MAPA Progress Towards National Highway Performance Program Freight and Travel Time Reliability (PM3) Targets

MAPA Omaha - Council Bluffs Metropolitan Area Planning Agency

Connect. Plan. Thrive.

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Purpose

This memo provides a progress report for 2019 to 2020 through April towards the MAPA regional Freight and Travel Time Reliability targets. These targets, established in October of 2018, were based upon National Performance Management Research Data Set (NPMRDS) trend data.

Abstract

Of the three National Highway Performance Program (NHPP) measures (Interstate Travel Time Reliability, Non-Interstate Travel Time Reliability, and Truck Travel Time Reliability), only the Interstate Travel Time Reliability measure is currently on track to meet its target of 94.70% in 2021. The remaining measures have both worsened (contrary to the predicted trend), and both currently exceed the target values, with Non-Interstate Travel Time Reliability at 83.7% through the end of 2019 (target 90.20%), and Freight Travel Time Reliability at 1.37 (target 1.14). Last year's midterm assessment highlighted the impact of severe winter weather and flooding in 2019. Conversely, 2020 started with a mild winter and a resultant improvement in reliability magnified by the current pandemic response. Since the last reporting period NPMRDS non-interstate coverage has greatly improved, with 609.5 miles being assessed (compared to 427.5 miles in 2018). An analysis of the roughly 229 miles of non-interstate NPMRDS TMC segments having measured LOTTR throughout 2017-2019 were less reliable (84.8% to 81.8%) but showed a less dramatic degradation than the MAP-21 tool output. Finally, an initial assessment of Freight Travel Time Reliability (TTTR) during the COVID period seems to not have improved as much as expected given the greatly reduced congestion—trending from 1.42 in January to 1.22 in April. For comparison purposes the TTTR in August of 2019 was 1.28, and the most recent measurement as low as 1.22 occurred in November of 2017. Additional research will be undertaken as MAPA develops its Congestion Management Process update for LRTP 2050.

Background

Table 1 provides the targets established in coordination with the Nebraska and Iowa Departments' of Transportation, reviewed by the MAPA Transportation Technical Advisory Committee and approved by the MAPA Board of Directors. These targets are based on a linear trend of data from 2013-2017, which generally predicted:

1. Slow reduction in passenger vehicle reliability on MAPA region interstates
2. Improvement in passenger vehicle travel time reliability on MAPA non-Interstate highways
3. Improvement in interstate highway truck travel time reliability

Table 1. MAPA FY2019 Freight and Travel Time Reliability Targets

NHPP Measure	Target (2021)
Interstate Travel Time Reliability (% of person-miles travelled)	94.70%
Non-Interstate Travel Time Reliability (% of person-miles travelled)	90.20%
Freight Travel Time Reliability (Travel Time Reliability Ratio)	1.14

