

SYSTEM PERFORMANCE TARGETS TRAVEL TIME RELIABILITY AND TRUCK TRAVEL TIME RELIABILITY

Performance-Based Planning and Programming

July 2018



National Capital Region
Transportation Planning Board

SYSTEM PERFORMANCE TARGETS: TRAVEL TIME RELIABILITY AND TRUCK TRAVEL TIME RELIABILITY

Adopted on July 18, 2018

ABOUT THE TPB

The National Capital Region Transportation Planning Board (TPB) is the federally designated metropolitan planning organization (MPO) for metropolitan Washington. It is responsible for developing and carrying out a continuing, cooperative, and comprehensive transportation planning process in the metropolitan area. Members of the TPB include representatives of the transportation agencies of the states of Maryland and Virginia and the District of Columbia, 24 local governments, the Washington Metropolitan Area Transit Authority, the Maryland and Virginia General Assemblies, and nonvoting members from the Metropolitan Washington Airports Authority and federal agencies. The TPB is staffed by the Department of Transportation Planning at the Metropolitan Washington Council of Governments (COG).

CREDITS

Editor: Matthew Gaskin

Contributing Editors: Eric Randall, “James” Li, Dusan Vuksan

Design: COG Communications Office

Photo Credit: Ron Cogswell/Flickr

ACKNOWLEDGEMENTS

Ting Ma and Stephanie Dock of the District Department of Transportation; Subrat Mahapatra and Meredith Hill of the Maryland Department of Transportation’s State Highway Administration; and Mena Lockwood, Amir Shapar, Ben Mannell and Margie Ray of the Virginia Department of Transportation.

ACCOMMODATIONS POLICY

Alternative formats of this document are available upon request. Visit www.mwcog.org/accommodations or call (202) 962-3300 or (202) 962-3213 (TDD).

TITLE VI NONDISCRIMINATION POLICY

The Metropolitan Washington Council of Governments (COG) fully complies with Title VI of the Civil Rights Act of 1964 and related statutes and regulations prohibiting discrimination in all programs and activities. For more information, to file a Title VI related complaint, or to obtain information in another language, visit www.mwcog.org/nondiscrimination or call (202) 962-3300.

El Consejo de Gobiernos del Área Metropolitana de Washington (COG) cumple con el Título VI de la Ley sobre los Derechos Civiles de 1964 y otras leyes y reglamentos en todos sus programas y actividades. Para obtener más información, someter un pleito relacionado al Título VI, u obtener información en otro idioma, visite www.mwcog.org/nondiscrimination o llame al (202) 962-3300.

TABLE OF CONTENTS

SYSTEM PERFORMANCE	5
Overview of Performance-Based Planning and Programming Requirements	5
National Highway System	6
Overview of System Performance Measures	6
Travel Time Reliability and Truck Travel Time Reliability	7
TPB Forecasting	8
TPB Target Setting	13

FIGURES AND TABLES

Table 1: Summary of System Performance Measures	7
Table 2: Summary of TTR Statewide Two and Four-Year Targets	8
Table 3: Summary of TTTR Statewide Two and Four-Year Targets	8
Figure 1: Extrapolation Method for Interstate and Non-Interstate Roadways for TTR	9
Figure 2: Extrapolation Method for Interstate Roadways for TTTR	10
Figure 3: Travel Demand Model for Interstate and Non-Interstate Roadways for TTR	11
Figure 4: Travel Demand Model for Interstate Roadways for TTTR	11
Figure 5: Averaging of Extrapolation and Travel Demand Model Methods for TTR	12
Figure 6: Averaging of Extrapolation and Travel Demand Model Methods for TTTR	12
Table 4: Regional Travel Time Reliability Targets for the Interstate and Non-Interstate Roadways	13
Table 5: Regional Truck Travel Time Reliability for the Interstate System Roadways	13

SYSTEM PERFORMANCE

This report summarizes the federal requirements for the National Capital Region Transportation Planning Board (TPB), which is a Metropolitan Planning Organization (MPO), in the establishment of performance targets associated with System Performance. This includes performance concerning Travel Time Reliability (TTR) on both the Interstate and Non-Interstate roadways as well as the Truck Travel Time Reliability (TTTR) on Interstate roadways. The targets described in this report meet the MAP-21/FAST performance-based planning and programming (PBPP) requirements and are consistent with the target setting approaches of Maryland, Virginia, and the District of Columbia. These targets were approved by the National Capital Region Transportation Planning Board (TPB) at its regular meeting on (date).

