Truck and Travel Time Reliability | 2020 Update to 4-Year Targets

Executive Summary

In October of 2018, MAPA established regional truck and travel time reliability targets to meet federal requirements. These three targets, part of the National Highway Performance Program, measure performance on: Interstate and non-interstate travel time reliability, and truck travel time reliability (measured only on the interstate). These performance measures established four year targets, with a mid-term assessment period offering the opportunity to adjust targets based on the additional two year's worth of data.

Following a detailed assessment of the data described within, MAPA intends to revise the 4-year targets as shown in Table 1 below.

Table 1: MAPA Original and Revised Freight and Travel Time Reliability Targets

NHPP Measure	4-Year Targets	
	Original	Revised
Interstate Travel Time Reliability (% of person-miles travelled)	94.70%	94.70%
Non-Interstate Travel Time Reliability (% of person-miles travelled)	90.20%	87.30%
Freight Travel Time Reliability (Travel Time Reliability Ratio)	1.14	1.28

Purpose

This memo provides a detailed review of the MAPA regional Freight and Non-Interstate Travel Time Reliability (PM3) performance measures and recommended target updates. These targets, established in October of 2018, were based upon National Performance Management Research Data Set (NPMRDS) trend data, and are eligible for update during the current mid-period review.

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. Analysis provided in MAPA's June 15th, 2020 update highlights current trends and some possible issues not considered during initial target development.

On June 24th, NDOT presented an update on statewide Federal Transportation Performance Measures (to include changes to the state's PM3 targets) to MPOs. This notification of PM3 changes provides MAPA with a 180-day window to accept the state's changes, as well as the opportunity to change our existing targets. NDOT changes include an increase in Truck Travel Time Reliability Ratio (TTTR) target from 1.10 to 1.25, acknowledging greater delay in truck traffic than predicted. NDOT is also lowering it's percent Person-Miles Travelled (Non-Interstate) which are reliable from 92.6% to 88.0%, again reflecting lower reliability than projected. Effective September 30th, Iowa DOT increased TTTR from 1.14 to 1.21, as well as reducing percent Person-Miles Travelled (Interstate) from 99.5% to 98.5%. Proposed changes for MAPA are generally consistent with NDOT and Iowa DOT trends.

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 2: 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

Interstate Travel Time Reliability

As reported in June, MAPA is on track to meet the 4-year Interstate NHPP measure. The target provides an objective measure and will not be considered for change in this review. This report is available at the link.

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 update from 2018 HPMS)
2. MAPA changes to the functional classification in 2015, 2017 and 2020
3. Large changes were made to NPMRDS dataset as a result of 2019 PM3 reporting

Figure 1 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 September of 2020 a milder winter and reduced traffic from pandemic response has resulted in 93.3% of person-miles travelled on the non-interstate system being reliable. While analysis of traffic volumes and resulting congestion is ongoing, it is evident for the short-term that while traffic volumes have nearly returned to pre-COVID response volumes, the distribution of traffic to the traditional AM and PM peak periods has not.

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

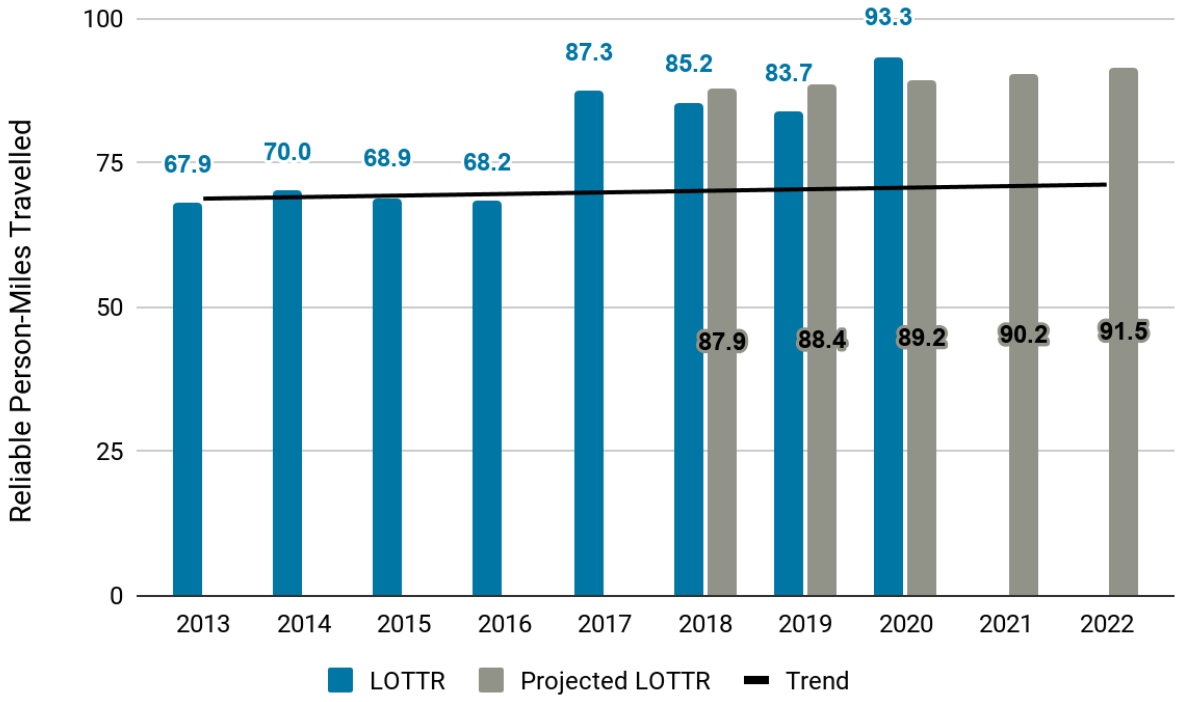


Table 2 below presents the total mileage evaluated in the MAP-21 non-interstate travel time reliability measure. A road segment is deemed to be unreliable if the Level of Travel Time Reliability (LOTTR) for any one of the four measured time periods is greater than or equal to 1.5. The variation in NPMRDS coverage and the location of the unreliable segments are shown by year in Figures 2-5.