Analysis

Interstate Travel Time Reliability

Figure 1 shows that interstate travel reliability within the MAPA TMA worsened in 2019 but is more reliable than predicted for 2020 to date. The MAPA TMA contains just under 170 miles of Interstate on the NHS, of which only about 4.7 segment-miles (up from 2.75 segment-miles in 2018) were unreliable. Additionally, the analysis showed dataset issues which resulted in approximately 0.58 miles of interstate having null LOTTR values. These unreliable and null LOTTR segments are illustrated in Figure 2.
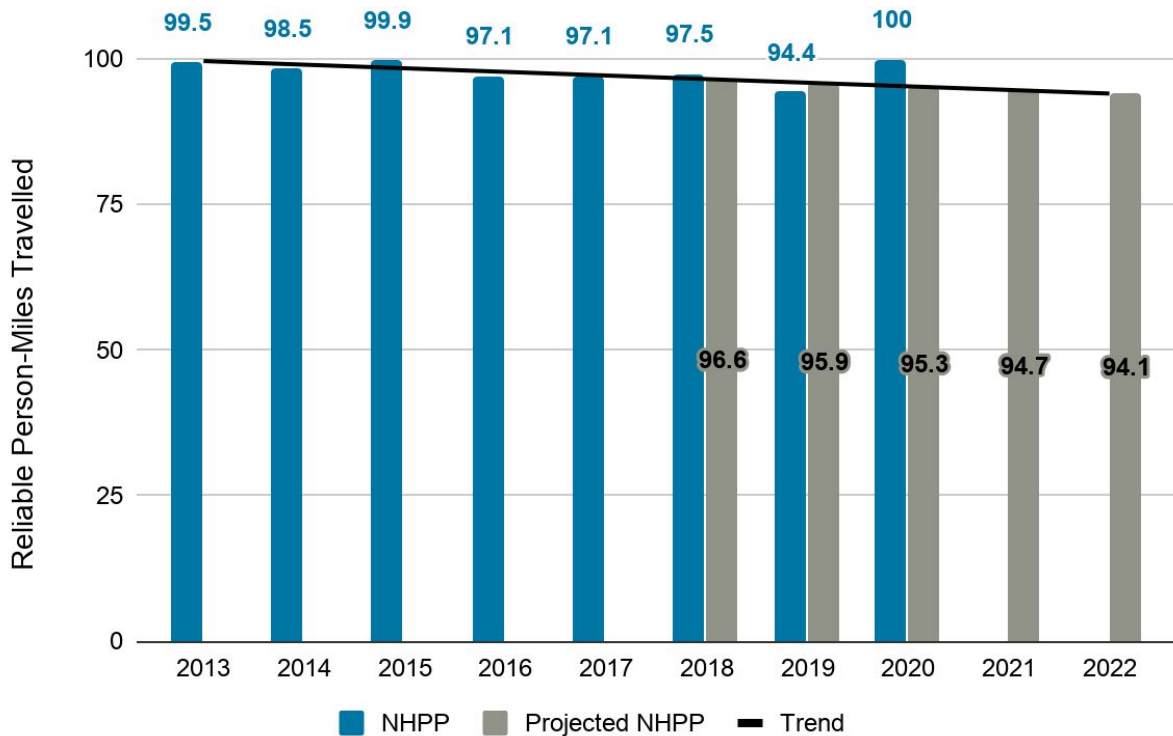

Figure 1. MAPA MPO Interstate Travel Time Reliability (% of Person-Miles Travelled)

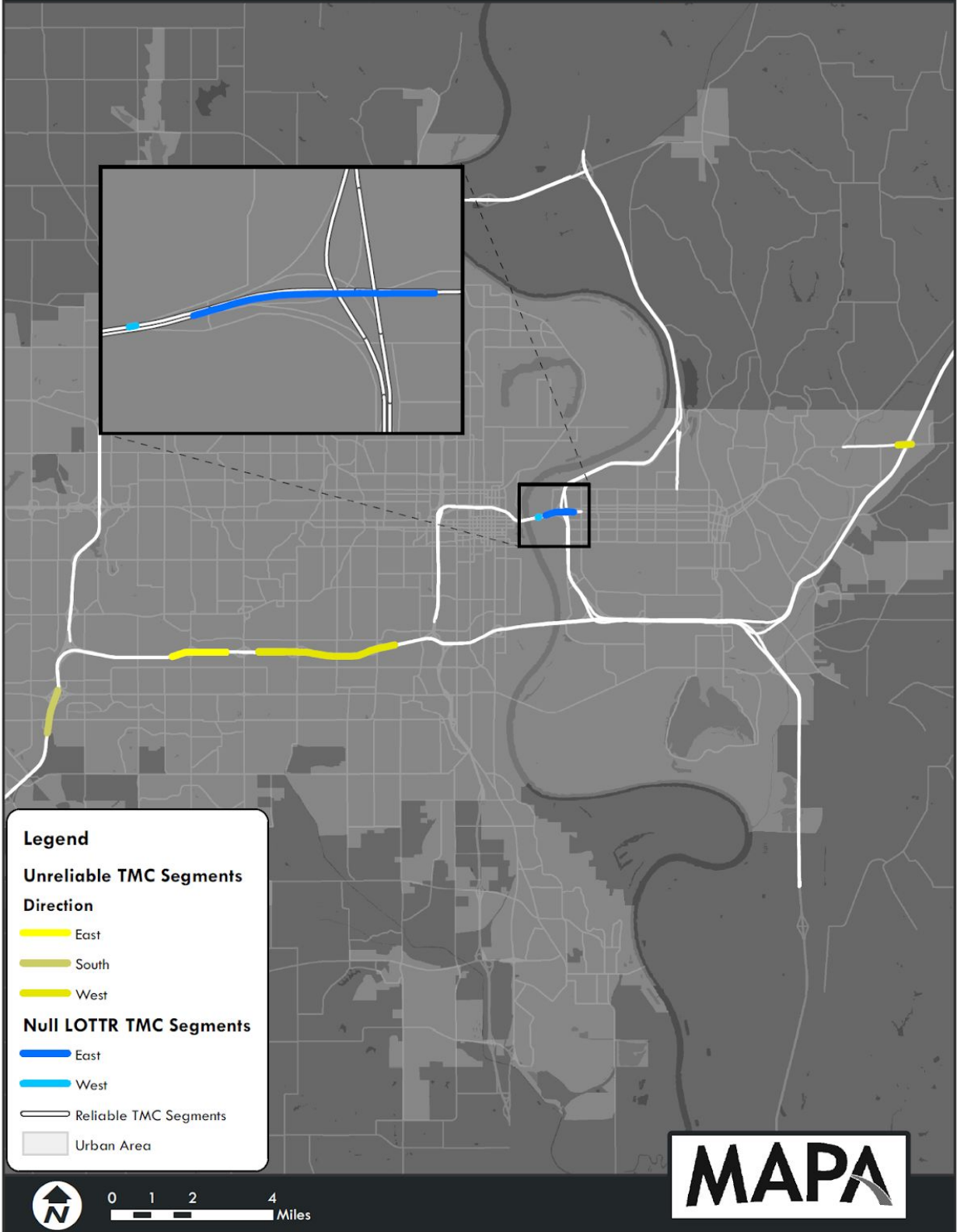# Unreliable and Null LOTTR 2020 Interstate TMC Segments

