# SYSTEM PERFORMANCE TARGETS TRAVEL TIME RELIABILITY AND TRUCK TRAVEL TIME RELIABILITY - DRAFT

Performance-Based Planning and Programming

June 2018

**SYSTEM PERFORMANCE TARGETS**
July xx, 2018

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# SYSTEM PERFORMANCE

This report summaries 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. The 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 Programing 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.

## 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, 2018, at which time the states are due to make their report to the FHWA. The rule requires states to set targets for four performance measures concerning Highway and Freight: 1) Interstate Travel Time Reliability (TTR), 2) National Highway System (NHS) TTR, 3) Greenhouse Gas Emissions, and 4) Freight Reliability (Truck Travel Time Reliability (TTTR)). In addition, the FHWA requires states to set three performance measures concerning CMAQ: 1) Peak Hour Excessive Delay (PHED), 2) Mode Share, and 3) Emissions.

This report will cover the Highway and Freight Performance Measures, specifically, TTR and TTTR. This report details the overview of the measures, data acquisition, as well as the methodology and forecasting methods recommended for future target setting.

**Figure 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 (LOTTR) 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.

## TPB Forecasting and Target Setting

After the collection of data there are three general approaches that could be utilized for forecasting performance: the extrapolation of measured performance or the use of travel demand model data.

- 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 VMT estimates to project change in congestion, applying the percentage increases 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 of Interstate and Non-Interstate (NHS) for TTR**

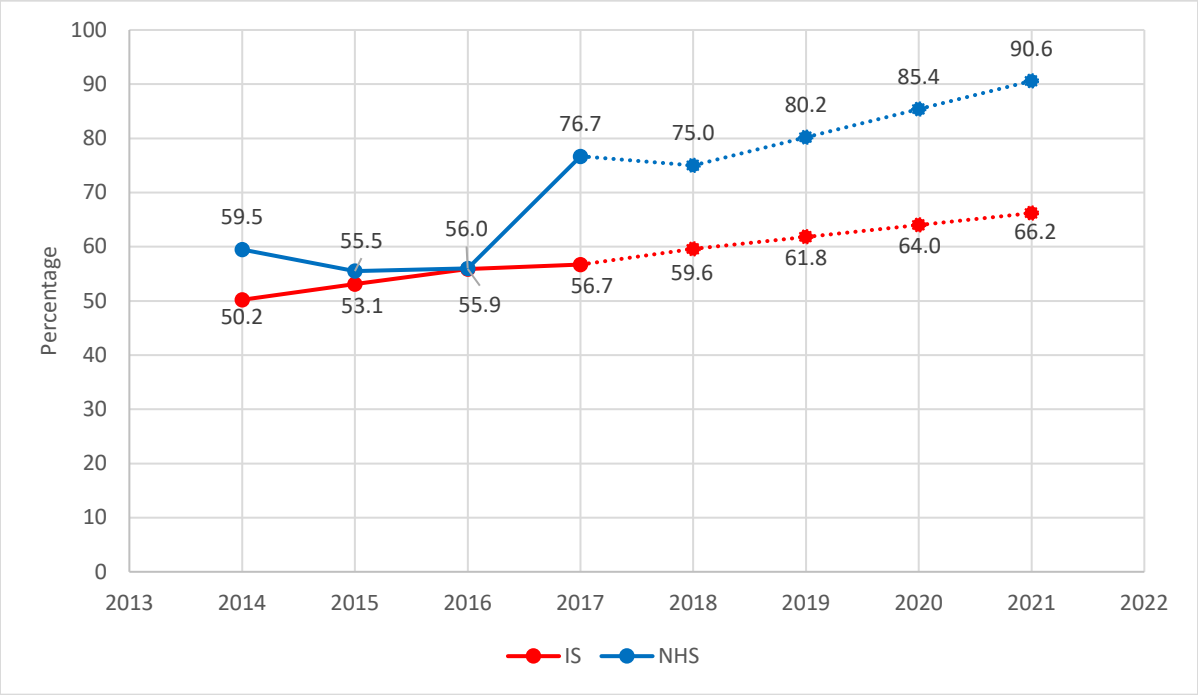
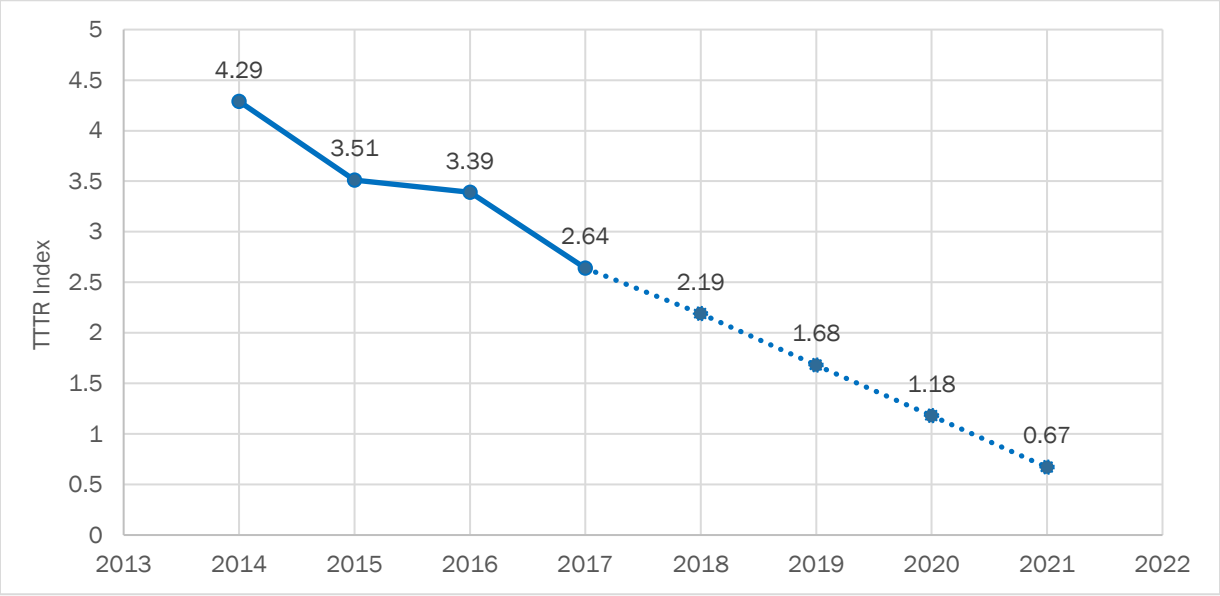