Table 3: MAPA Segment Miles Measuring Non-Interstate Travel Time Reliability by Year

Year	Total (Miles)	Unreliable (Miles)	% Unreliable
2017	502.28	54.82	10.9%
2018	427.51	93.87	22.0%
2019	609.50	93.9	15.4%
2020	607.05	47.5	7.8%

Figure 2: MAPA Non-Interstate Travel Time Reliability Network | 2017

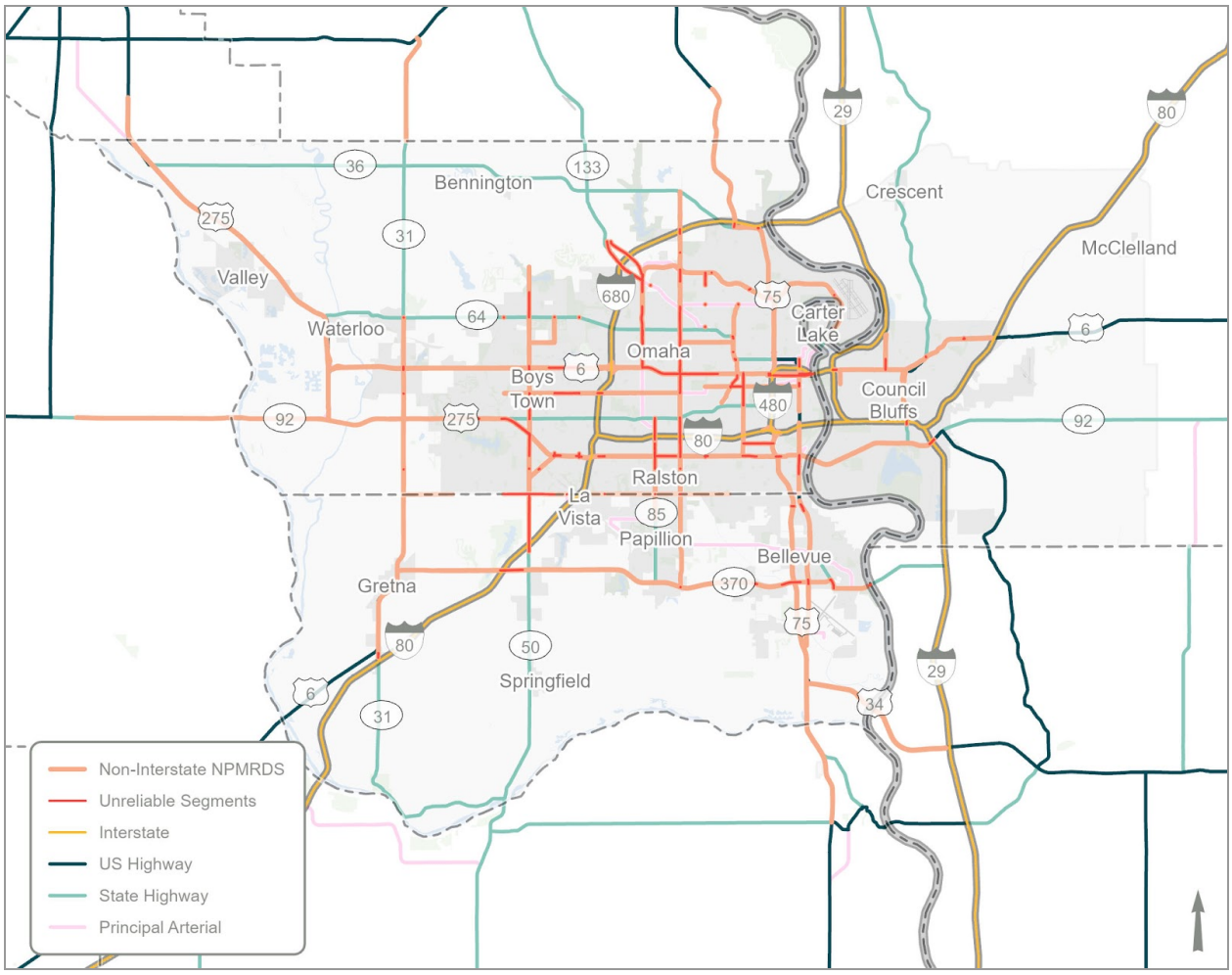


Table 4: Non-Interstate Roads with the Most Unreliable Segments | 2017

Road Name	Route Number	Unreliable (miles)
W Dodge Rd, Dodge and Douglas St	US-6	5.48
S 144th St	US-50, 5001	4.83
N 90th St	NE-133	3.86
N 72nd St	5037	3.43
Blair High Rd	NE-133	3.33