Legend

Unreliable TMC Segments
Direction
- ▬ East (yellow)
- ▬ South (olive)
- ▬ West (yellow)

Null LOTTR TMC Segments
- ▬ East (blue)
- ▬ West (light blue)
- ▭ Reliable TMC Segments
- ▭ Urban Area

N

0   1   2   4
            Miles

MAPA

Figure 2. Unreliable and Null Value TMCs on Interstate Highway for 2019

Non-Interstate Travel Time Reliability

There is a large amount of variability in the evaluated non-interstate data set from year to year. Some of this variability is a result of the process used in developing the NPMRDS dataset, while some is due to external factors, such as road construction, flooding, and the dramatic drop in traffic due to pandemic response. Specifically, the year-to-year dataset being analyzed in this report (2017-2020-to-date) is impacted by:

1. NPMRDS conflation lagging HPMS NHS updates (2020 updates this fall will be from 2018 HPMS)
2. MAPA changes to the functional classification in 2015 and 2017 (and pending for 2020)
3. Large changes were made to NPMRDS dataset as a result of 2019 PM3 reporting

Figure 3 below shows progress to date towards the MAPA non-interstate reliability target. The flooding in 2019 had a measurable impact on reliability, however, the growth in traffic volume throughout the region also played a role. From January through April of 2020 a milder winter and reduced traffic from pandemic response has resulted in 91.7% of person-miles travelled on the non-interstate system being reliable.
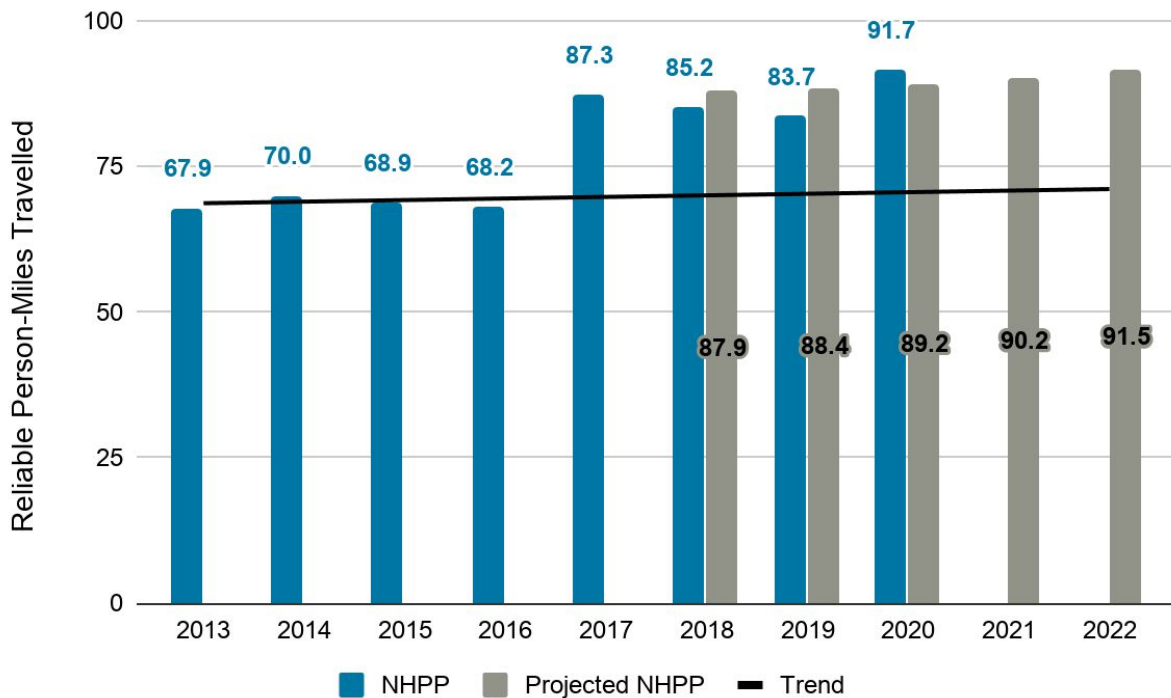