Overview of Performance-Based Planning and Programming Requirements

Under the Moving Ahead for Progress in the 21st Century Act (MAP-21) and reinforced in the Fixing America's Surface Transportation (FAST) Act, federal surface transportation regulations require the implementation of performance management requirements through which states and MPOs will “transition to a performance-driven, outcome-based program that provides for a greater level of transparency and accountability, improved project decision-making, and more efficient investment of federal transportation funds.”

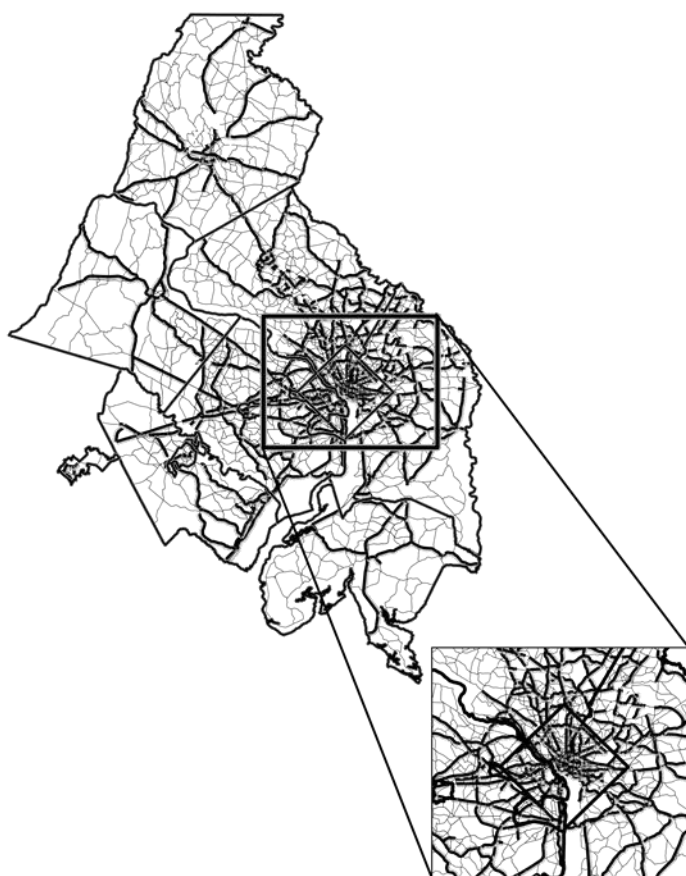
The Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) have been gradually issuing a set of rulemakings, initially proposed and subsequently final, for the implementation of this performance-based planning and programming (PBPP) process. Each rulemaking lays out the goals of performance for an area of transportation, establishes the measures for evaluating performance, specifies the data to be used to calculate the measures, and then sets requirements for the setting of targets.

Under the PBPP process, states, MPOs, and providers of public transportation must link investment priorities to the achievement of performance targets in the following areas:

- Highway Safety;
- Highway Assets: Pavement and Bridge Condition;
- System Performance (Interstate and National Highway System, Freight Movement on the Interstate System, and the Congestion Mitigation and Air Quality Improvement Program); and
- Transit Safety and Transit Asset Management.

The final Statewide and Metropolitan Planning Rule, published May 27, 2016, provides direction and guidance on requirements for implementation of PBPP, including specified measures and data sources, forecasting performance, target-setting, documentation in the statewide and metropolitan long-range transportation plans and Transportation Improvement Programs (TIPs), and reporting requirements. The initial part of the PBPP process will require coordination and agreement on specific responsibilities for each agency in accordance with the planning rule.