87.3%

Of the person-miles traveled that are reliable

Baseline

Figure 3: MAPA Non-Interstate Travel Time Reliability Network | 2018

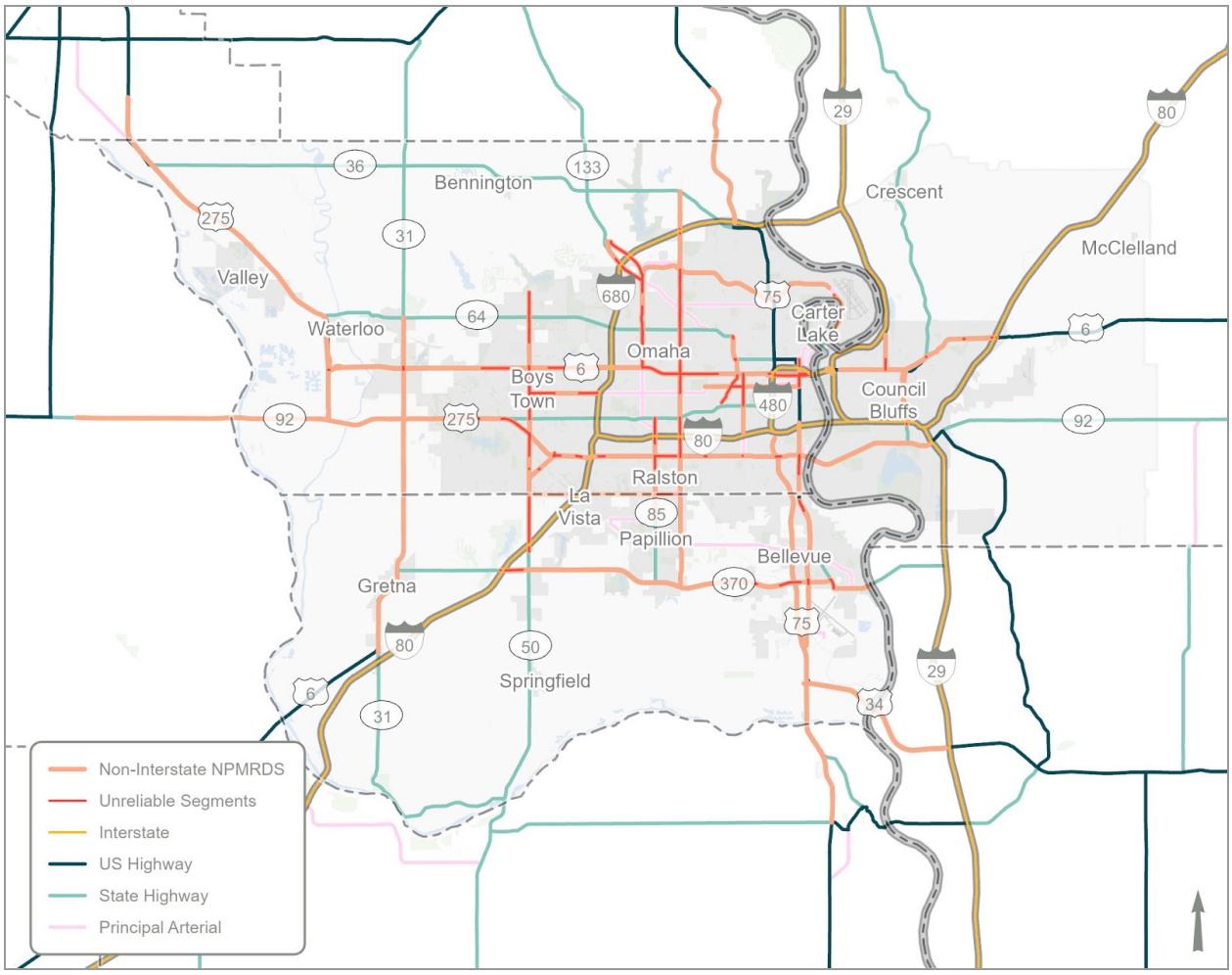


Table 5: Non-Interstate Roads with the Most Unreliable Segments | 2018

Road Name	Route Number	Unreliable (miles)
N 72nd St	5037	6.89
W Dodge Rd, Dodge and Douglas St	US-6	6.67
S 144th St	US-50 (portions)	6.20
N 90th St	NE-133 (portions)	3.87
Irvington Rd	5021	3.65

85.2%

Of the person-miles traveled that are reliable

Below Baseline

Figure 4: MAPA Non-Interstate Travel Time Reliability Network | 2019

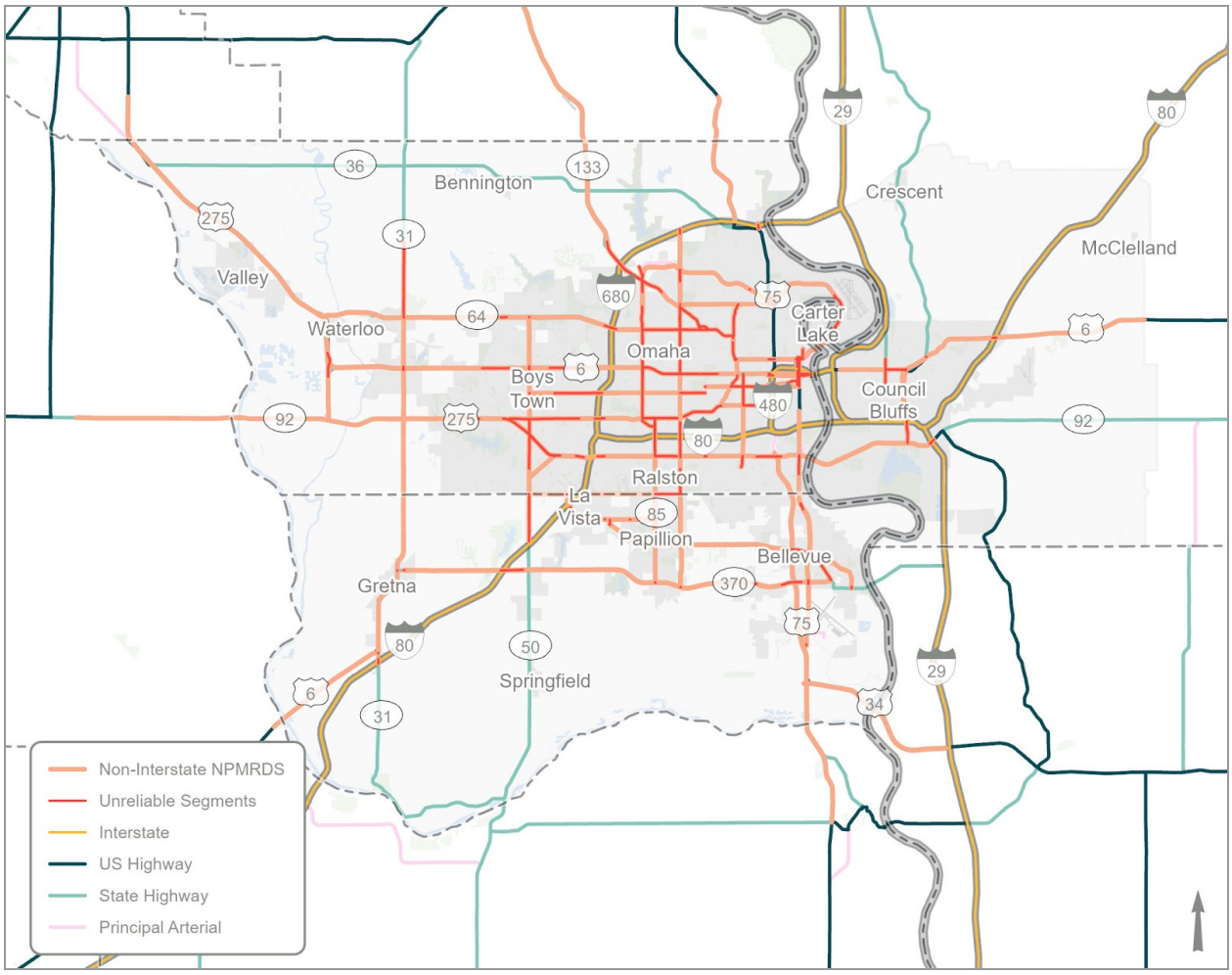


Table 6: Non-Interstate Roads with the Most Unreliable Segments | 2019

Road Name	Route Number	Unreliable (miles)
N 72nd St	5037	6.89
W Dodge Rd, Dodge and Douglas St	US-6	6.67
S 144th St	US-50 (portions)	6.2
N 90th St	NE-133 (portions)	3.87
Irvington Rd	5021	3.65

83.7%

Of the person-miles traveled that are reliable

Below Baseline

Figure 5: MAPA Non-Interstate Travel Time Reliability Network | 2020 through September