Figure 3. MAPA MPO Non-Interstate Travel Time Reliability (% of Person-Miles Travelled)

Figure 4 on the following page displays the change by year in the non-interstate coverage in NPMRDS from 2017 to 2019. The area shown in red is the 2019 coverage, which is not anticipated to have significant changes in 2020. The thicker segments in green (2017) and yellow (2018) illustrate the major changes over these three years. It is anticipated that NPMRDS updates this summer will capture the remaining roadways identified in last year's report as missing from the dataset, most notably US-75 from I-480 to I-680.
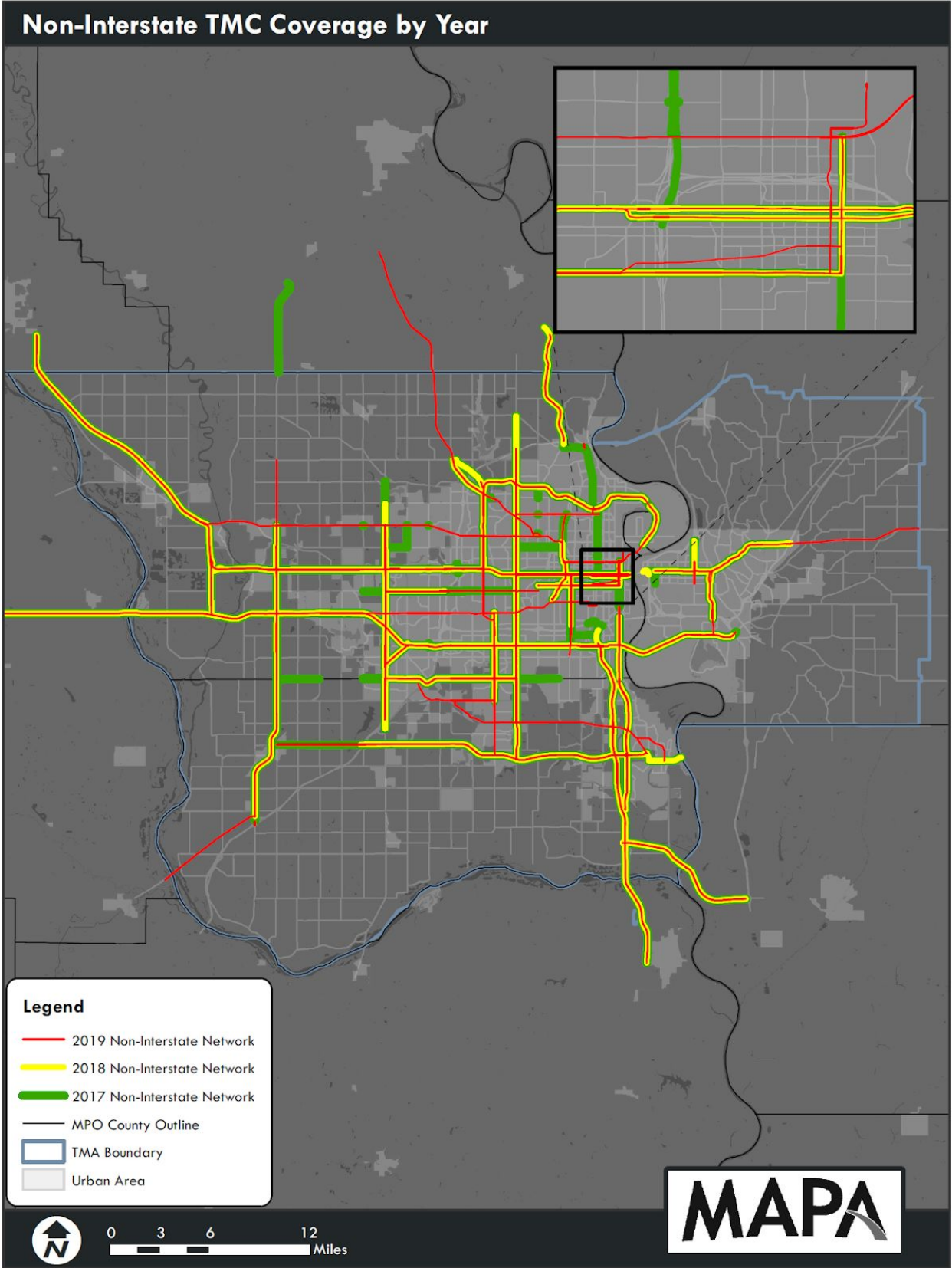
Non-Interstate TMC Coverage by Year