Figure 1: National Highway System within the TPB Planning Area



NATIONAL HIGHWAY SYSTEM

A number of the MAP-21 performance measures are directly involved the National Highway System¹ The National Highway System (NHS) includes the Interstate Highway System as well as other roads important to the nation's economy, defense, and mobility. The NHS was developed by the Department of Transportation (DOT) in cooperation with the states, local officials, and metropolitan planning organizations (MPOs). Figure 1 illustrates the extent of the NHS within the TPB Planning Area. The darkened roadways are the NHS. With the adoption of MAP-21 on October 1, 2012, the NHS became the “enhanced-NHS” by adding roads that were previously classified as principal arterials but not yet part of the System. These Interstate and Non-Interstate roadways on the NHS are the primary roadways for the assessment of MAP-21 Performance-Based Planning and Programming. When performance measures are referring to the Interstate or Non-Interstate roadways on the NHS, it is the MAP-21 “enhanced-NHS.”

State DOTs have the ability to make modifications to the NHS by either removing or adding additional roadways. This can be done in writing to the FHWA Division Office. Supporting documents must be included such as maps and documentation of the coordination with the effected jurisdictions. Following that, FHWA will review, summarize, and move for recommendation to FHWA HQ. With the approval, FHWA HQ will make modifications to the NHS.

Overview of System Performance Measures

The Federal Highway Administration (FHWA) published the System Performance: Highway and Freight, Congestion Mitigation and Air Quality (CMAQ) Final Rule on January 18, 2017, with an effective date of May 20, 2017, followed by one year for implementation. Accordingly, state DOTs had until May 20, 2018 to initially set targets. The rule requires state DOTs to set targets for three performance measures concerning Highway and Freight: 1) Interstate Travel Time Reliability (TTR), 2) National Highway System (NHS) TTR, and 3) Freight Reliability (Truck Travel Time Reliability (TTTR)).

¹ https://www.fhwa.dot.gov/planning/national_highway_system/nhs_maps/

In addition, the FHWA requires state DOTs to set three performance measures under the CMAQ Program: 1) Peak Hour Excessive Delay (PHED), 2) Mode Share, and 3) Emission Reductions.

This report covers the Highway and Freight Performance Measures, specifically, TTR and TTTR, and provides an overview of the measures, data collection, and the methodology and forecasting methods used for future target setting.

Table 1: Summary of System Performance Measures

	Performance Measures
National Highway System	(1) Interstate Travel Time Reliability (TTR) - Percent of person-miles traveled on the Interstate System that are reliable
	(2) NHS (Non-Interstate) Travel Time Reliability (TTR) - Percent of person-miles traveled on the non-Interstate NHS that are reliable
	Performance Measures
Freight Movement	(4) Freight Reliability (TTTR) Measurement of travel time reliability on the Interstate System using Truck Travel Time Reliability (TTTR) Index.

TRAVEL TIME RELIABILITY AND TRUCK TRAVEL TIME RELIABILITY

The Travel Time Reliability (TTR) measure assesses the reliability of roadways on the Interstate and Non-Interstate (NHS) systems. TTR is defined by the FHWA as the percent of person-miles on the (Interstate/NHS) that are reliable. Concerning freight, reliability is the ratio of the Interstate System Mileage providing for reliable Truck Travel Time Reliability (TTTR). Data are derived from the travel time data set found in the National Performance Management Research Data Set (NPMRDS). The metrics to be used are Level of Travel Time Reliability (LOTR) and the TTTR Index.

Regarding the roles and responsibilities of both states and MPOs, state DOTs are required to establish two and four-year targets for the Interstate, but only a four-year target for the TTR of the NHS by May 20, 2018. These targets will be included in the state’s baseline performance period report due to the FHWA on October 1, 2018. MPOs are required to either support the State targets or establish their own quantifiable four-year targets within 180 days of the State target establishment.

On December 18, 2017, TBP staff led a webinar with representatives of Virginia, Maryland, and the District of Columbia departments of transportation for the purposes of coordination and sharing information regarding these performance measures, particularly with regards for target setting and forecasting. On May 20, 2018 state DOTs were required to establish statewide targets for TTR and TTTR. Below Table 2 provides both the TTR for Interstate and Non-Interstate roadways. Table 3 provides information on the state forecasted targets for TTTR.

