May 20, 2018

MPO targets due: 180 days after DOT

Baseline Performance Period Report due: October 1, 2018

2

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Data Review – NPMRDS Data

What is NPMRDS?

National Performance Management Research Data Set

- Archived speed and travel time dataset covering the National Highway System

- Sourced from INRIX probe-based data (reported from vehicles, trucks, and mobile devices)

- Compiled in 5-minute intervals for passenger vehicles, trucks, and combined

- Referenced to roadway segments by Traffic Message Channel (TMC); over 1,100 TMC segments in Delaware

Delaware NPMRDS TMC Network

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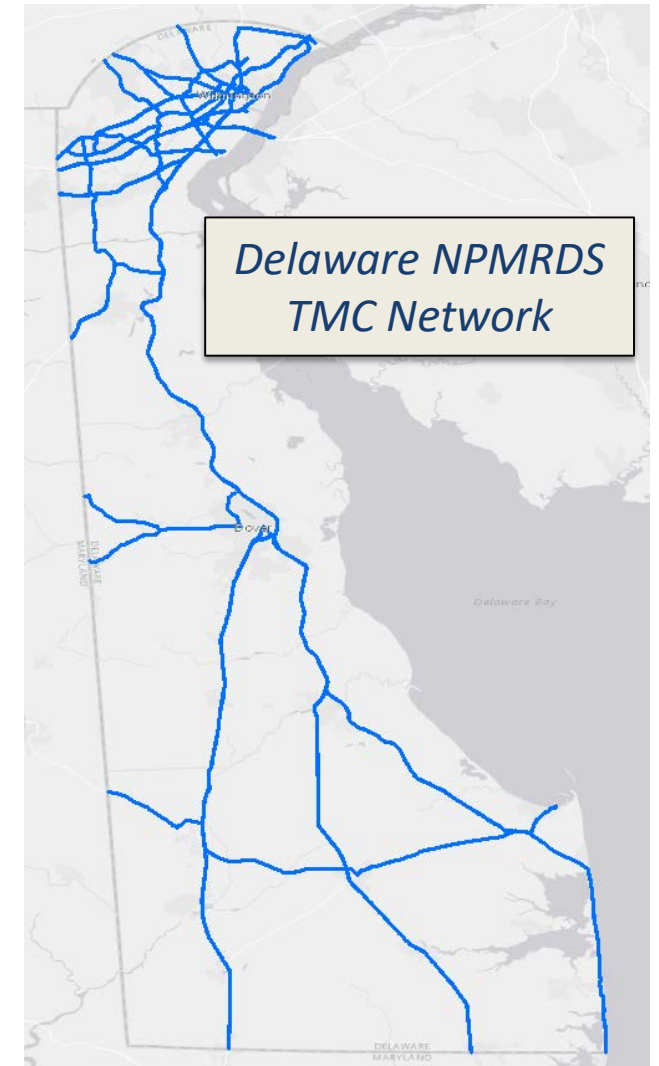
Data Review – RITIS NPMRDS Analytics Tools

PM3 widget set compliant with MAP-21

1. Geography (*State, MPA, UZA*)
2. Measures   (*TTR_I, TTR_{NI}, TTTR, PHED*)
3. Year   (*2017*)
4. Data Style (*graph, map*)

DE Posted Speed Limits (for PHED calcs) processed by CATT Lab

*Historic **2011-2017** data (for trendlines) pulled by WILMAPCO*

How is NPMRDS Data Used ?

1) Data for **"This Year"** (2017, 2018, 2019, etc.)
2) Recent **Historic Trends**
3) Future **Trend Estimates**

**Examples of Targets:
Data Trending "Downward"**

THIS YEAR

2-YR TARGET

4-YR TARGET

SAME AS EXISTING

FOLLOW THE TREND

LESS THAN TREND

2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022

5

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How is NPMRDS Data Used ?

Examples of Targets: Data Trending "Upward"

MORE THAN TREND

FOLLOW THE TREND

SAME AS EXISTING

THIS YEAR

2-YR TARGET

4-YR TARGET

2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022

6

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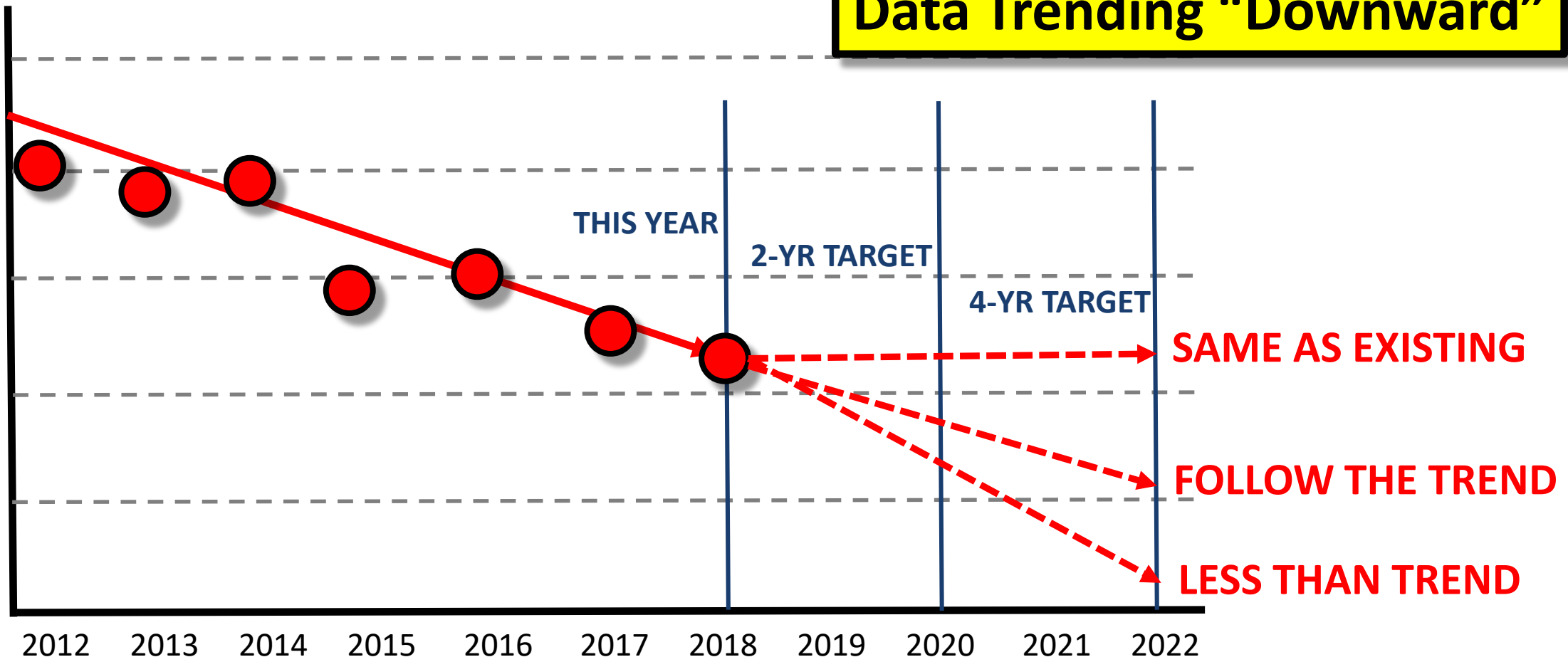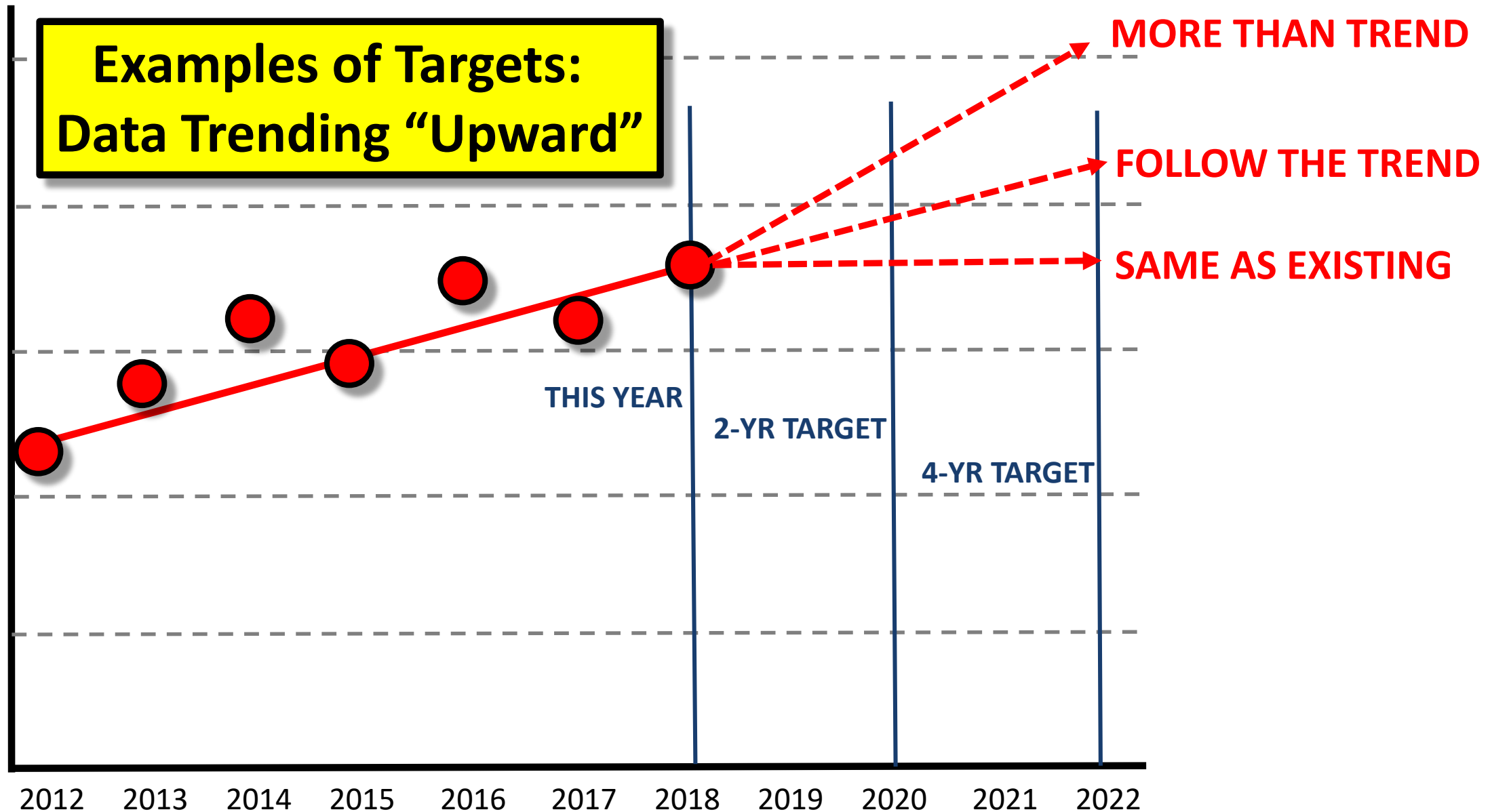
What do 50th vs. 80th vs. 95th percentile travel times look like?