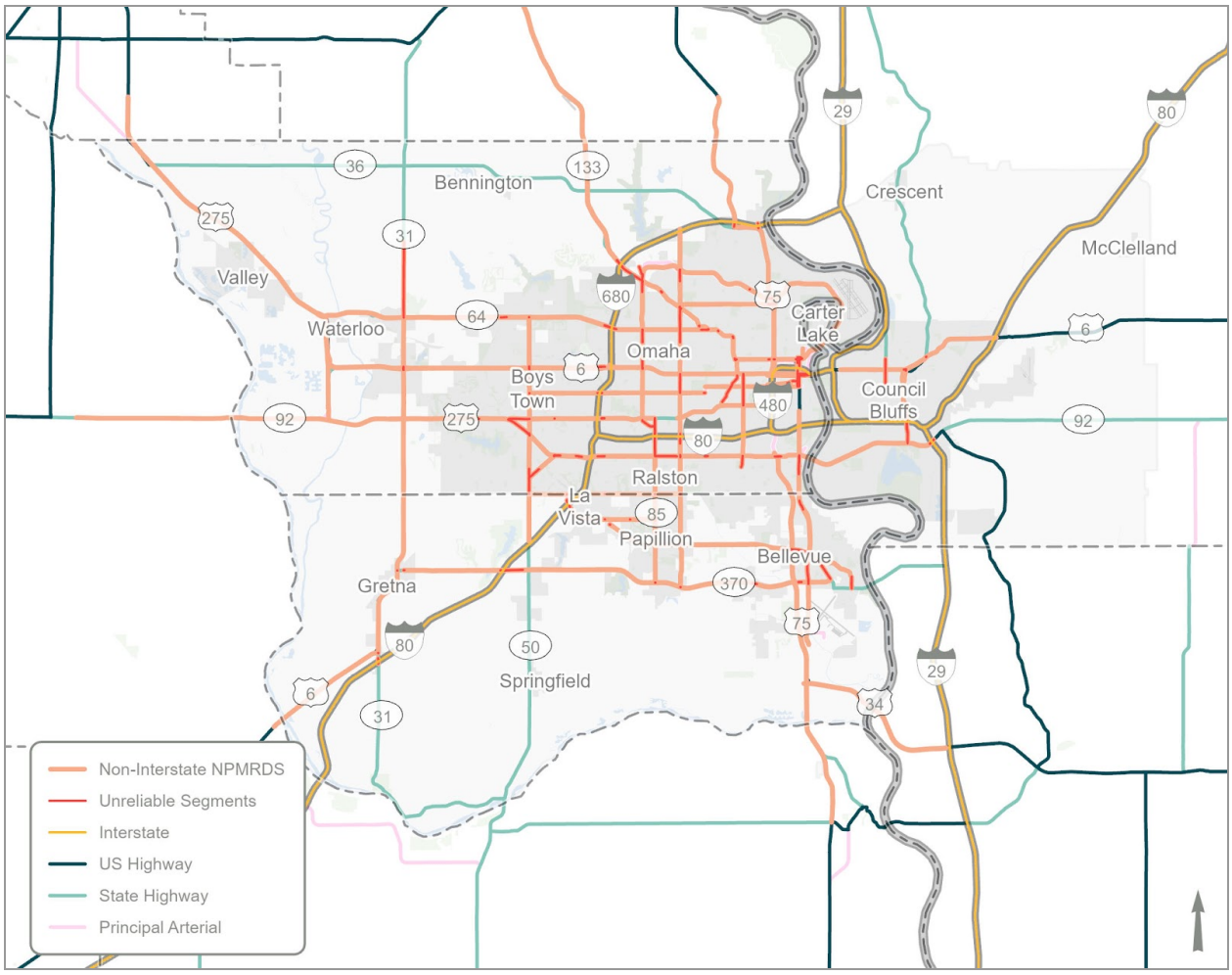


Table 7: Non-Interstate Roads with the Most Unreliable Segments | 2020*

Road Name	Route Number	Unreliable (miles)
N 204 St	NE-31	3.01
S 42nd St	5057	2.95
L St	US-275	2.78
Cornhusker Rd	5006	2.41
S Expressway St	-	2.40

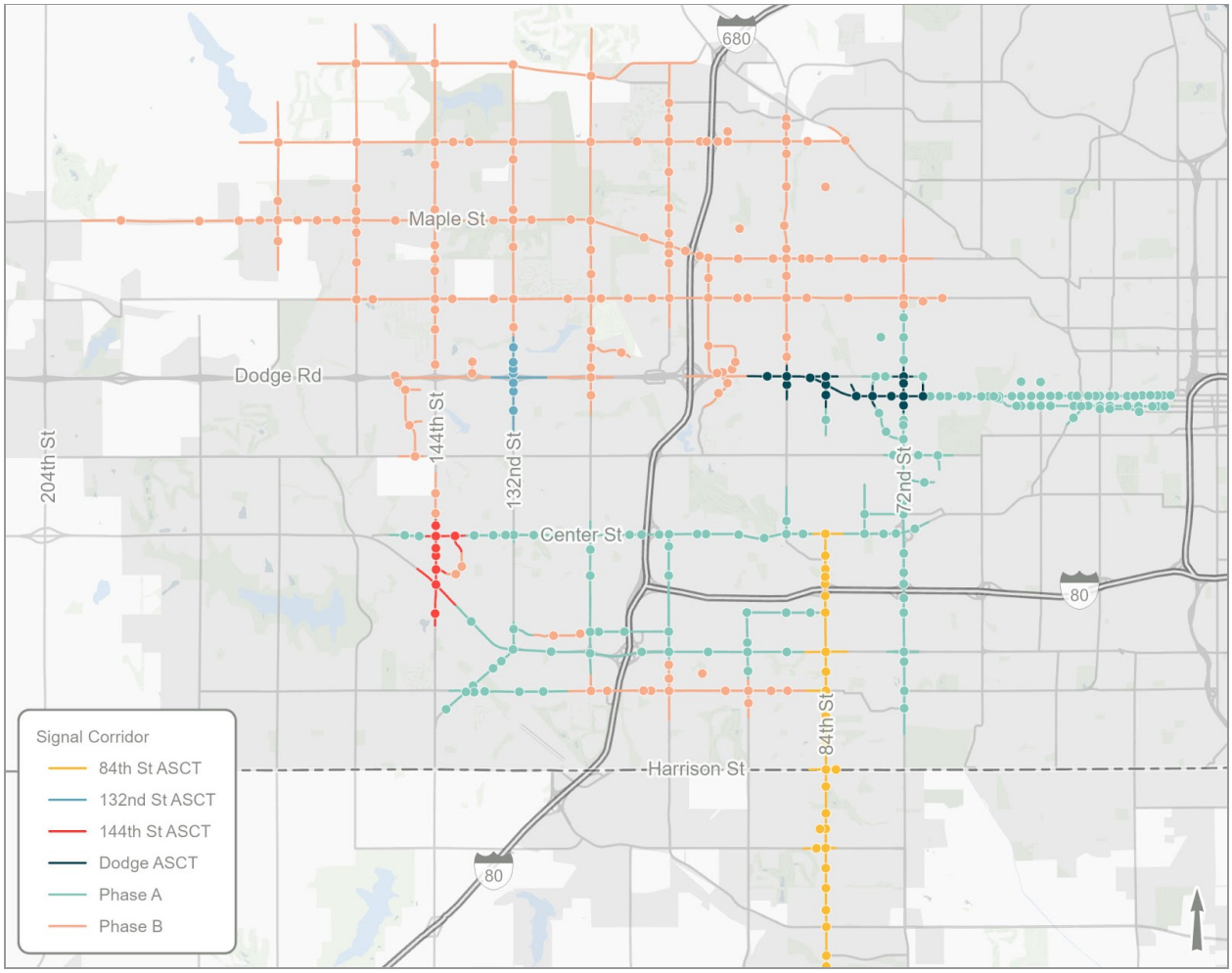
93.3%
Of the person-miles traveled that are reliable
Better than Baseline and 4-year target

Positive Contributing Factors

Signal Timing Projects

Recently completed Adaptive Signal Controller Technologies (ASCT) upgrades along Dodge St and 144th St (shown in Figure 5 below) are just two of several projects intended to reduce delay on non-interstate corridors. These ASCT corridors will also be supported by improvements to most of Omaha's aged signal architecture, providing the opportunity for more efficient travel. The NE-370 corridor is also undergoing many changes and will soon be "Nebraska's smartest corridor", offering improvements along a major east-west corridor.