Table 2: Summary of TTR Statewide Two and Four-Year Targets

State	Interstate or Non-Interstate	Two-Year State Target	Four-Year State Target
District of Columbia	Interstate	24.0%	23.0%
	Non-Interstate	Not Applicable	60.0%
Maryland	Interstate	72.1%	72.1%
	Non-Interstate	Not Applicable	81.7%
Virginia	Interstate	82.2%	82.0%
	Non-Interstate	Not Applicable	82.5%

Table 3: Summary of TTTR Statewide Two and Four-Year Targets

State	Two-Year Target	Four-Year Target
District of Columbia	4.0	4.0
Maryland	1.87	1.88
Virginia	1.54	1.57

TPB FORECASTING

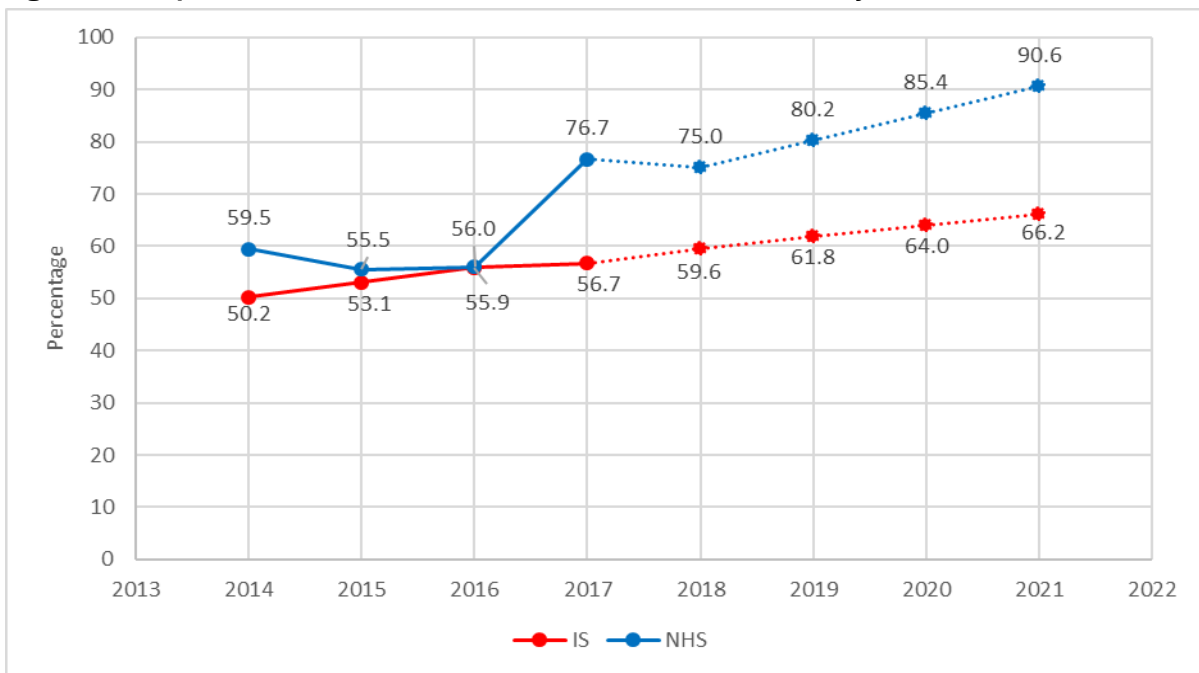
TPB staff obtained data from the NPMRDS, and the utilization of RITIS with the MAP-21 widget. This enabled staff to review the TTR and TTTR for the TPB Planning Area from 2014 to 2017. With this collection of data, staff applied three general methodologies to determine performance forecasting: the extrapolation of measured performance, the use of travel demand model data, or the average of the two.