**Figure 3: Extrapolation of Interstate for TTTR (Interstate System)**




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 3 shows a decreasing TTTR Index for the roadways. This translates into commercial trucks having increased more reliable routes of transport, with respect to congestion.

**Figure 4: Travel Demand Model for Interstate and Non-Interstate (NHS) for TTR**

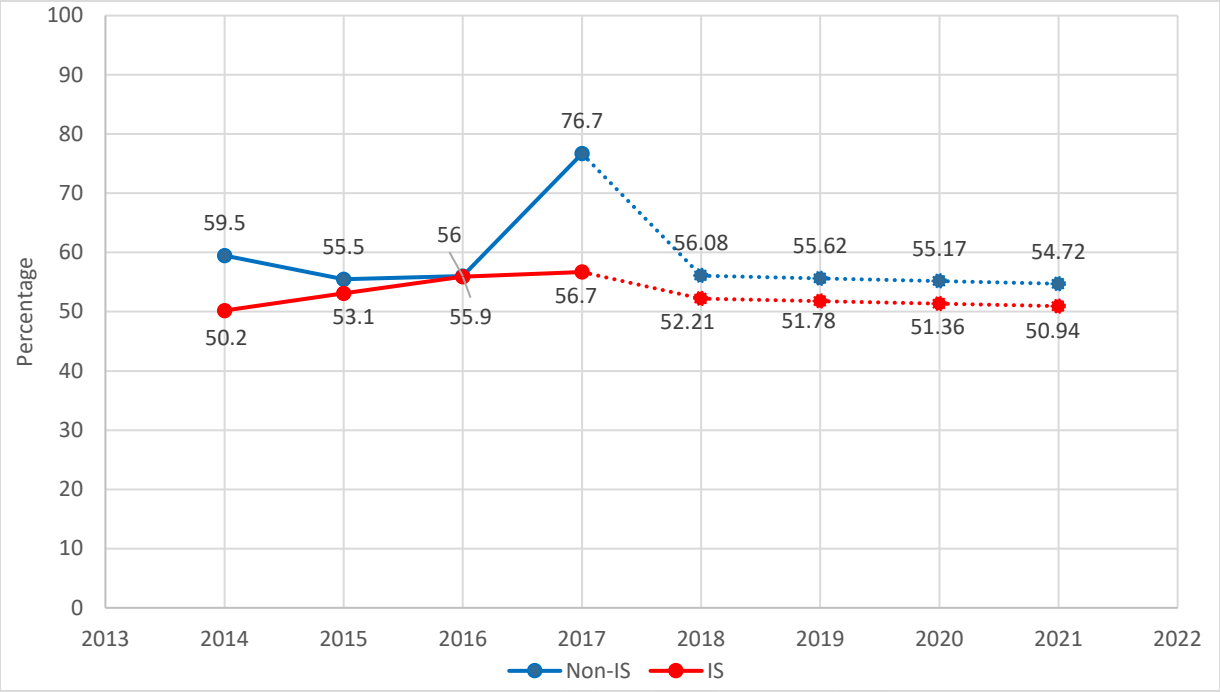



**Figure 5: Travel Demand Model of Interstate for TTTR (Interstate System)**

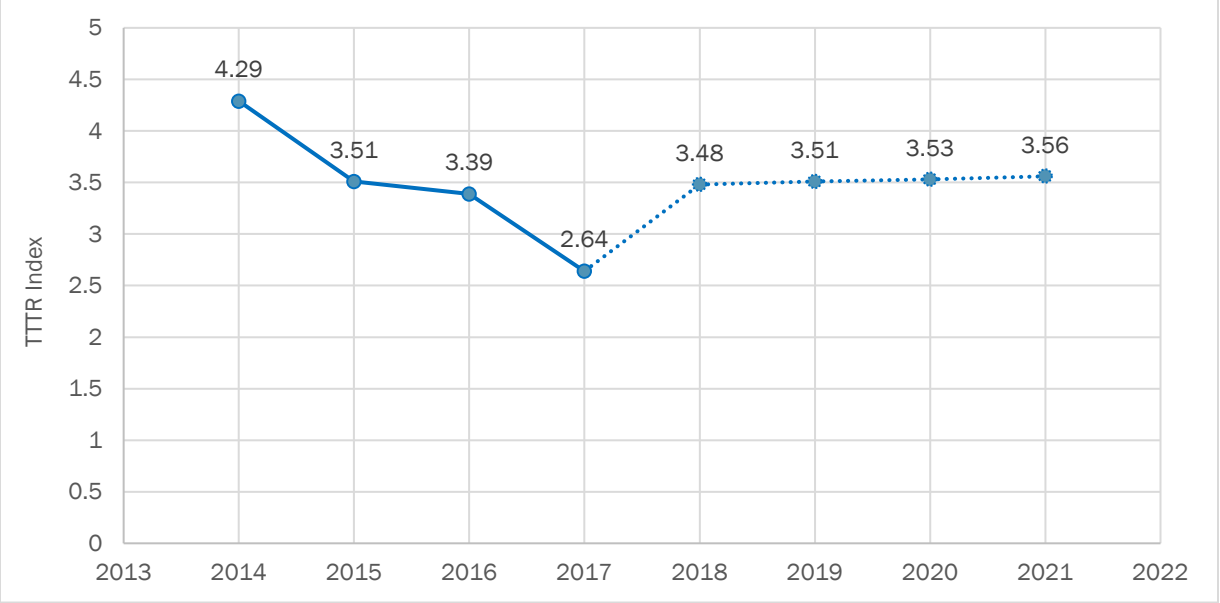



Figure 4 and 5 illustrate to usage of the TPB Travel Demand Model on the performance measures TTR and TTTR. The Travel Demand Model does not provide a specific output for TTR or TTTR, however, it does provide an output of total daily vehicle hours of delay and the population. Taking these two outputs a VHD/capita number was created. This number was then applied to 2017 collected data and compounded grow was calculated far enough to capture both two and four-year

target years. Figure 4 illustrates the reliability of roadways slowly decreasing over time. The same steady decrease of the TTTR is shown in figure 5.