Figure 5: City of Omaha Signal System Master Plan



Bus Rapid Transit

The Metro Transit agency recently launched ORBT, the region's first Rapid Transit line. ORBT will provide greater frequency combined with dedicated bus lanes downtown and Transit Signal Priority (TSP)—extending green lights to allow the bus to pass through intersections. This will improve the traffic flow of east and westbound traffic as well. By both reducing automobile traffic, as well as reducing bus stop time (through level boarding through three doors and on-bus bicycle storage), travel times along Dodge St should improve.

Travel Demand Management Strategies

Travel demand strategies, including work-from-home, staggered working hours, and even providing distance-learning during severe weather are three of a range of Travel Demand Strategies (TDM) aimed at reducing traffic congestion by reducing the AM and PM peak traffic volumes. While historically not approached at a scale significant enough to measure, the current pandemic has forced these changes to occur. While it is too soon to tell how long the current impacts will continue, it is fair to assume the reduced traffic will continue through a measurable portion of 2021 (the final data collection year for this PM3 reporting cycle).

Traffic Incident Management

The metro area continues to build upon a robust Traffic Incident Management (TIM) collaboration (MetroArea TIM), as well as current additions to related infrastructure which improves incident recognition and response. In particular, the addition of Digital Message Signs (DMS) and traffic cameras along US-75 (and the stretch of I-480 which divides it in the downtown area) will improve response along this major corridor. Coordination with neighboring cities is critical, as the off-expressway roadway network has little extra capacity, and well-designed TIM detour plan execution both reduce the overall impact of the first incident, as well as the risk of secondary crashes.

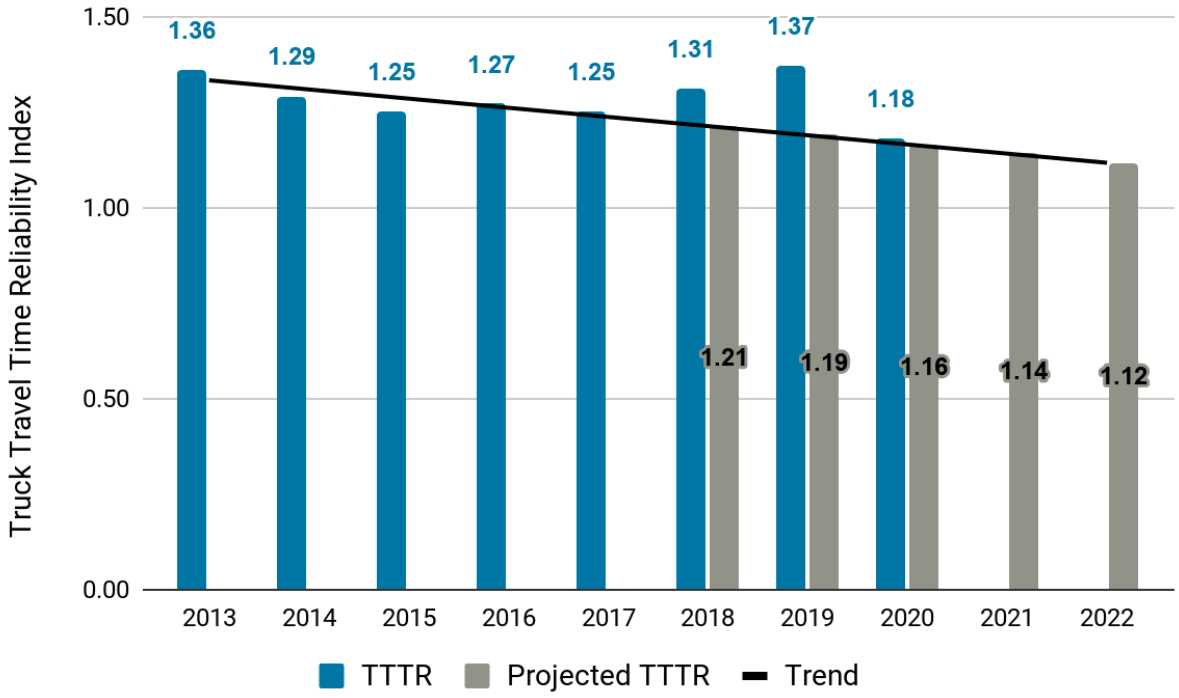
Recommended Target

Following nearly three years of data collection, it is clear that environmental factors outside the control of local transportation organizations have been the major influence on the non-interstate measure. The 2017 and 2018 data was least impacted by external factors, and are therefore a better predictor of future reliability. Assuming the long-term positive contributing factors offset traffic volume growth, it is recommended that the PM3 4-year target be set to the baseline value of 87.3%, recognizing many improvements are just beginning to become operational.

Truck Travel Time Reliability

As highlighted in Figure 6, 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 7-10 show the progression of truck reliability changes from 2017 through 2020.

Figure 6: MAPA Regional Truck Travel Time Reliability



The truck travel time reliability data has not encountered the variability experienced in the non-interstate NPMRDS data. However, there are instances where TMCs have been included which lie off the interstate system, or otherwise shouldn't be counted (such as interstate ramps), which provide unrepresentative TTTR values. As these TMCs are only a small percentage of the total interstate network, they are only a small fraction of resultant annual TTTR (removing them for 2019 results in a TTTR of 1.35 versus 1.37). Therefore, the approach taken is to acknowledge the errors, and to not include them in tables 6-9 below. The table lists the top five series of interstate segments ranked by the highest TTTR in that segment.