Example 1 (DE 1 SB, 6-10 AM Peak):

50th Percentile = 7.15 min (56 mph)

80th Percentile = 7.39 min (54 mph)

95th Percentile = 7.76 min (52 mph)

TT Difference   = ± 0.61 minutes

Approx. Speeds   = 52-56 mph

Approx. LOTTR   = 1.03 to 1.08

6.7 mile segment

DE 1 SB from DE 16 to DE 404
Weekday AM Travel Time (Monday-Friday, 6AM - 10AM)

50th Percentile = 7.15 min

80th Percentile = 7.39 min

95th Percentile = 7.76 min

Legend
- < 80th Percentile Travel Time
- > 80th and < 95th Percentile Travel Times
- > 95th Percentile Travel Time

80/50 TTR = 1.03

95/50 TTR = 1.08

Number of Observations

Average Travel Time (min)

50th   **80th**   **95th**
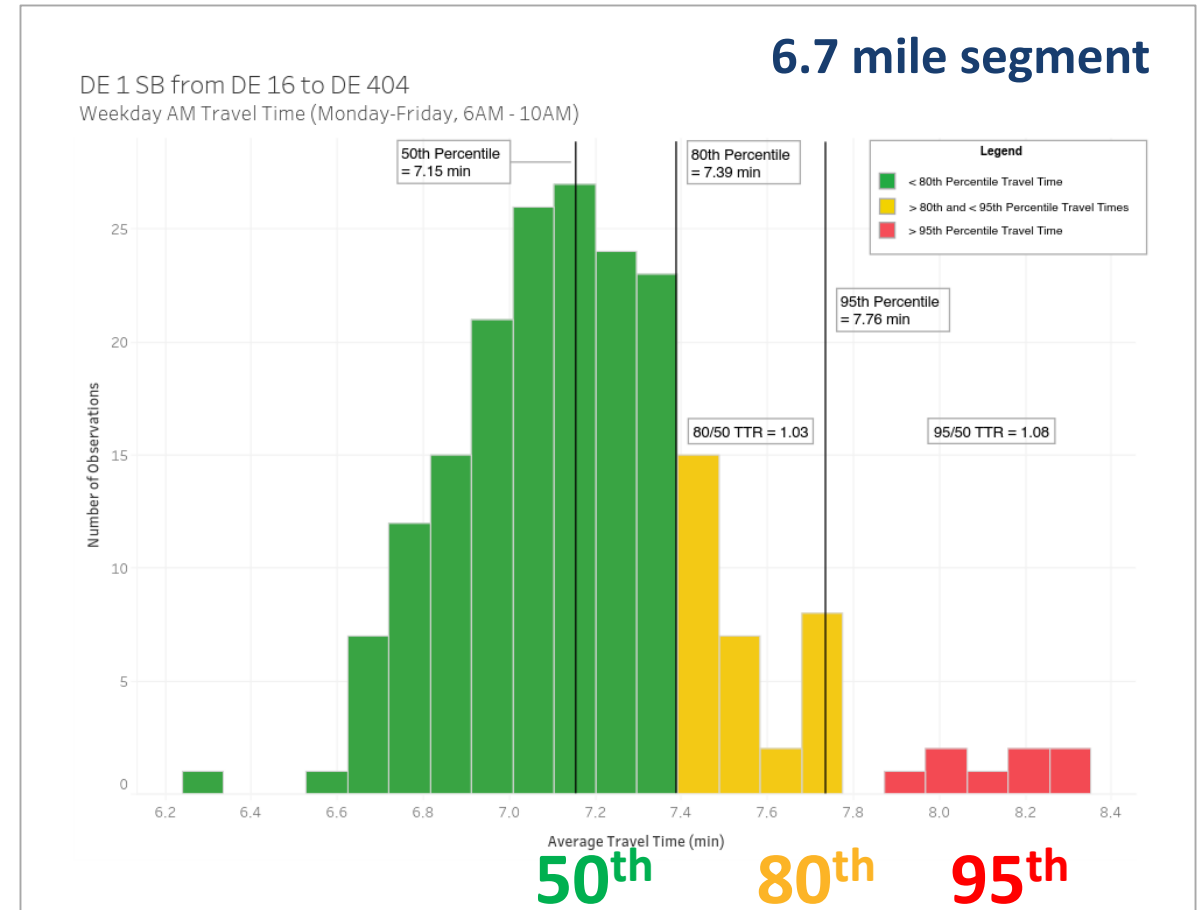
Source: DelDOT Bluetooth travel times (June-August 2015), as compiled by Rybinski Engineering

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Travel Time Reliability (Interstate)

Interstate Travel Time Reliability for Delaware

Delaware

MAP-21 Percent of the Person-Miles Traveled on the Interstate That Are Reliable (the Interstate Travel Time Reliability measure)

2017 Target
at least
75.0%

👍 **81.3%**

Year-to-Date
2017

Target: At least 75% of the system should have a LOTTR less than 1.50

Show map...

Calculated using 100.00% of miles in De[laware]

Data source: NPMRDS INRIX (2016-201[7])
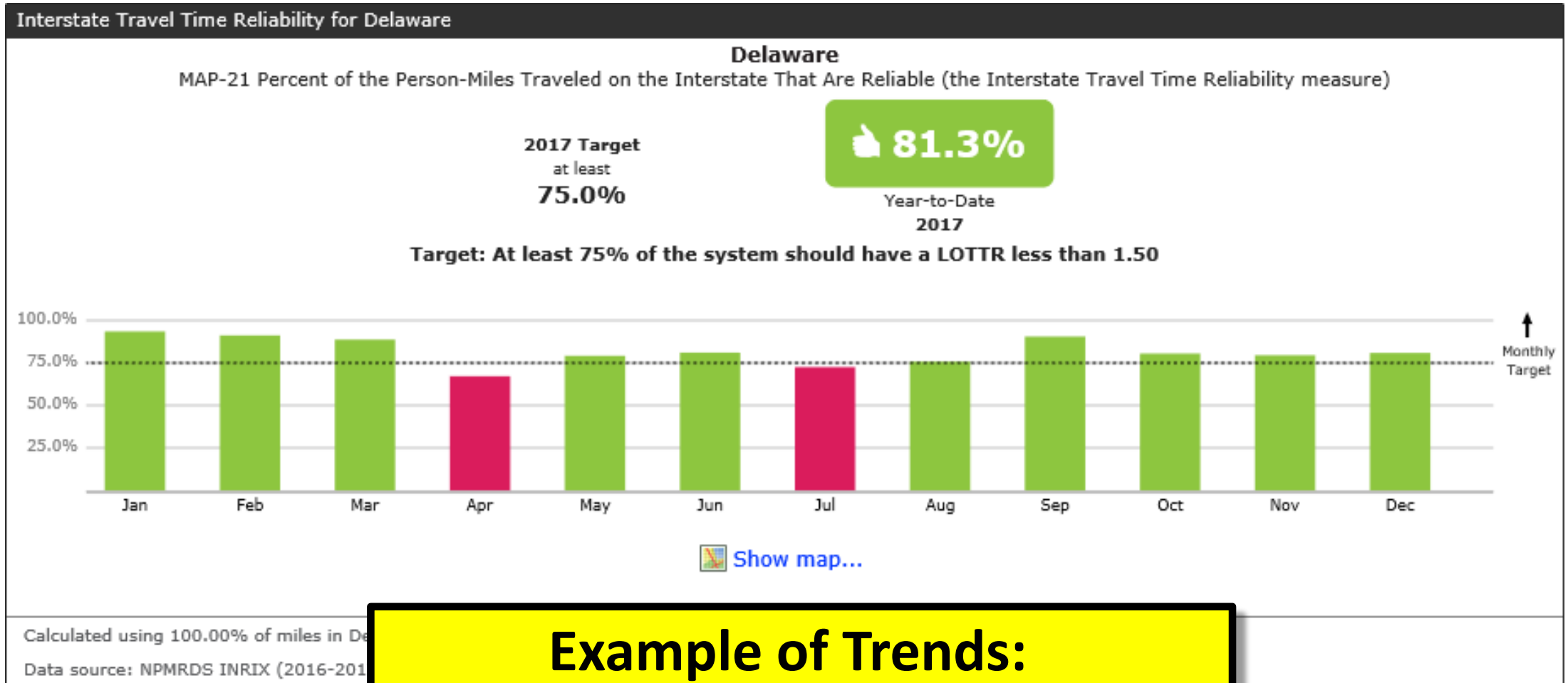
**Example of Trends:
Travel Time Reliability, by Month**