Legend
- 2019 Non-Interstate Network
- 2018 Non-Interstate Network
- 2017 Non-Interstate Network
- MPO County Outline
- TMA Boundary
- Urban Area

0   3   6   12
Miles

MAPA

Figure 4. MAPA MPO Non-Interstate Travel Time Reliability Coverage by Year

Figure 4. NPMRDS Non-Interstate Coverage by Year (2017-2019)

Truck Travel Time Reliability

As highlighted in Figure 5, the measured truck travel time reliability index is both significantly higher than predicted, and showing a negative trend. As this analysis is only conducted on the interstate TMC segments, it is difficult to capture the full extent of the change in truck traffic flow and subsequent impact of congestion, but it is likely major construction (such as the Council Bluffs Interstate System and I-80 at 13th Street) in 2018-2019, and blizzards and flooding in the spring of 2019 were major contributors. Figures 6-9 show the progression of truck reliability changes from 2017 through 2020.

From the middle of March, 2020, to date, traffic volumes on the interstate are significantly reduced due to the pandemic response. The corresponding reduction in TTTR supports this trend, but the resultant TTTR does not seem reflective of the current conditions.
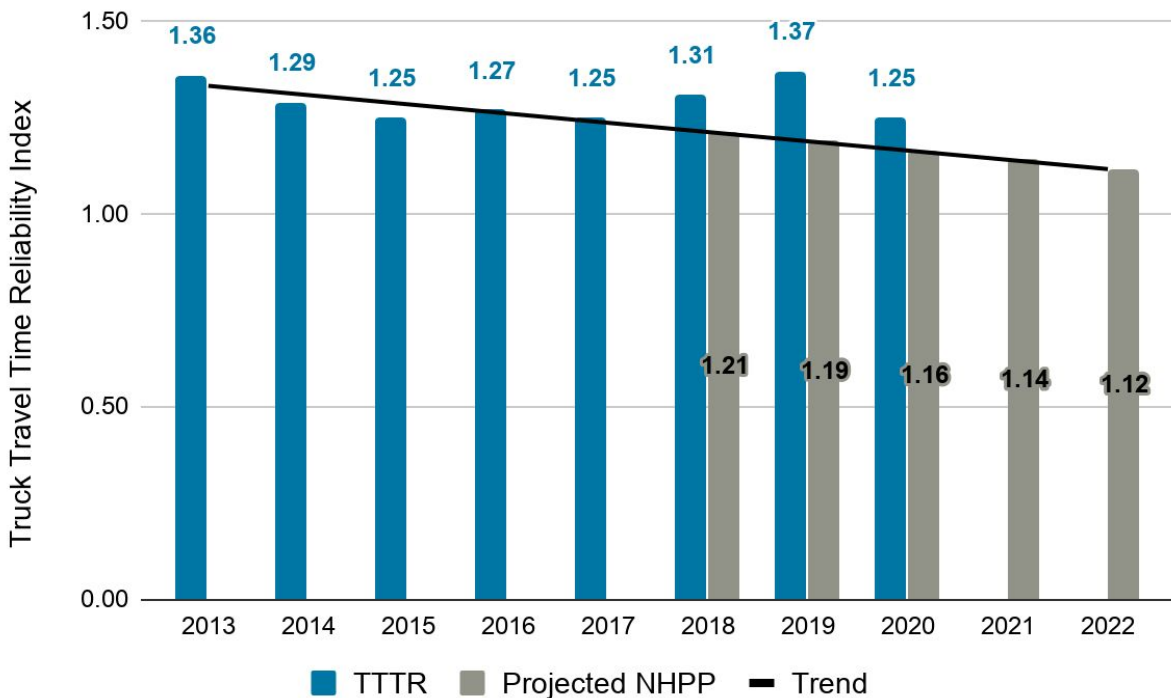