Figure 7: MAPA Truck Travel Time Reliability Network | 2017

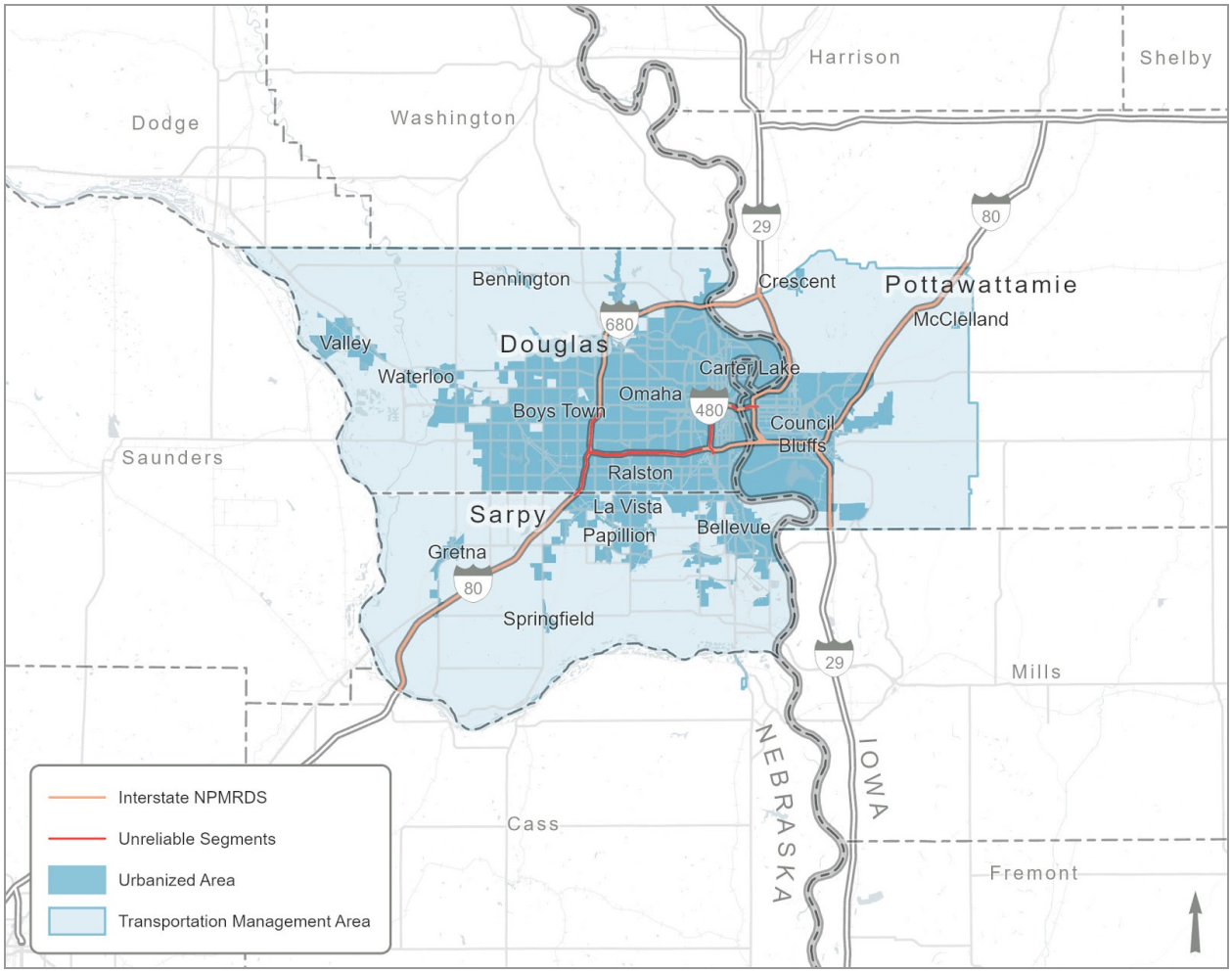


Table 8: Truck Travel Time Most Unreliable Segments | 2017

Name	Location	Max. TTTR	Length (mi)	Period
I-80 W	42nd St to county line	3.29	9.2	PM
I-80 E	I-680 to 60th St	2.45	4.4	PM
US-75 N	I-80	2.27	0.8	AM
I-480 S	US-75N to I-80	1.90	1.8	PM
I-480 W	US-75/N 30th St	1.70	0.29	PM

1.24

Truck Travel Time Reliability Index

Baseline

Figure 8: MAPA Truck Travel Time Reliability Network | 2018

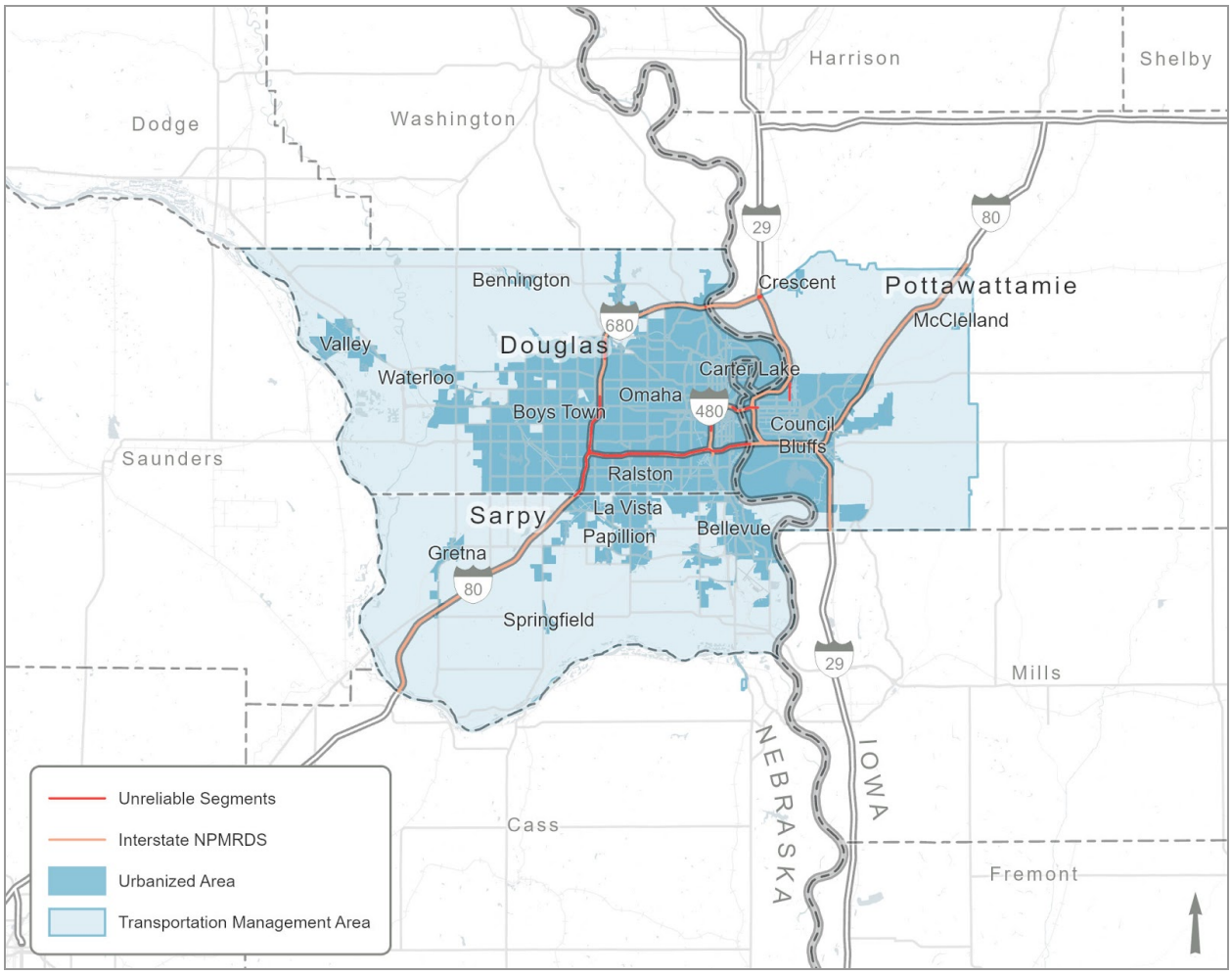


Table 9: Truck Travel Time Most Unreliable Segments | 2018

Name	Location	Max. TTTR	Length (mi)	Period
I-80 W	13th St to county line	3.4	10.9	PM
I-680 N	Dodge St to Blair High Rd	2.52	1.1	0VN/AM/PM
I-680 S	Dodge St to I-80	2.34	3.0	PM
I-80 E	84th to 13th St	2.32	5.1	PM
I-480 S	I-480 W to Leavenworth	2.03	1.1	PM