Updated May 3, 2018 4:00 PM

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Travel Time Reliability (Interstate)

TTR_I

Example of Trends: Travel Time Reliability, by Road Segment

Updated May 3, 2018 4:00 PM
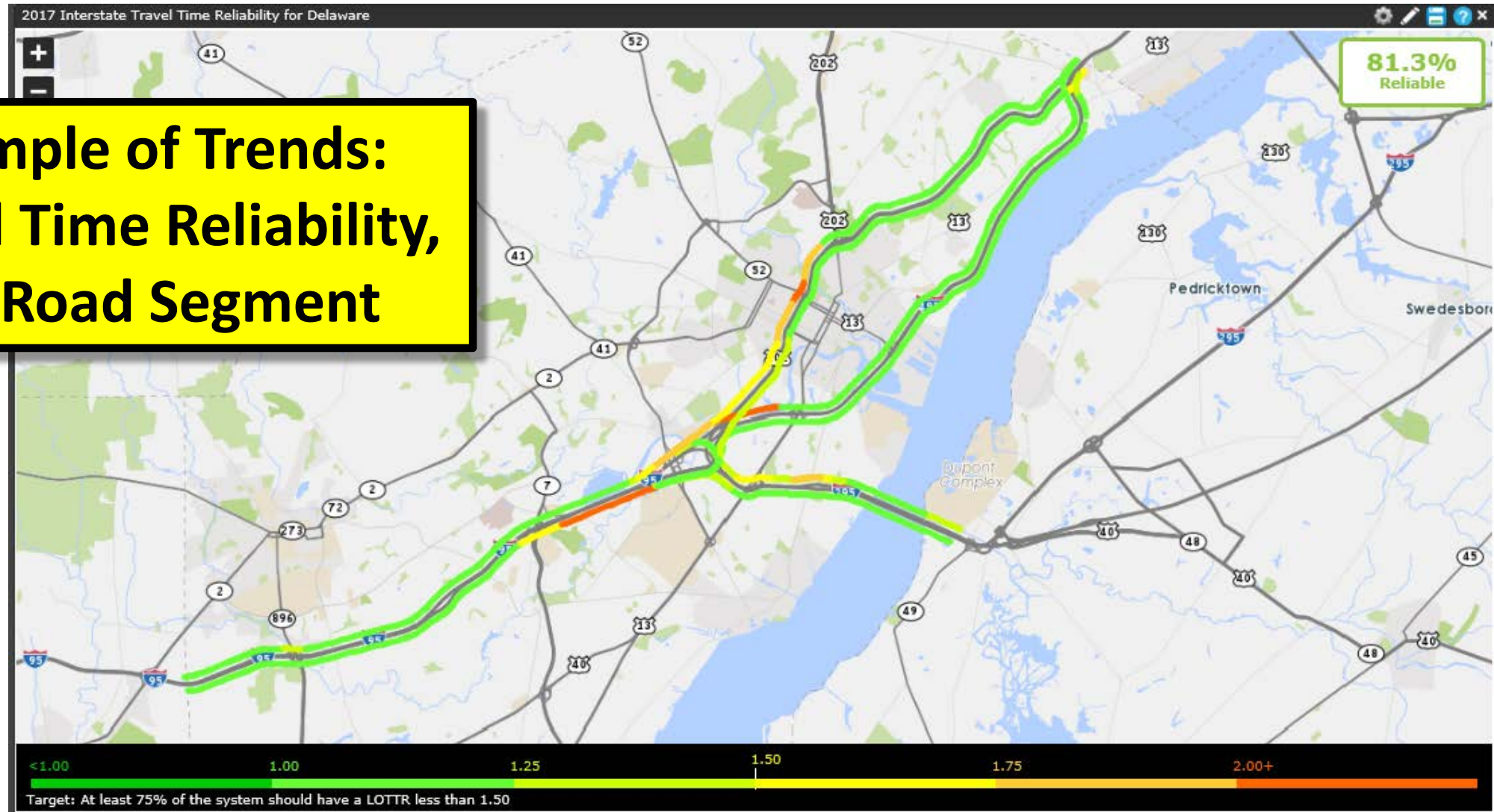
Travel Time Reliability (Interstate)

TTR_I

Historic Data Insights by Month

Highly variable by month (limited mileage?)

Delaware Statewide
TTR_I by Month (FEB-DEC 2017)

> 90%

67%

**2017 Avg
80.1%**
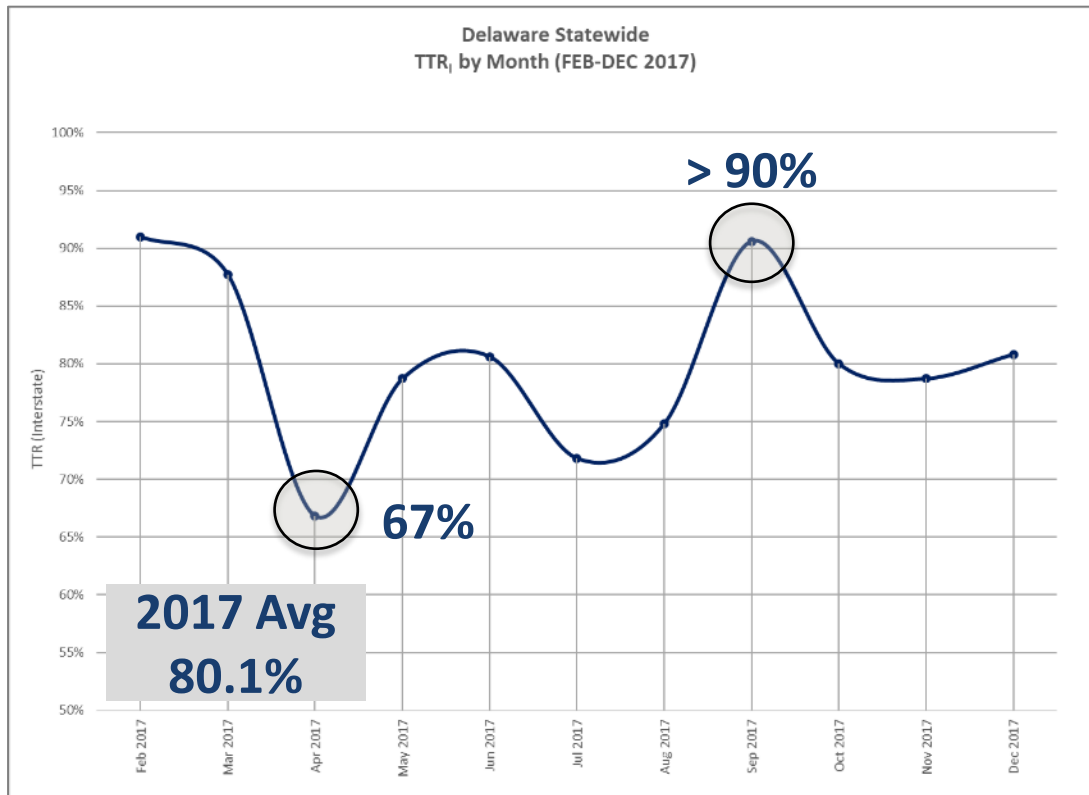
Reflective of seasonal travel

Delaware Statewide
TTR_I by Month (2014-2017 Overlay)

**Cabin
Fever**

**Back to
School**

**Summer
Vacation**

Holidays

Travel Time Reliability (Interstate)

Historic Data Insights by Year

General downward trend since 2012

Influenced by I-495 Closure (Jun-Aug 2014)

Travel Time Reliability (Non-Interstate NHS) TTR_{NI}

Variations by Urbanized Area

WILMAPCO Area	Dover / Kent County MPO Area	Salisbury-Wicomico MPO Area
$TTR_{NI} = 86.8\%$	$TTR_{NI} = 97.9\%$	$TTR_{NI} = 98.3\%$

2017 Non-interstate NHS Travel Time Reliability for DE - Wilmington Area

DE - Wilmington Area Planning Council, Wilmington (WILMAPCO)
MAP-21 Percent of the Person-Miles Traveled on the Non-Interstate NHS That Are Reliable (the Non-Interstate NHS Travel Time Reliability measure)

2017 Target at least 88.0%   👍 88.6% Year-to-Date 2017

Target: At least 88% of the system should have a LOTTR less than 1.50

Show map...

Calculated using 100.00% of miles in Wilmington Area Planning Council
Data source: NPMRDS INRIX

Updated May 3, 2018 4:00 PM

2017 Non-interstate NHS Travel Time Reliability for DE - Dover / Kent County

DE - Dover / Kent County MPO, Dover (D/KC MPO)
MAP-21 Percent of the Person-Miles Traveled on the Non-Interstate NHS That Are Reliable (the Non-Interstate NHS Travel Time Reliability measure)

2017 Target at least 88.0%   👍 98.5% Year-to-Date 2017

Target: At least 88% of the system should have a LOTTR less than 1.50

Show map...

Calculated using 100.00% of miles in Dover / Kent County MPO
Data source: NPMRDS INRIX

Updated May 3, 2018 4:00 PM

2017 Non-interstate NHS Travel Time Reliability for DE - Salisbury-Wicomico

DE - Salisbury-Wicomico MPO, Salisbury
MAP-21 Percent of the Person-Miles Traveled on the Non-Interstate NHS That Are Reliable (the Non-Interstate NHS Travel Time Reliability measure)

2017 Target at least 88.0%   👍 98.6% Year-to-Date 2017

Target: At least 88% of the system should have a LOTTR less than 1.50

Show map...