- Extrapolation of Measured Performance
 - For this approach, measured data for the previous years of 2014 through 2017 would be selected either by month or year. This data would then be extrapolated, via polynomial regression, through the year 2021. This would cover both the two and four-year targets. This approach would result in either a fitted line or a best fit curve as a means of forecasting.
- Travel Demand Model

- In 2016 TPB produced a travel demand model which produced congestion/related outputs for modelled years 2016, 2020,2025, etc. Forecasting will be achieved by utilizing such outputs as Percentage of Congested AM Peak Hour VMT estimates to project change in congestion, applying the percentage changes to measured performance.
- Averaging
 - Taking the average of both the extrapolation of measured performance and the utilization of the Travel Demand Model as a means of forecasting the targets.

The following pages will show and explain charts of both approaches. The charts showing the TTR for Interstate and NHS roadways are in terms of the percent of person miles on a roadway that is reliable. Charts illustrating TTTR are measured using a scale/index to determine the reliability of conditions for trucks. In all cases, the percentages shown are based on the TTR or TTTR for the TPB region.

Figure 2: Extrapolation Method for Interstate and Non-Interstate Roadways for TTR



Figures 2 and 3 illustrate the extrapolation of the previous NPMRDS data collected from years 2014, 2015, and 2016 for TTR and TTTR. Measures were extrapolated from 2018 to 2021, which cover both two and four-year target years of 2019 and 2021. The TTR for Interstate and Non-Interstate roadways shows an overall increase in the TTR, which translates into roadways are becoming more reliable in regard to congestion. Figure 2 shows a decreasing TTTR Index for the roadways. This translates into commercial trucks having achieved more reliable routes of movement with respect to congestion.

Figure 3: Extrapolation Method for Interstate Roadways for TTTR

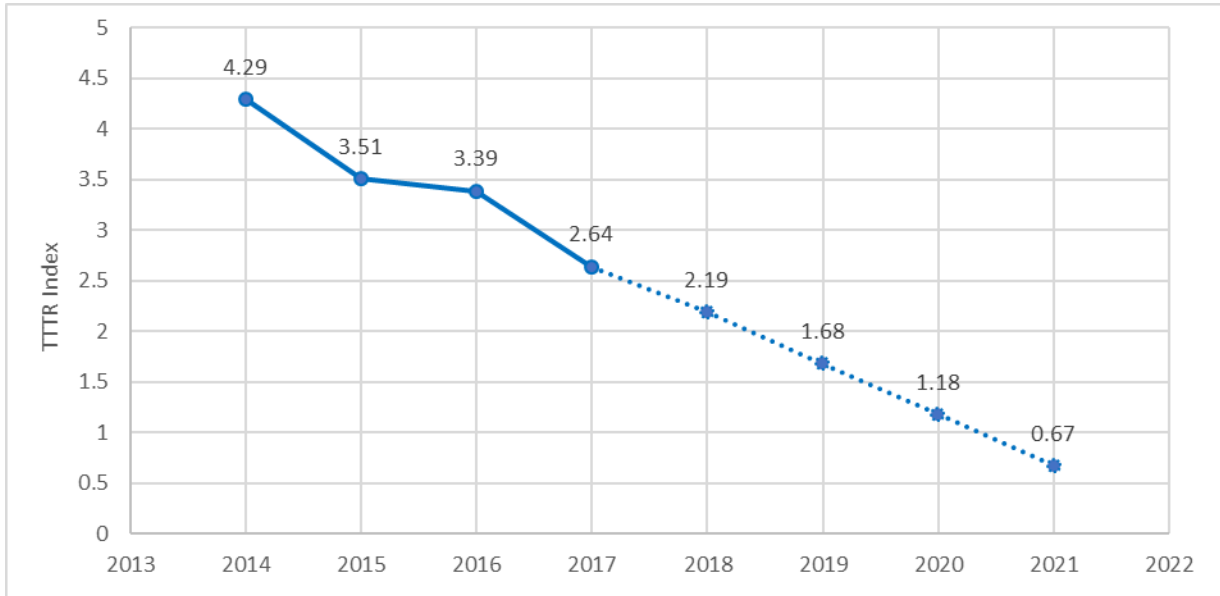


Figure 4 and 5 below illustrates the application of the TPB Travel Demand Model on the performance measures TTR and TTTR. The Travel Demand Model does not provide a specific output for TTR or TTTR, however, it does provide called Percentage of Congested AM Peak Hour VMT. Taking this output, the rate of change was calculated from the TPM Travel Demand Model from year 2017 to 2025. This rate was then applied to the 2016 recorded TTR and TTTR data. The 2016 data was utilized instead of 2017 data, due to the belief that 2017 data is an outlier. With this number and the collected data, a compounded growth rate was calculated far enough to capture both two and four-year target years. Figure 3 illustrates the reliability of roadways slowly decreasing over time. The same steady decrease of the TTTR is shown in Figure 4.