1.31

Truck Travel Time Reliability Index

Above Baseline

Figure 9: MAPA Truck Travel Time Reliability Network | 2019

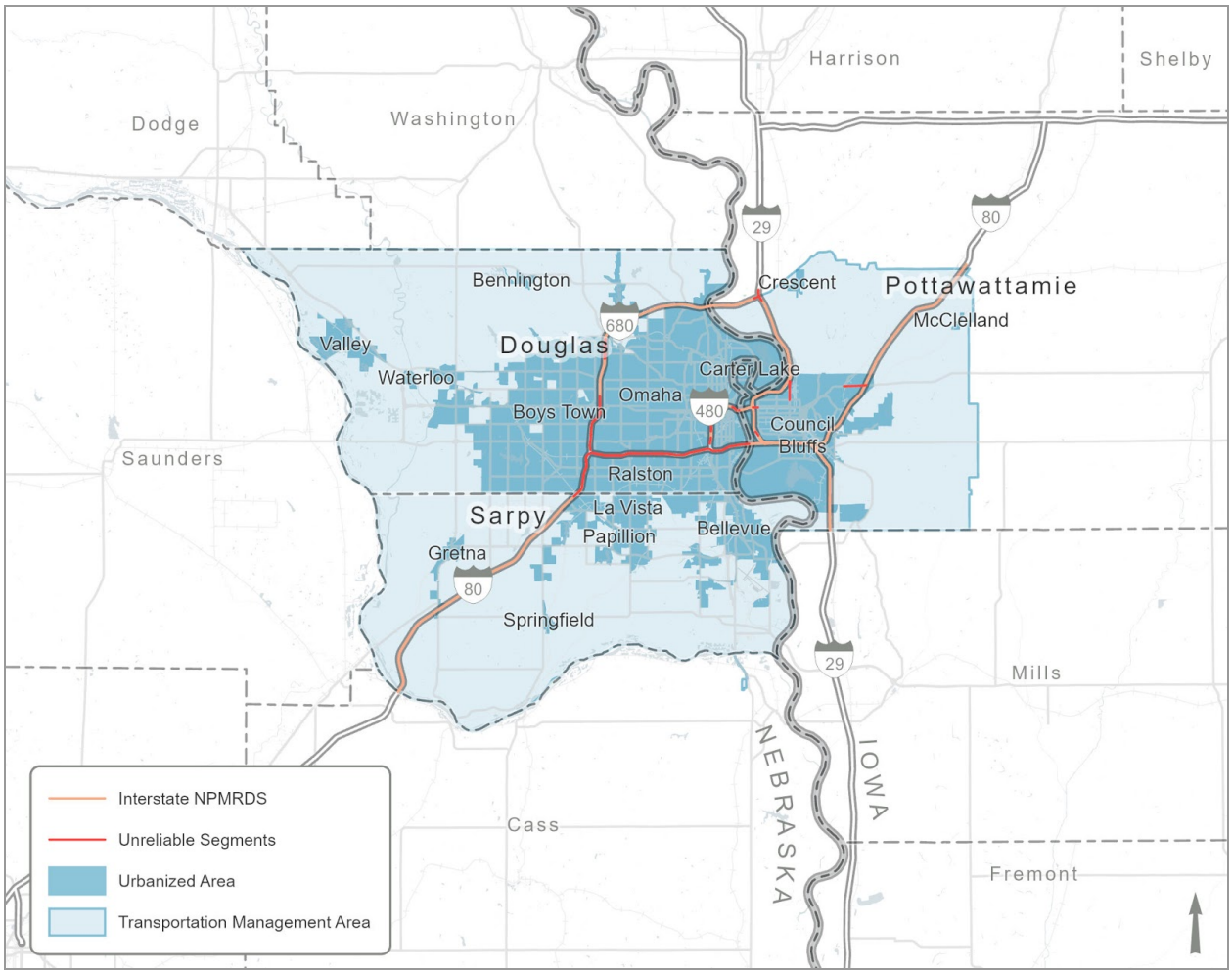


Table 10: Truck Travel Time Most Unreliable Segments | 2019

Name	Location	Max. TTTR	Length (mi)	Period
I-80 W	13th St to 84th St	3.83	8.8	PM
I-680 S	Dodge St to I-680	3.34	3.0	PM
I-80 S	I-80/I-680 to county line	3.27	2.6	PM
I-80 E	I-80/I-680 to 60th St	2.99	5.1	PM
I-480 S	US-75 S to Martha St	2.40	1.6	PM