Calculated using 100.00% of miles in Salisbury-Wicomico MPO
Data source: NPMRDS INRIX
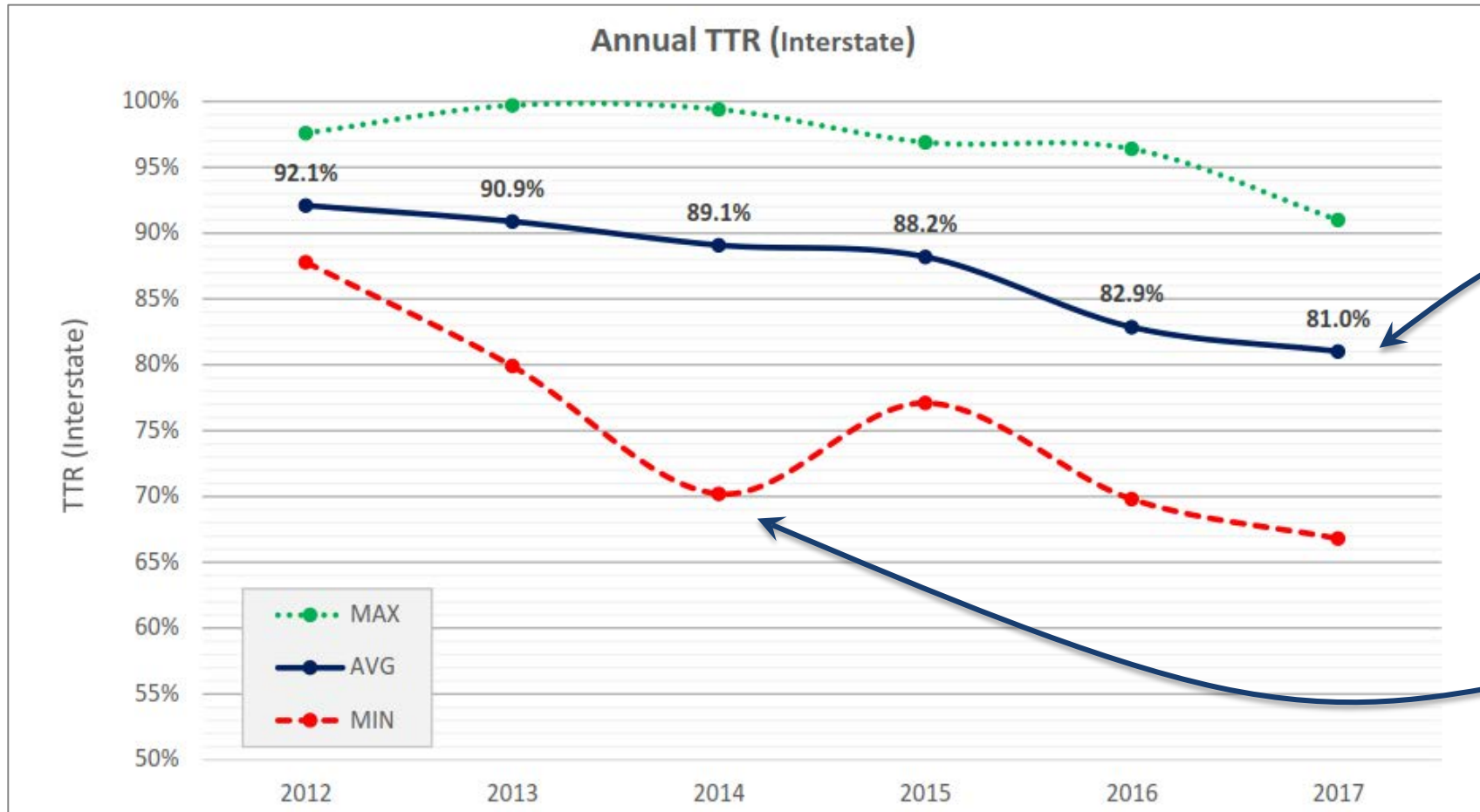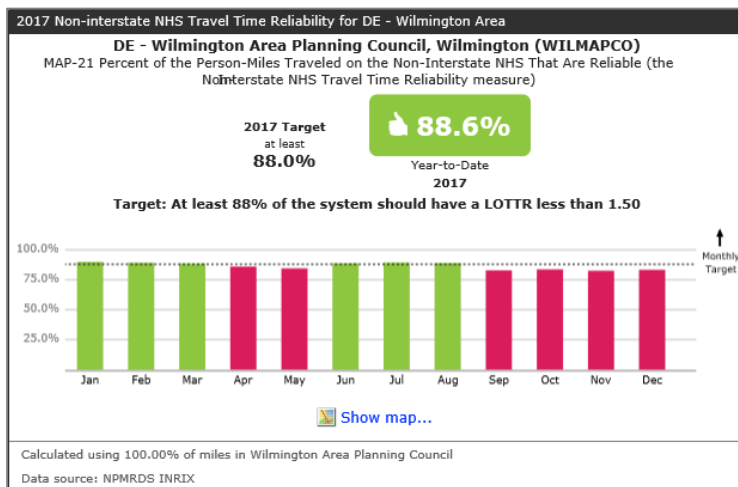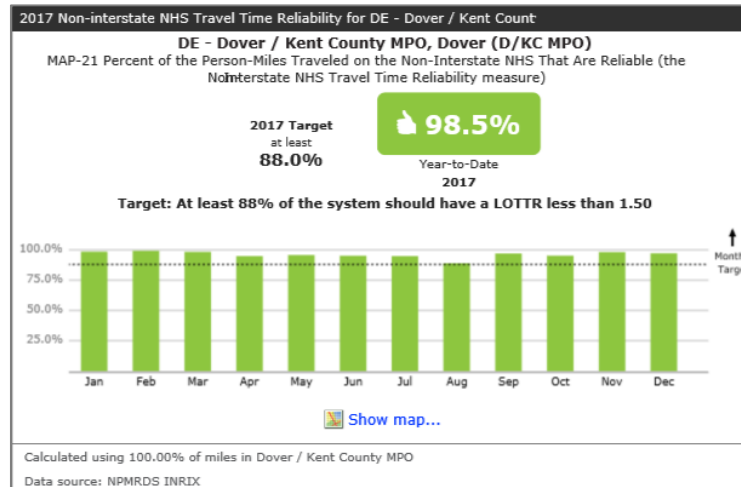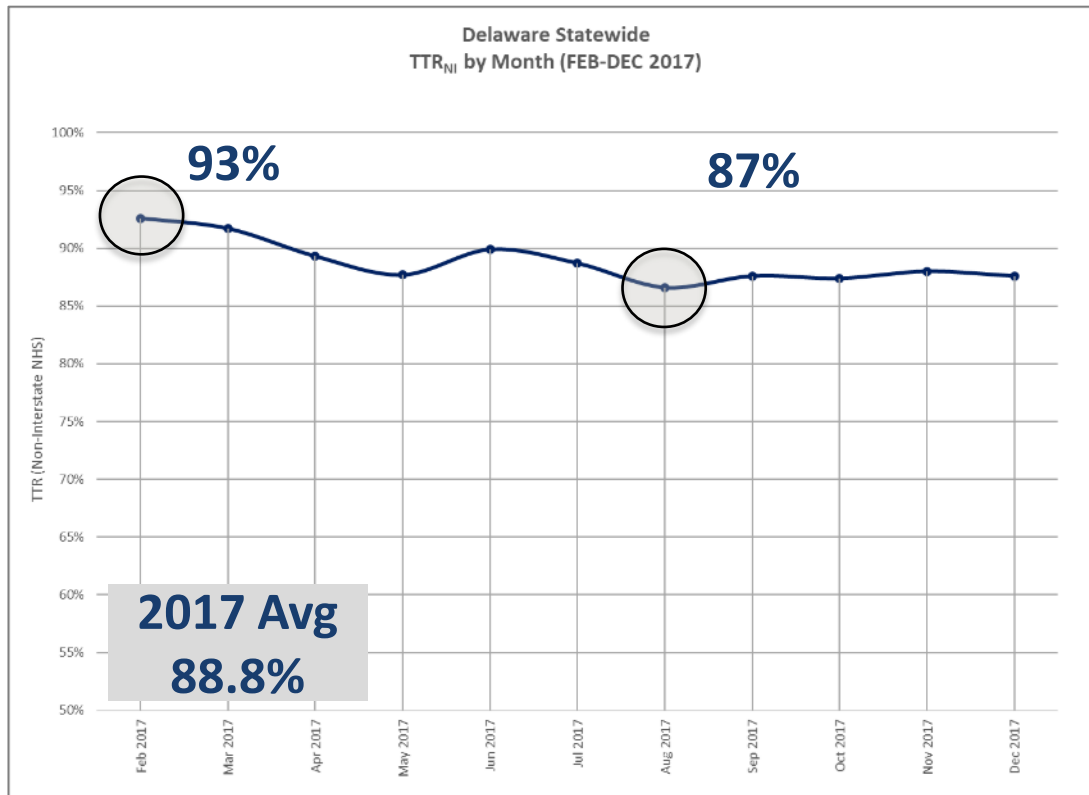
Updated May 3, 2018 4:00 PM