**Figure 6: Averaging of Extrapolation and Travel Demand Model of Interstate and Non-Interstate for TTR**

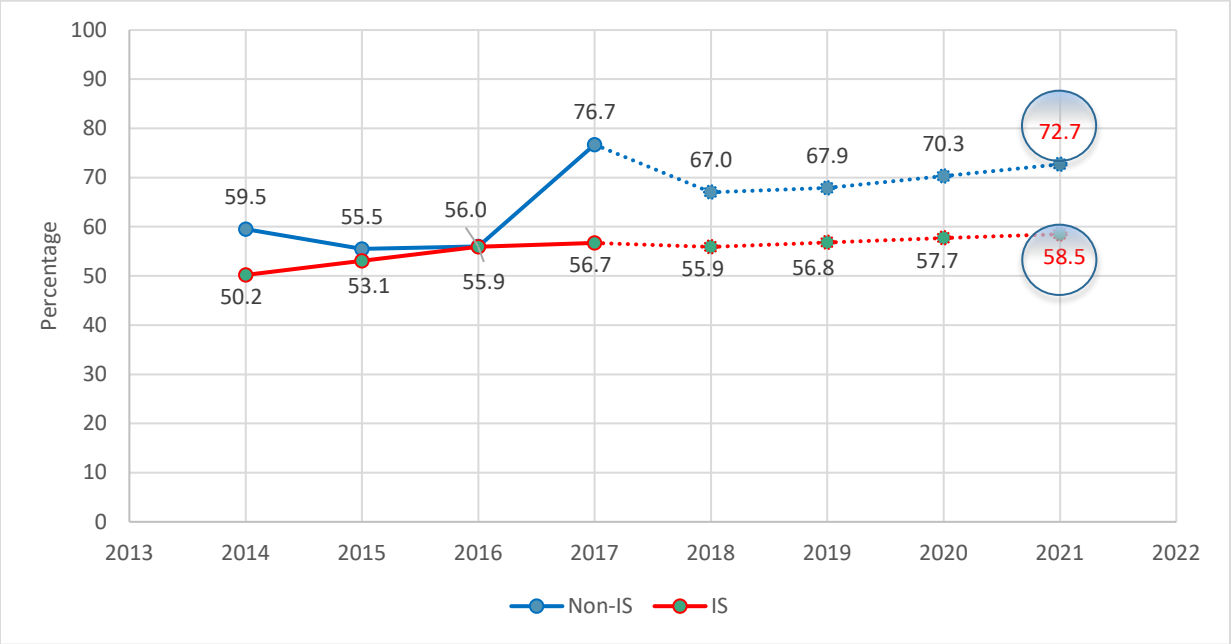
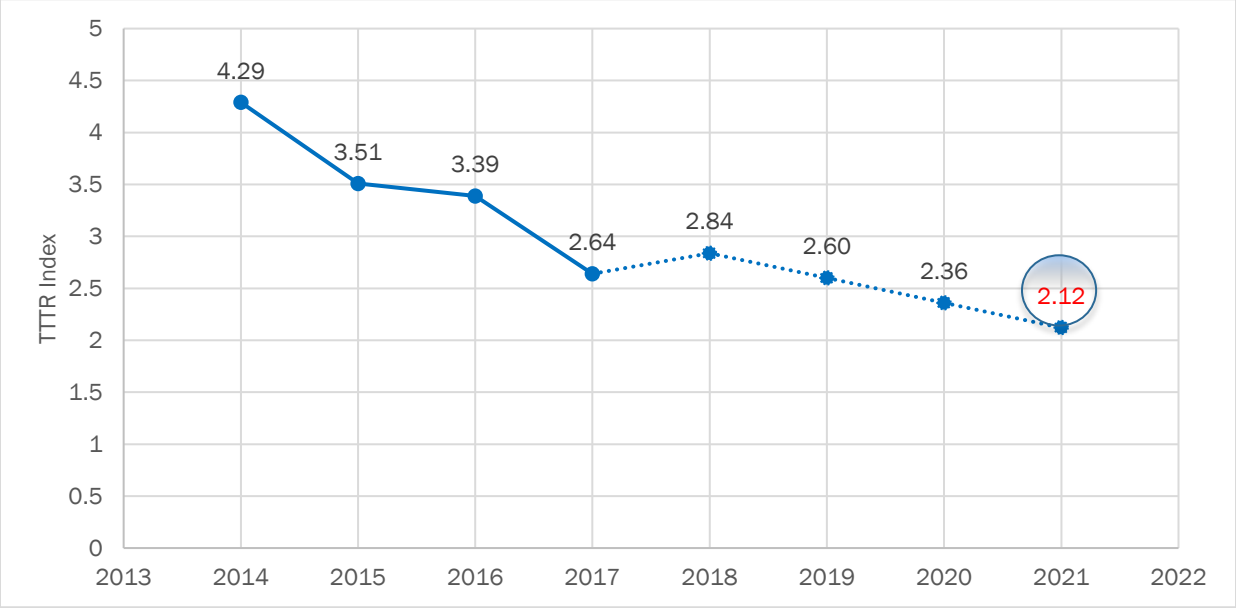



**Figure 7: Averaging of Extrapolation and Travel Demand Model of Interstate for TTTR**



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

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