Figure 4: Travel Demand Model for Interstate and Non-Interstate Roadways for TTR

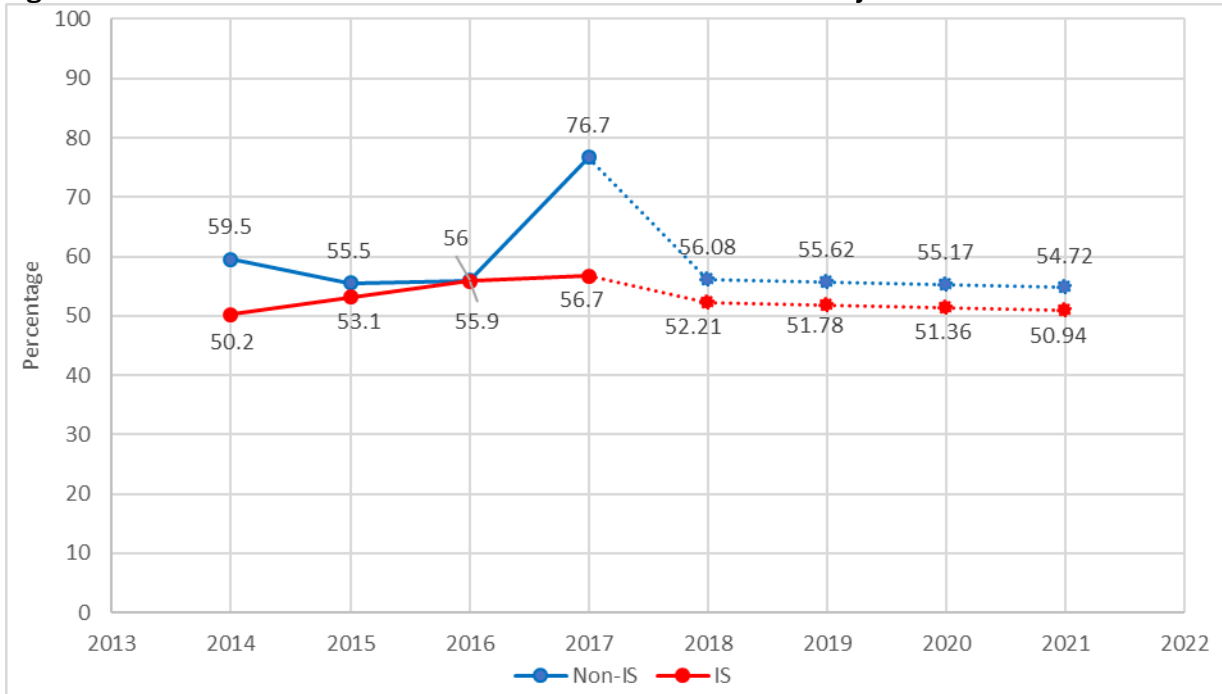


Figure 5: Travel Demand Model for Interstate Roadways for TTTR

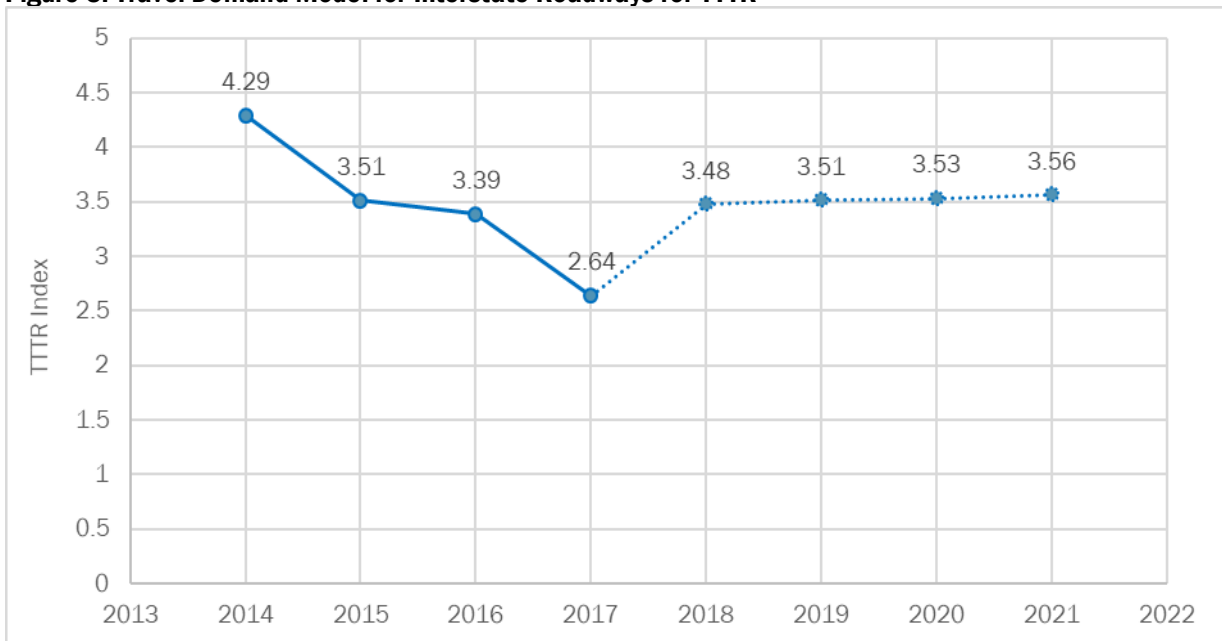


Figure 6: Averaging of Extrapolation and Travel Demand Model Methods for TTR

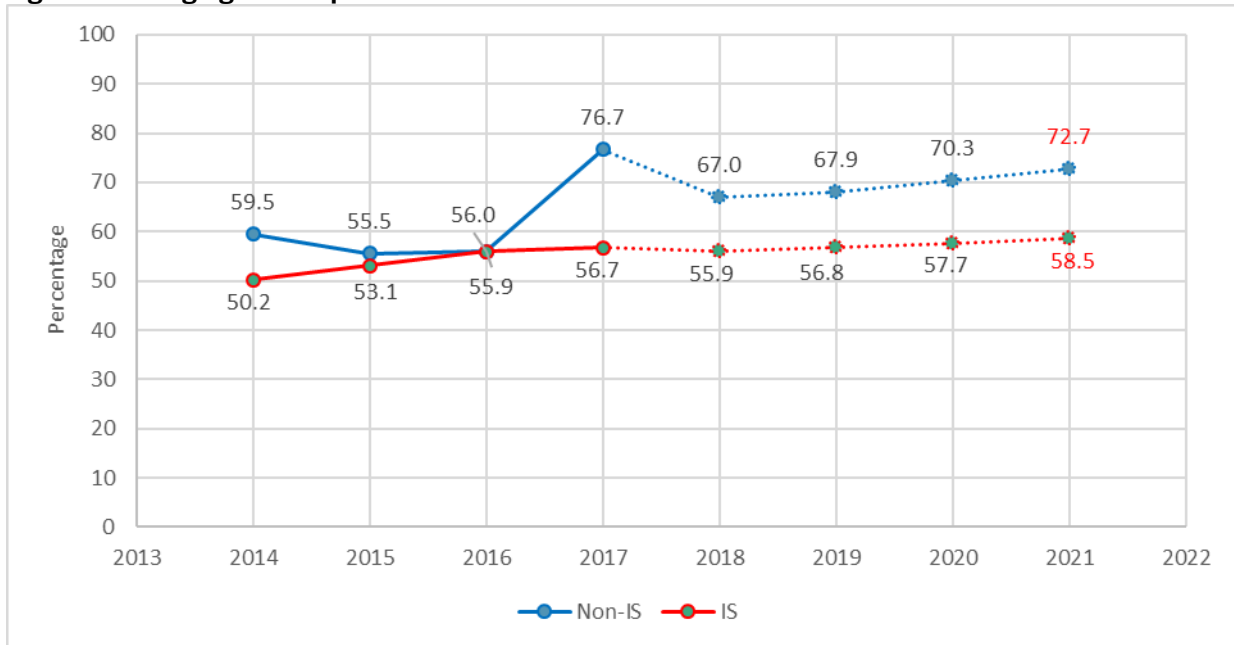
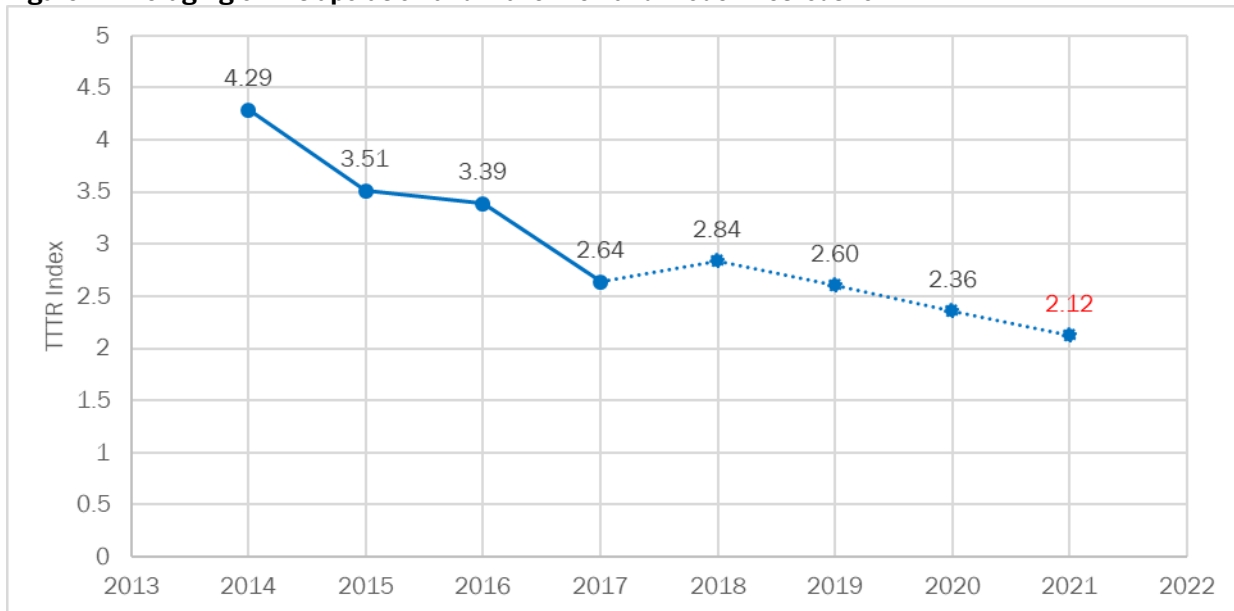


Figure 7: Averaging of Extrapolation and Travel Demand Model Methods for TTTR



Figures 6 and 7 above simply take the average of both the extrapolation and the travel demand model methods. This was selected at the methodology to utilize in the TPB’s forecasting of its own quantifiable four-year targets for both TTR and TTTR.

TPB Target Setting

Based on the performance data and forecasting methodology in the previous section, Tables 3 and 4 show the regional four-year targets, covering the period 2018 through 2021, for the TPB planning area for the three performance measures.

Table 4: Regional Travel Time Reliability Targets for the Interstate and Non-Interstate Roadways

Travel Time Reliability	Four-Year Target (2018 – 2021)
Interstate (NHS)	58.5%
Non-Interstate (NHS)	72.7%

Table 5: Regional Truck Travel Time Reliability for the Interstate System Roadways

Truck Travel Time Reliability	Four-Year Target (2018 – 2021)
Interstate System	2.12