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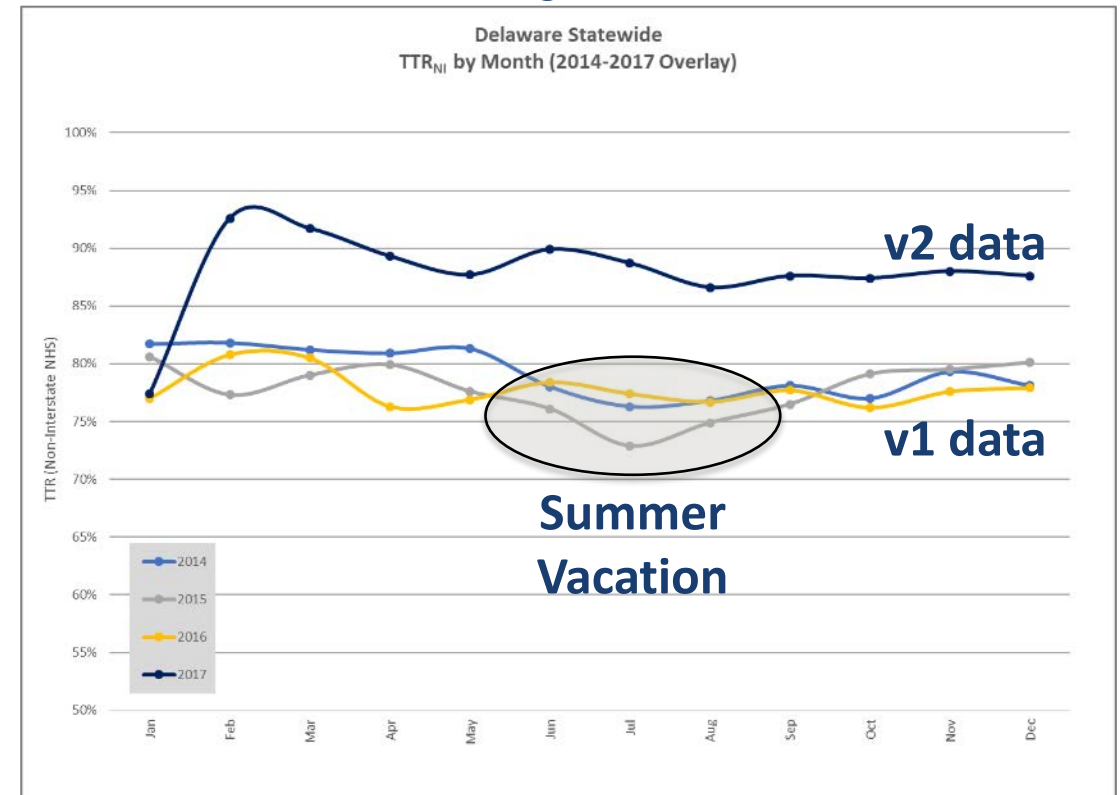# Travel Time Reliability (Non-Interstate NHS)

TTR_{NI}

Historic Data Insights by Month
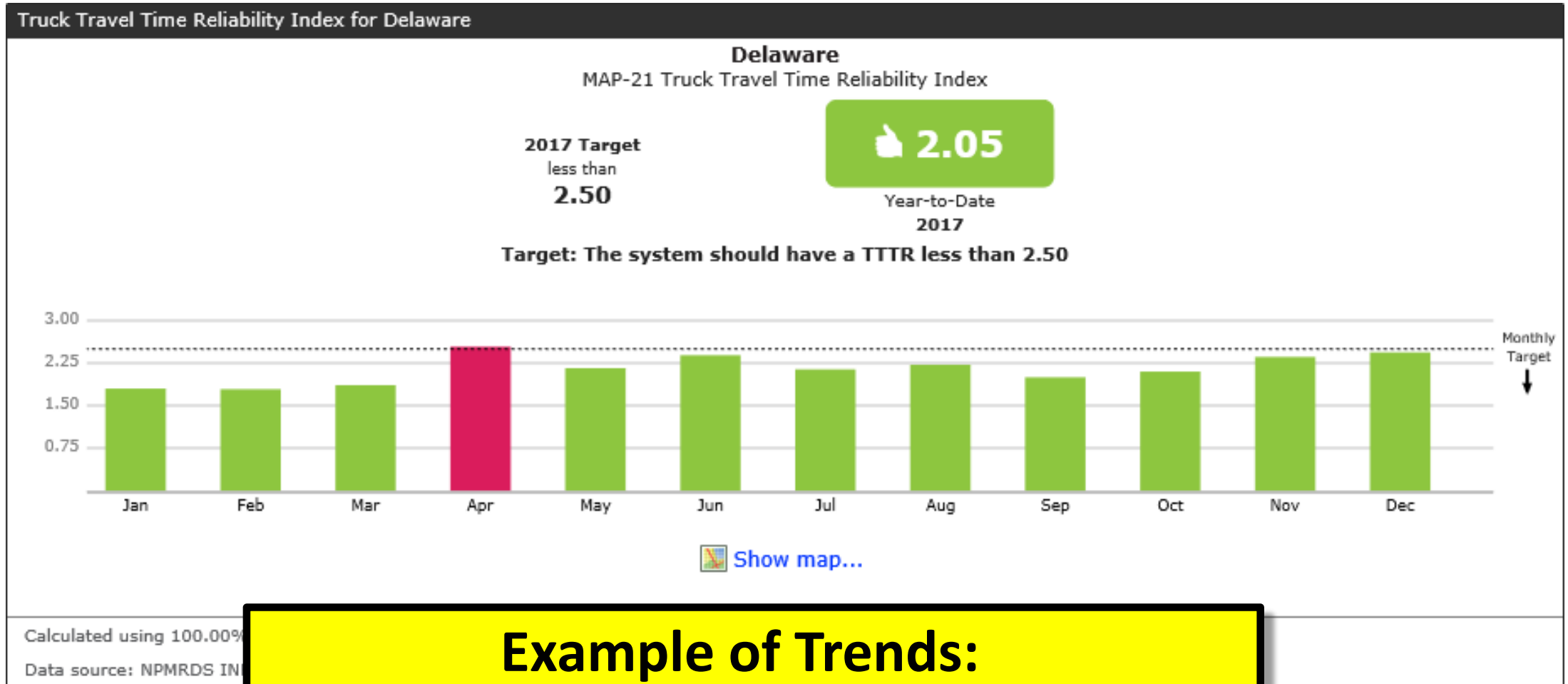
More stable than Interstates (more mileage?)

Less variation (than interstate data) by season;
Potential re-baselining with v2 versus v1 data

Delaware Statewide
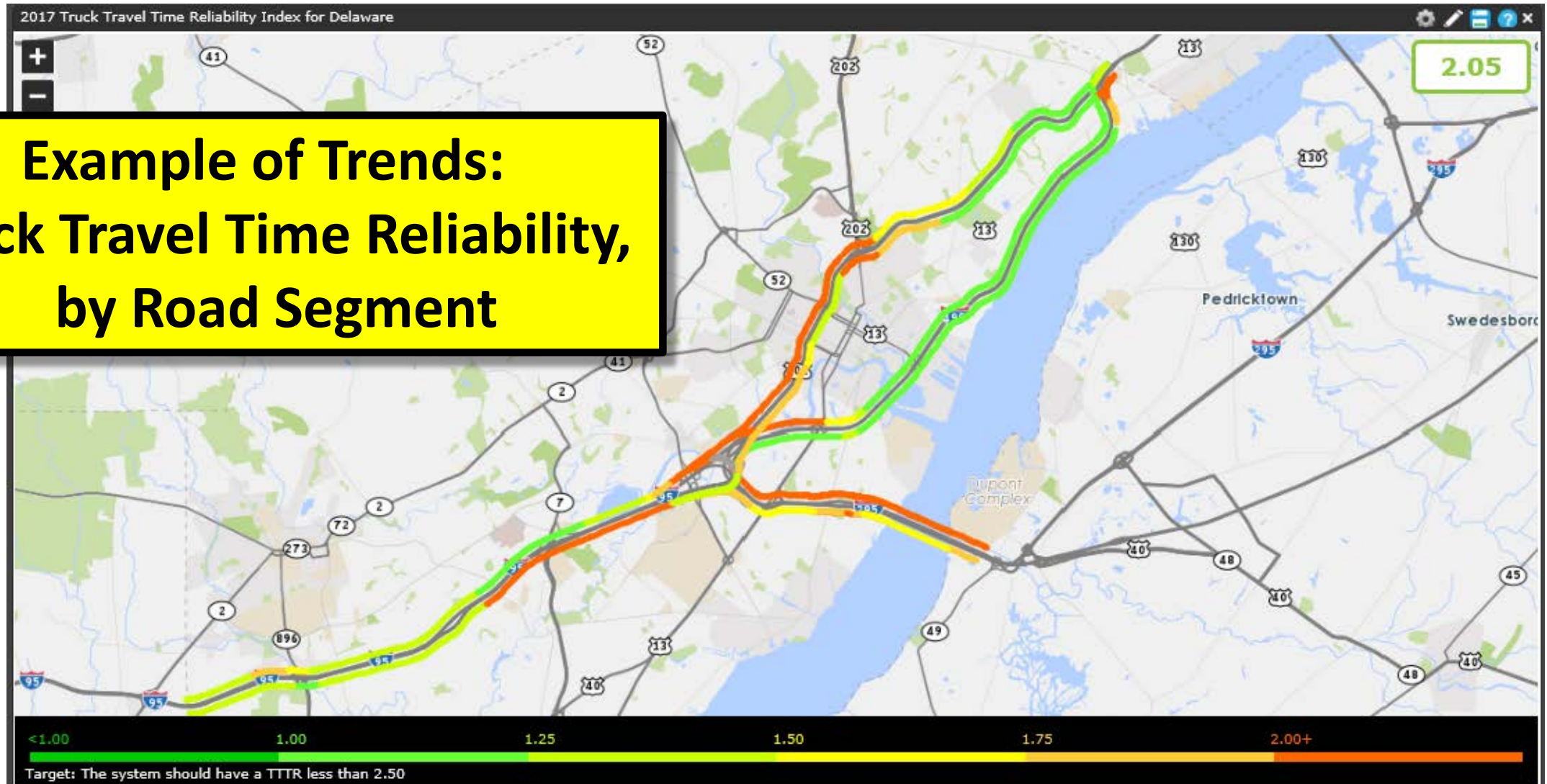TTR_{NI} by Month (FEB-DEC 2017)

93%   **87%**

2017 Avg 88.8%

Delaware Statewide
TTR_{NI} by Month (2014-2017 Overlay)

v2 data

v1 data

Summer Vacation

2014
2015
2016
2017

Truck Travel Time Reliability Index for Delaware

Delaware
MAP-21 Truck Travel Time Reliability Index

2017 Target
less than
2.50

👍 **2.05**
Year-to-Date
2017

Target: The system should have a TTTR less than 2.50

Show map...