Figure 5. MAPA MPO Truck Travel Time Reliability Metric (TTTR)

The Truck Travel Time Reliability Metric (TTTR) considers TTRI over five specific time periods. The Truck Travel Time Reliability Index (TTRI for each segment) is different from the other LOTTR metrics in that it also considers an overnight period. An assessment of the time periods in which TMC segments were unreliable for the freight metric resulted in a surprisingly large number of overnight unreliable segments—sometimes being the only unreliable time period. An assessment of these unreliable segments spatially also identified a number of areas where the composition of the TMC segment may be influencing the reliability measure unintentionally. The unreliable TMC segments are shown in Figure 6 on the following page. MAPA will coordinate with the CATT Lab to identify possible solutions.
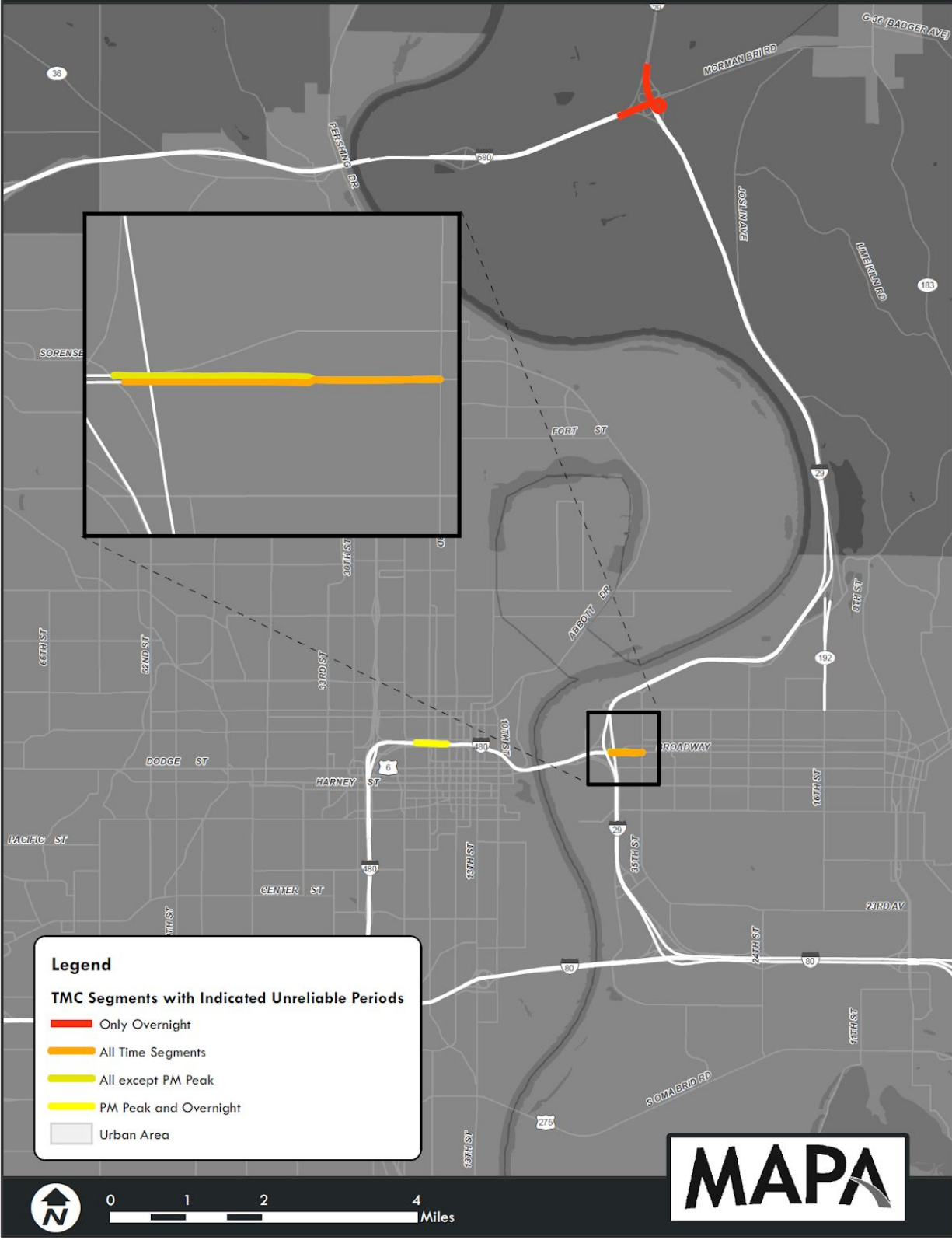
Figure 6. NPMRDS Truck Travel TMC Segments Unreliable Overnight