1.37

Truck Travel Time Reliability Index

Above Baseline

Figure 10: MAPA Truck Travel Time Reliability Network | 2020 through September

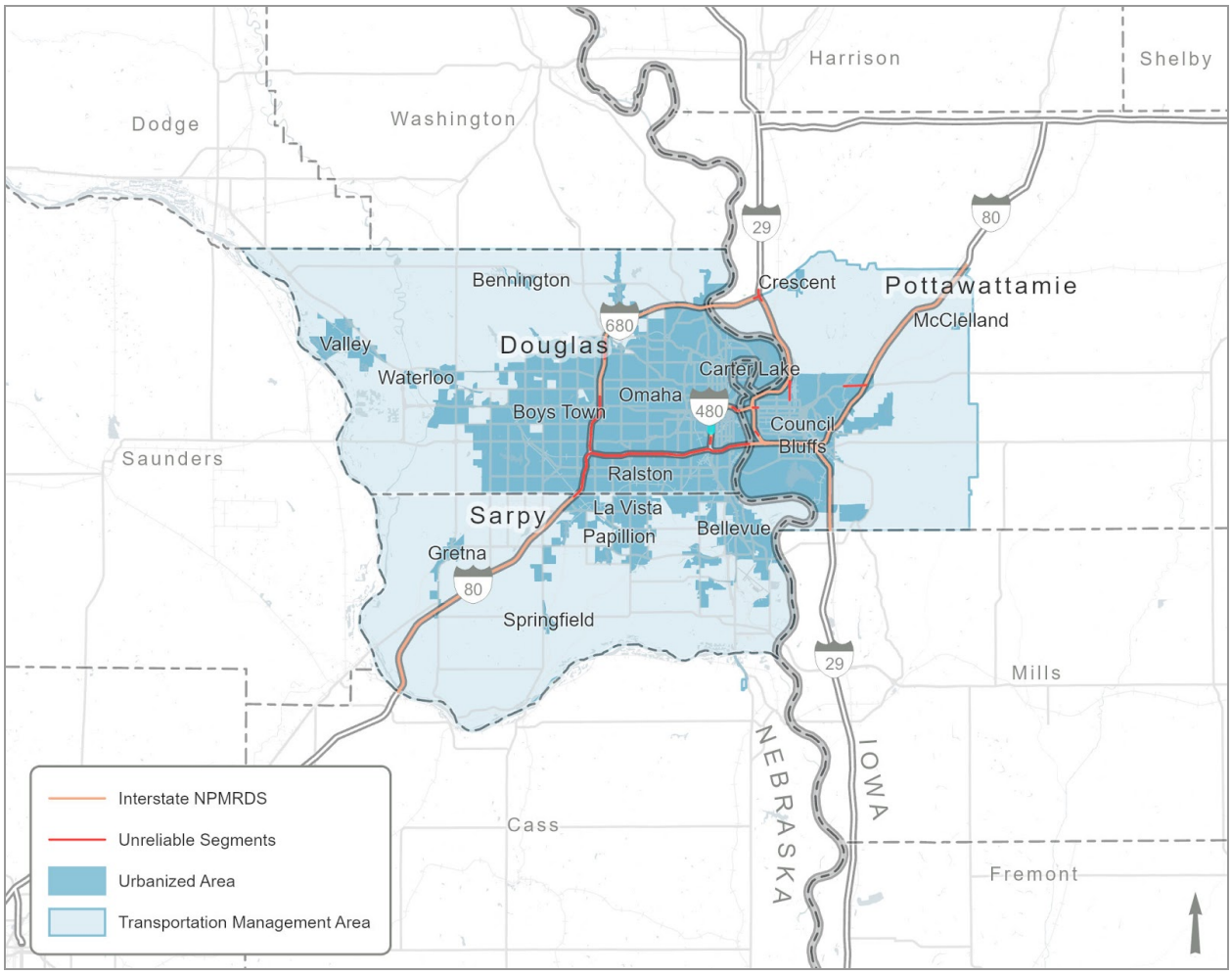


Table 11: Truck Travel Time Most Unreliable Segments | 2020*

Name	Location	Max. TTTR	Length (mi)	Period
I-80 W	42nd to 72nd St	2.81	3.1	PM
I-80 S	I-80/I-680 to county line	2.58	2.6	PM
I-80 E	I-80/I-680 to 72nd St	2.08	2.8	PM
I-480 W	Capitol Avenue	1.71	0.3	PM
I-480 S	Harney St to Martha St	1.63	1.63	PM

1.18

Truck Travel Time Reliability Index

Below Baseline
Above Target

Positive Contributing Factors

Traffic Incident Management

As with the non-interstate travel time reliability measure, truck travel time reliability is directly impacted by non-recurring congestion caused by crashes and other incidents. The deployment of additional DMS and cameras along the metro's interstates, particularly those providing enough advance warning to enable drivers to take another route should help reduce the impact of these incidents.

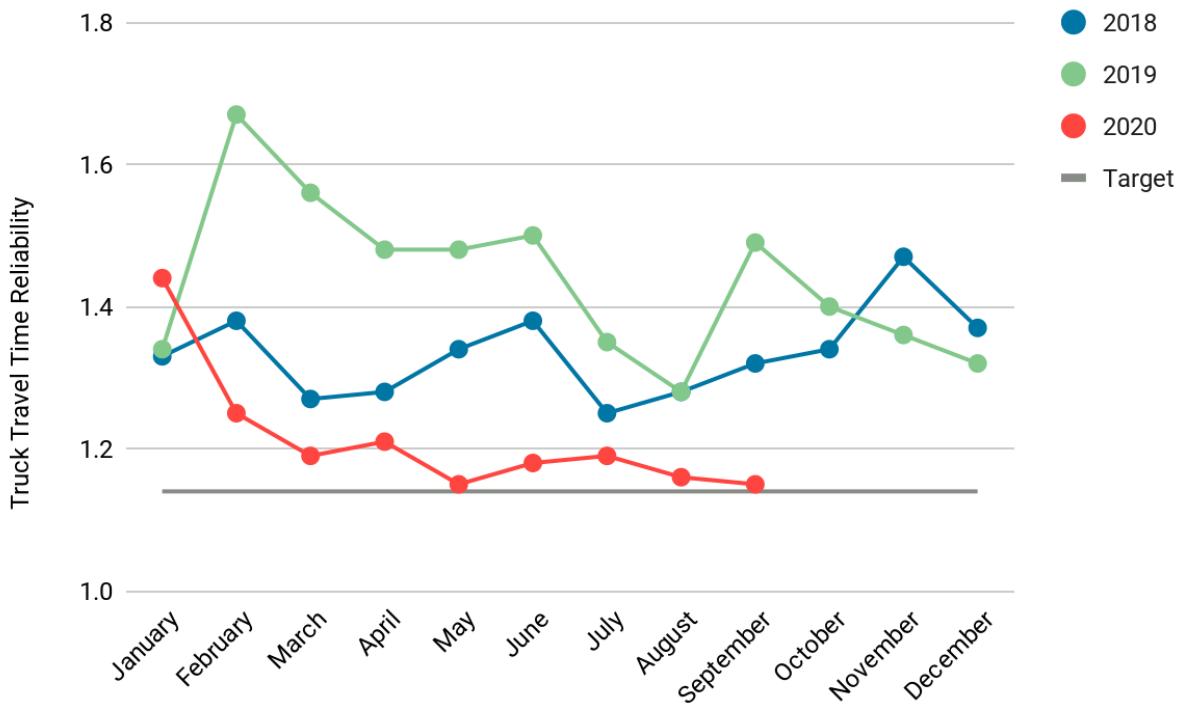
Travel Demand Management

Although unplanned, the change in overall traffic volume in response to the pandemic can be seen when comparing Tables 8 and 9. Not only does the maximum TTTR drop for each segment, the beginning and ending points of the unreliable segment change as well. Any strategy which reduces interstate travel during the PM peak will support truck travel reliability.

Seasonal Variation

The TTTR varies seasonally, and is clearly impacted by severe winter weather. Figure 11 on the following page shows this variation by month from 2018 to September of 2020.

Figure 11: Truck Travel Time Reliability by Month



Recommended Target

Given that 2019 and 2020 were both extreme years, a straight line analysis was conducted for the entire period of 2011-2019. The summer of 2018 was impacted by maintenance from I-80/I-680 interchange as well as 24th Street to 13th Street on I-80. The remaining years have some variation, but generally showed improvement year over year. Figure 12 shows the recommended new predicted values, with a predicted TTTR for 2020, as well as a 4-year target of 1.28 in 2021.

Figure 12: Recommended new MAPA Truck Travel Time Reliability 4-Year Target