Calculated using 100.00%
Data source: NPMRDS IN

Example of Trends:
Truck Travel Time Reliability, by Month

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Example of Trends:
Truck Travel Time Reliability,
by Road Segment

2017 Truck Travel Time Reliability Index for Delaware

2.05

| <1.00 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00+ |

Target: The system should have a TTTR less than 2.50
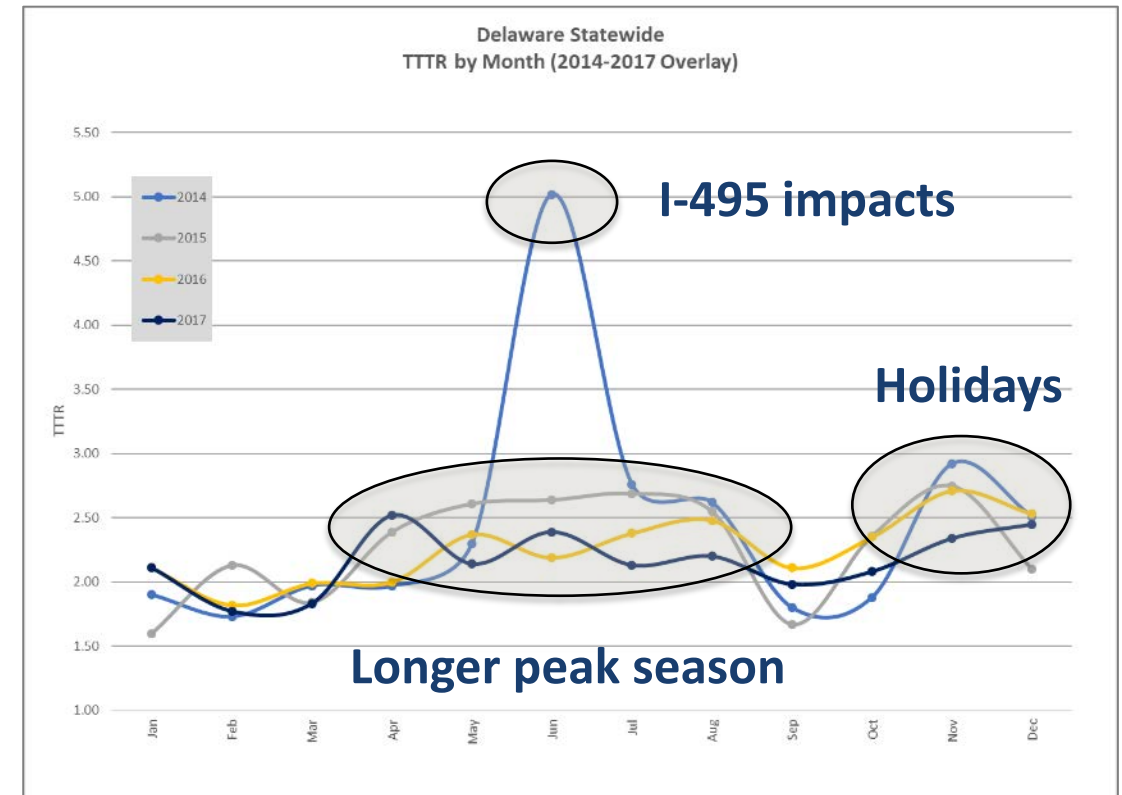
Updated May 3, 2018 4:00 PM

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Freight Reliability

Historic Data Insights by Month

More stable than passenger vehicle traffic
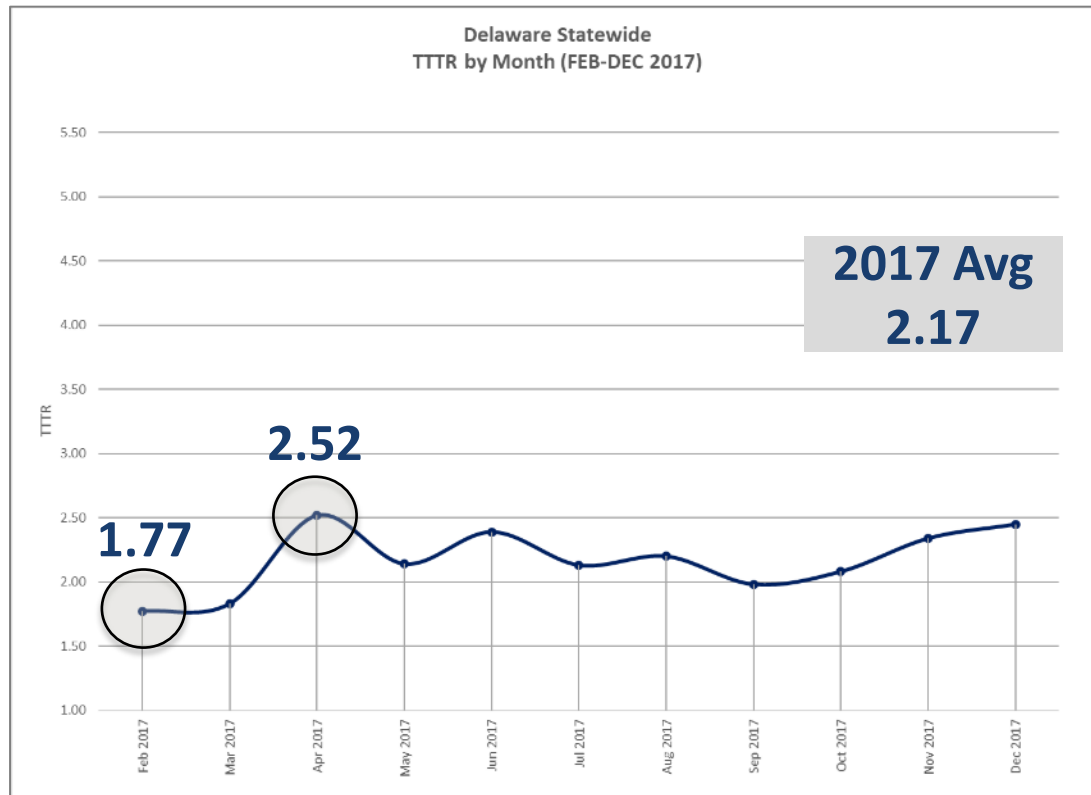
Seasonal variations and incident impacts

Delaware Statewide
TTTR by Month (FEB-DEC 2017)

2017 Avg
2.17

2.52

1.77

Delaware Statewide
TTTR by Month (2014-2017 Overlay)

I-495 impacts

Holidays

Longer peak season

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Freight Reliability

Historic Data Insights by Year

Annual TTTR
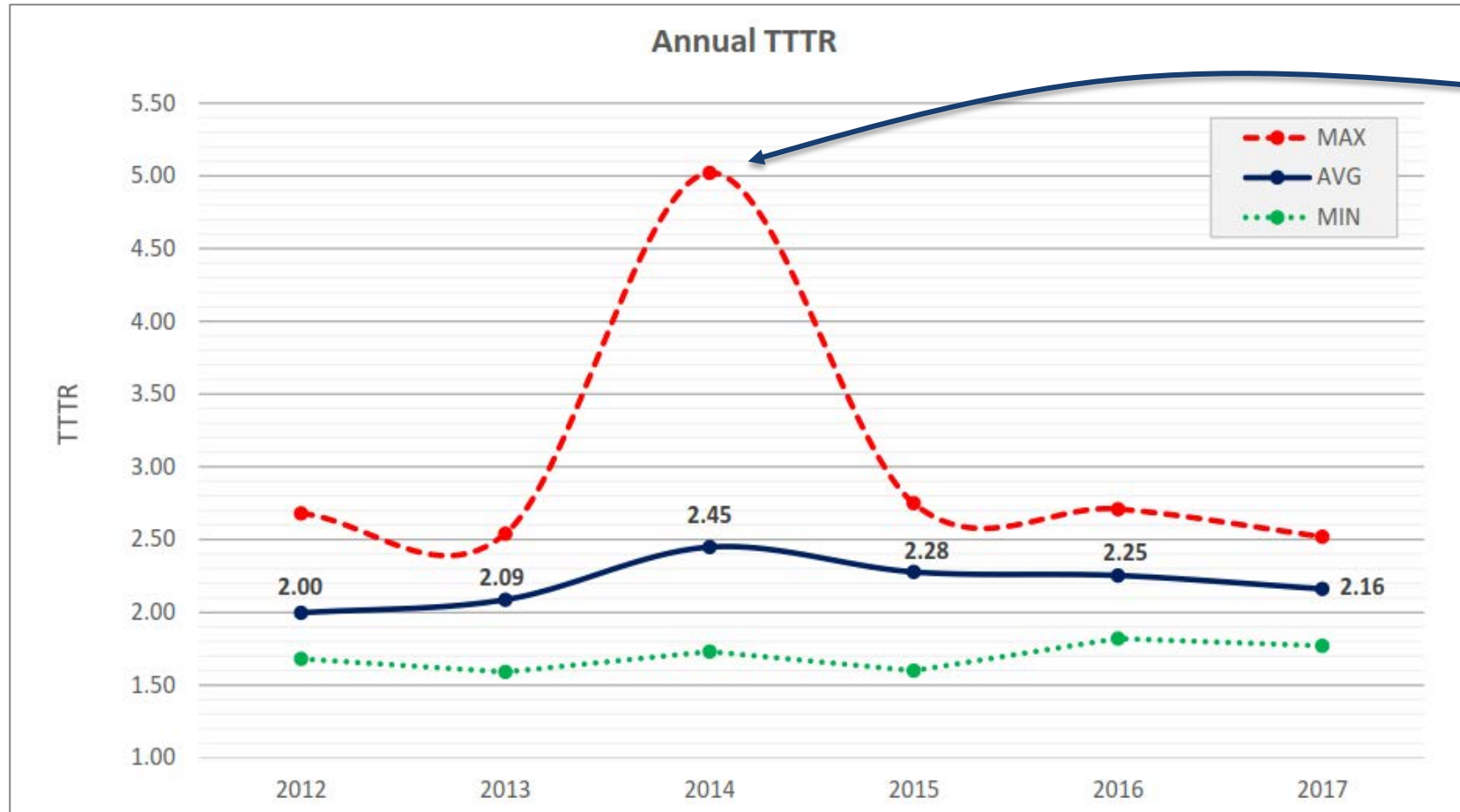
Severely influenced by I-495 Closure (Jun-Aug 2014)