The year over year assessment of the PM3 measures are shown in Table 4 below.

Table 4. MAPA Predicted Versus Measured Freight and Travel Time Reliability Targets

NHPP Measure	2019		2020 (Jan - April)	
	Pred.	Obs.	Pred.	Obs.
Interstate Travel Time Reliability (desired ↑)	94.4%	95.9%	95.3%	100.0% ↑
Non-Interstate Travel Time Reliability (desired ↑)	88.4%	83.7%	89.2%	92.7% ↑
Freight Travel Time Reliability (desired ↓)	1.19	1.37	1.16	1.25 ↓

Congestion Related Investments in the TIP

A review of completed projects which may improve travel time reliability in the MAPA TMA was conducted, and the projects are summarized in Table 5. In addition to completed projects, MAPA recognizes that the following programs, although not TIP projects, contribute to improving travel time reliability on the region's NHS:

1. Omaha-Council Bluffs Traffic Incident Management
2. Metropolitan Area Motorist Assistance (MAMA) Program
3. Highway Helper Program
4. Nebraska and Iowa DOT Transportation Systems Management and Operations (TSMO)

Table 5. MAPA Completed Transportation Improvement Program Congestion-Related Projects

| Control#	Project Name	Comment
NE-22608A	Omaha Signal Infrastructure - Phase A1 (Ongoing)	ITS
NE-22699	N-370/150th St	ITS
NE-22704	N-370 & 96th Street Intersection Project	Intersection
NE-22726	N-50/Platteview Road Intersection	Intersection
NE-22482	Dodge Street Adaptive Traffic Signal Control	ITS
NE-22132A	I-80: 24th Street - 13th Street	Widening
IA-38153	I-80: I-29/80/480 Interstates in Council Bluffs (CBIS) State Share	Divided
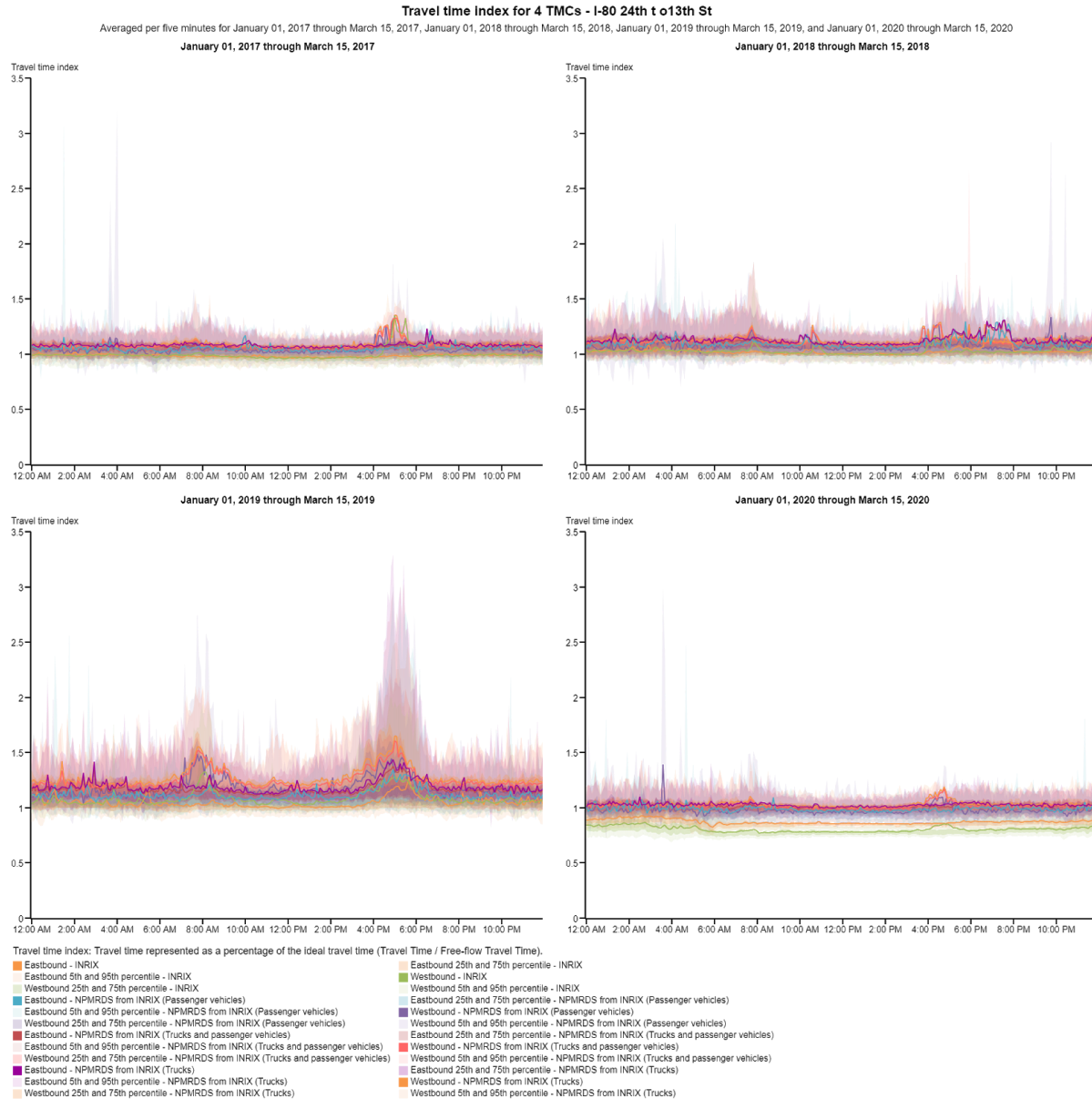
Figure 7. PDASuite Performance Chart for I-80 TMC Segments 24th St-13th St

A comparison of the Travel time index for the four TMC segments which make up I-80 between 24th and 13th Street is shown above. This product is produced using INRIX and NPMRDS data in the Performance Charts tool of the Performance Data Analytics Suite. This graphic only assesses the period of overlap from January 1st to March 15th, to avoid error induced with COVID-19 response. The 2017 period is pre-construction, where 2018 and 2019 are impacted by the 24th-13th construction.

The MAP-21 tool used to determine required PM3 metrics does not provide sufficient resolution to comment on the impacts of the remaining projects listed in Table 5. Future analysis in the Congestion Management Process (such as shown above for I-80) conducted at the corridor level will possibly provide greater insight, over time, on the benefits gained from projects conducted with intention to reduce congestion in the MAPA TMA on the non-interstate NHS.

Conclusions

The variability in data sources, combined with the short assessment period and abnormal weather and pandemic impacts make it difficult to conduct a detailed assessment of progress towards current MAPA targets. However, the assessment process has identified items that, if corrected, could provide a more comprehensive assessment of congestion in the TMA in future years. The MAPA Congestion Management Process will conduct additional analysis to further define driver experience on typical commuting corridors, and will provide additional insight into the benefit of LRTP and TIP projects towards the reduction of congestion in the MAPA region.