Legend:
- MAX
- AVG
- MIN

AVG values: 2.00, 2.09, 2.45, 2.28, 2.25, 2.16

Years: 2012, 2013, 2014, 2015, 2016, 2017

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Target-Setting Perspectives

KEY QUESTIONS:

Is the current set of historical travel time data <u>really indicative of future trends</u>?

What are the <u>anticipated project influences</u>?

- When and where will projects occur?
- What types of improvements will they introduce?
- Will improvements influence speed or travel time (near-, mid-, or long-term)?

What, realistically, might happen to <u>traffic in just two to four years</u>?

- To what degree will anticipated work zone impacts affect target achievement?
- Will this cause more frequent, but not necessarily more severe, "poor" conditions?
- Do short-term expectations degrade, maintain, or improve travel conditions?

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Target-Setting Perspectives

Interstate TTR?

- Requires 2-Yr and 4-Yr targets by 5/20/18

- Consider historic declining trends alongside continued growth in overall travel demand?

- Consider notable I-95 work zone impacts?

- Consider short-term declining "threshold" in lieu of "improvement target", pending anticipated 4-Yr CTP project plans?
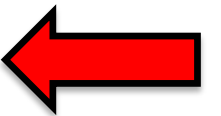
Interstate TTR Target Considerations	
2017 NPMRDS Avg	**81.3%**
2017 NPMRDS Range	**67% to 94%**
Est. Annual Trend	**- 2.0% per yr**
2-Yr Projection	**77.3%**
4-Yr Projection	**73.3%**

TARGET OPTION 1: Maintain Current Levels	**> 80%**
TARGET OPTION 2: Manage Current Trends	**> 75%**
TARGET OPTION 3: Expect Work Zone Impacts	**> 70%**

Target-Setting Perspectives

Non-Interstate NHS TTR?

- Requires 4-Yr target only by 5/20/18

- Consider current "acceptable" conditions, with MPO areas at 87 to as high as 98%?

- Consider only marginal declining trends?

- Consider potential project impacts?

- Consider "stabilizing threshold" (in lieu of "target") to maintain current acceptability?
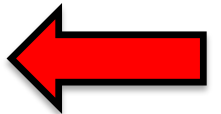
Non-Interstate NHS TTR Target Considerations	
2017 NPMRDS Avg	**91.5%**
2017 NPMRDS Range	**87% to 93%**
Est. Annual Trend	**- 0.5% per yr**
2-Yr Projection	**90.5%**
4-Yr Projection	**89.5%**

TARGET OPTION 1: Maintain Current Levels	**> 90%**
TARGET OPTION 2: Manage Current Trends	**> 88%**
TARGET OPTION 3: Expect Work Zone Impacts	**> 85%**

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Target-Setting Perspectives

Truck TTR?

- Requires 2-Yr and 4-Yr targets by 5/20/18

- Consider historic degrading trends alongside continued freight growth and development?

- Consider notable I-95 work zone impacts?

- Consider short-term declining "threshold" in lieu of "improvement target" given truck reliance on overall interstate TTR trends?
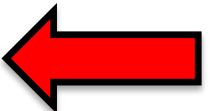
Truck TTR Target Considerations	
2017 NPMRDS Avg	**2.05**
2017 NPMRDS Range	**1.79 to 2.54**
Est. Annual Trend	**+ 0.10 per yr**
2-Yr Projection	**2.25**
4-Yr Projection	**2.45**
TARGET OPTION 1: Maintain Current Levels	**< 2.20**
TARGET OPTION 2: Manage Current Trends	**< 2.50**
TARGET OPTION 3: Expect Work Zone Impacts	**< 2.70**

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Performance Reporting

SUBMITTED !

Baseline Performance Period Report

Content per Section 490.107(b)(1)(ii)

- A. Targets
- B. Baseline Condition / Performance
- C. Relationship with Other Performance Expectations
- D. Urbanized Area Boundaries and Population Data for Targets
- E. Congestion at Truck Freight Bottlenecks
- F. Nonattainment and Maintenance Area for Targets
- G. MPO CMAQ Performance Plan
- H. GHG Metrics for the GHG Measure
- I. Data Collection Method for the Percent of Non-SOV Travel Measure

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Performance Reporting

**Mid Performance Period Progress Report**

Content per Section 490.107(b)(2)(ii)

A. 2-Year Condition/Performance
B. 2-Year Progress in Achieving Performance Targets
C. Investment Strategy Discussion
D. Congestion at Truck Freight Bottlenecks
E. Target Adjustment Discussion
F. 2-Year Significant Progress Discussion for the NHPP and NHFP Targets
G. Extenuating Circumstances Discussion on 2-Year Targets
H. Applicable Target Achievement Discussion
I. MPO CMAQ Performance Plan
J. GHG Metrics for the GHG Measure

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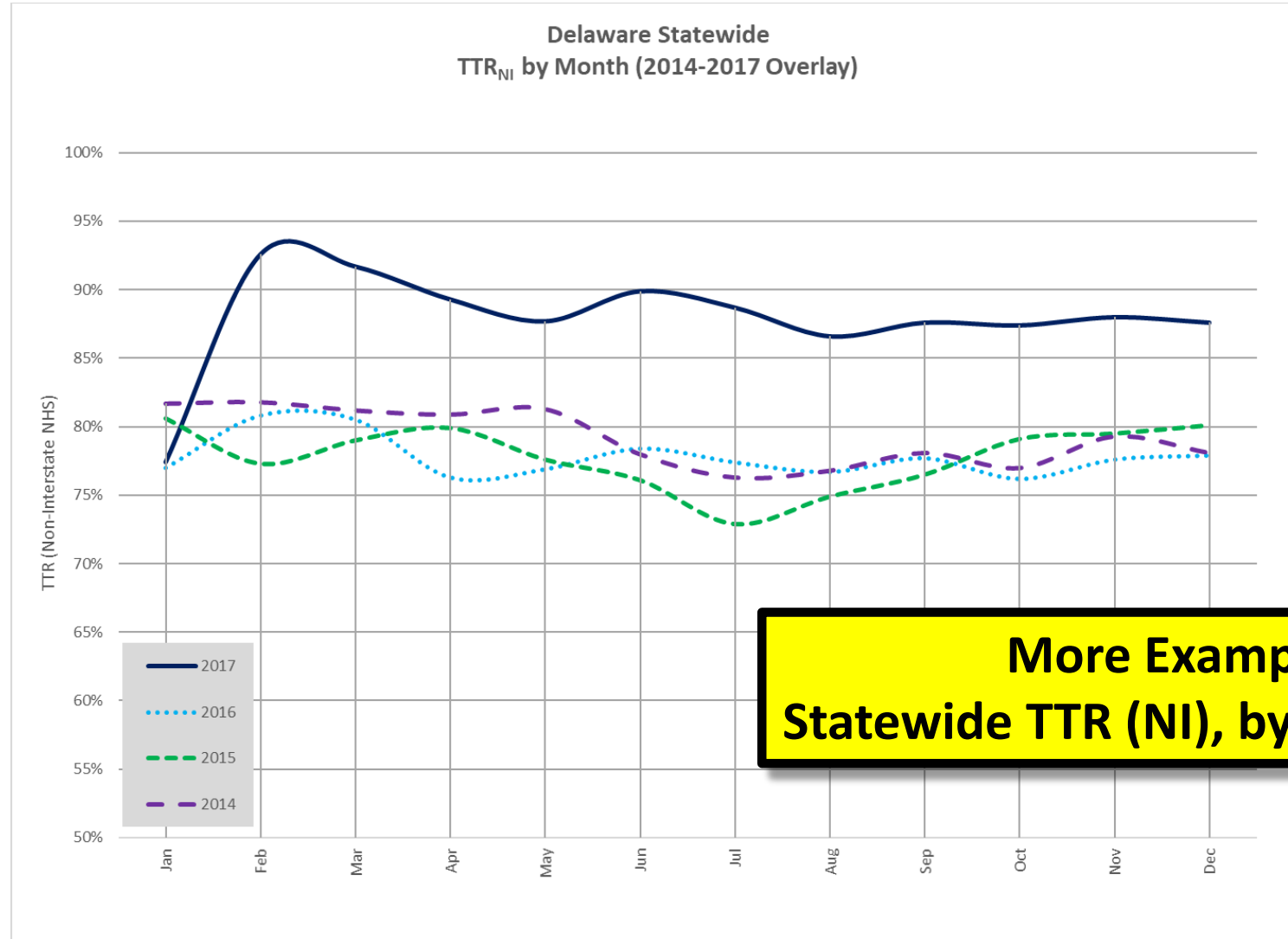**Full Performance Period Progress Report**

Content per Section 490.107(b)(3)(ii)

A. 4-Year Condition / Performance
B. 4-Year Progress in Achieving Performance Targets
C. Investment Strategy Discussions
D. Congestion at Truck Freight Bottlenecks
E. 4-Year Significant Progress Evaluation for Applicable Targets
F. Extenuating Circumstances Discussion on Applicable Targets
G. Applicable Target Achievement Discussion
H. MPO CMAQ Performance Plan
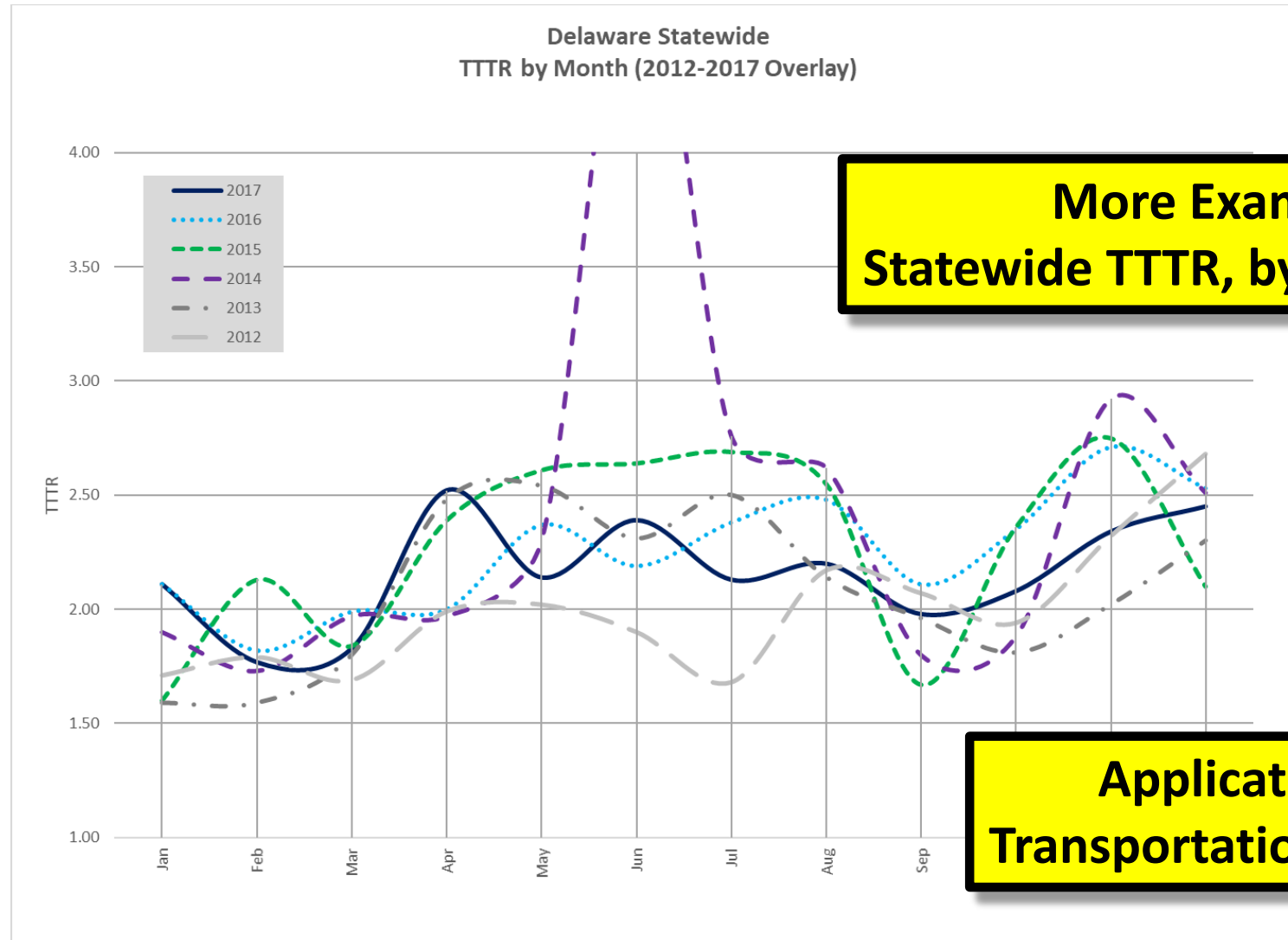I. GHG Metrics for the GHG Measure

NPMRDS Data (TTR$_I$ Graph by Year)

Delaware Statewide
TTR$_I$ by Month (2012-2017 Overlay)
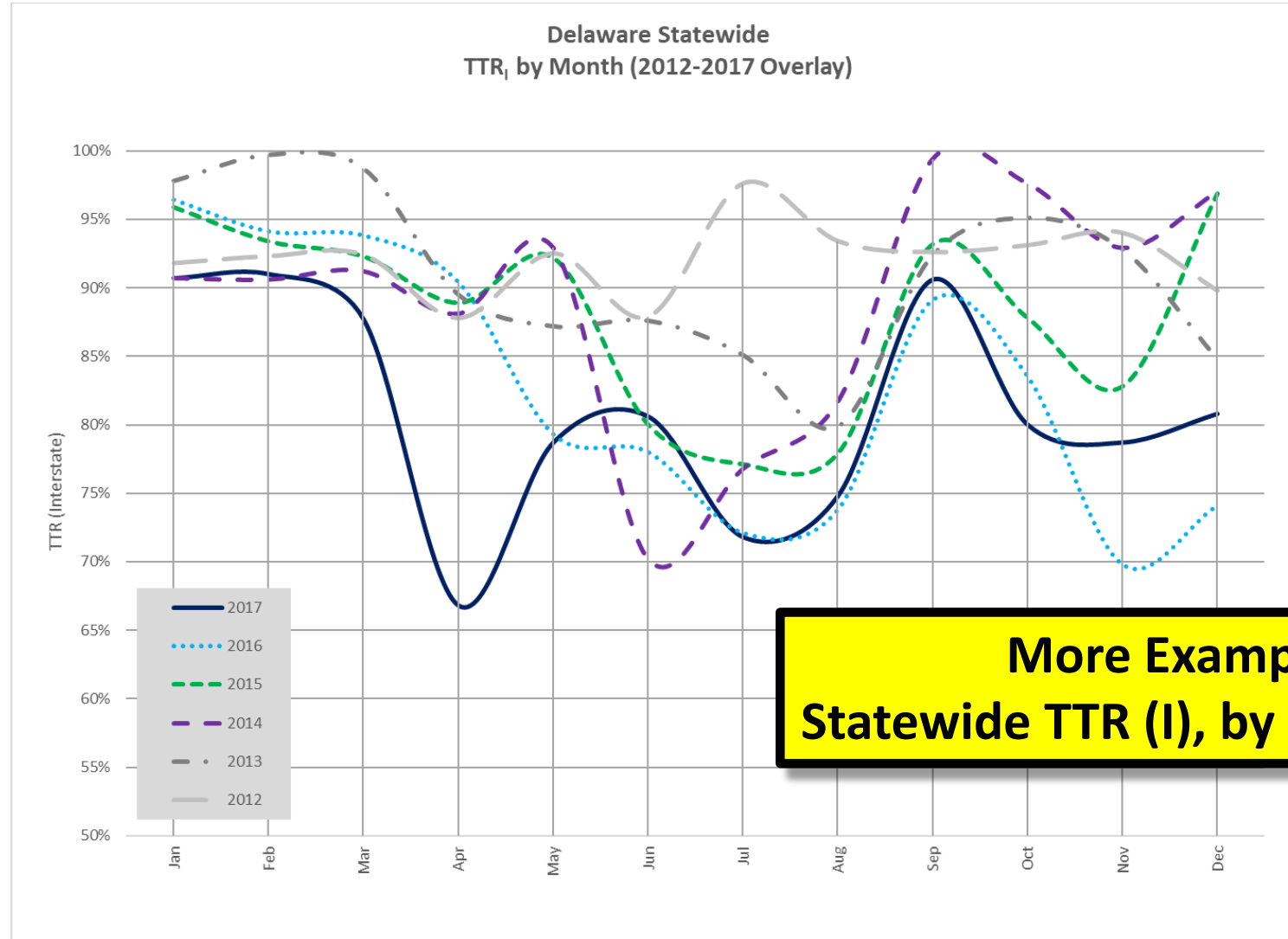
More Examples:
Statewide TTR (I), by Year & Month

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NPMRDS Data (TTR$_{NI}$ Graph by Year)

Delaware Statewide
TTR$_{NI}$ by Month (2014-2017 Overlay)

**More Examples:
Statewide TTR (NI), by Year & Month**

NPMRDS Data (TTTR Graph by Year)

Delaware Statewide
TTTR by Month (2012-2017 Overlay)

Legend:
- 2017
- 2016
- 2015
- 2014
- 2013
- 2012

**More Examples:
Statewide TTTR, by Year & Month**

**Application:
Transportation Studies**