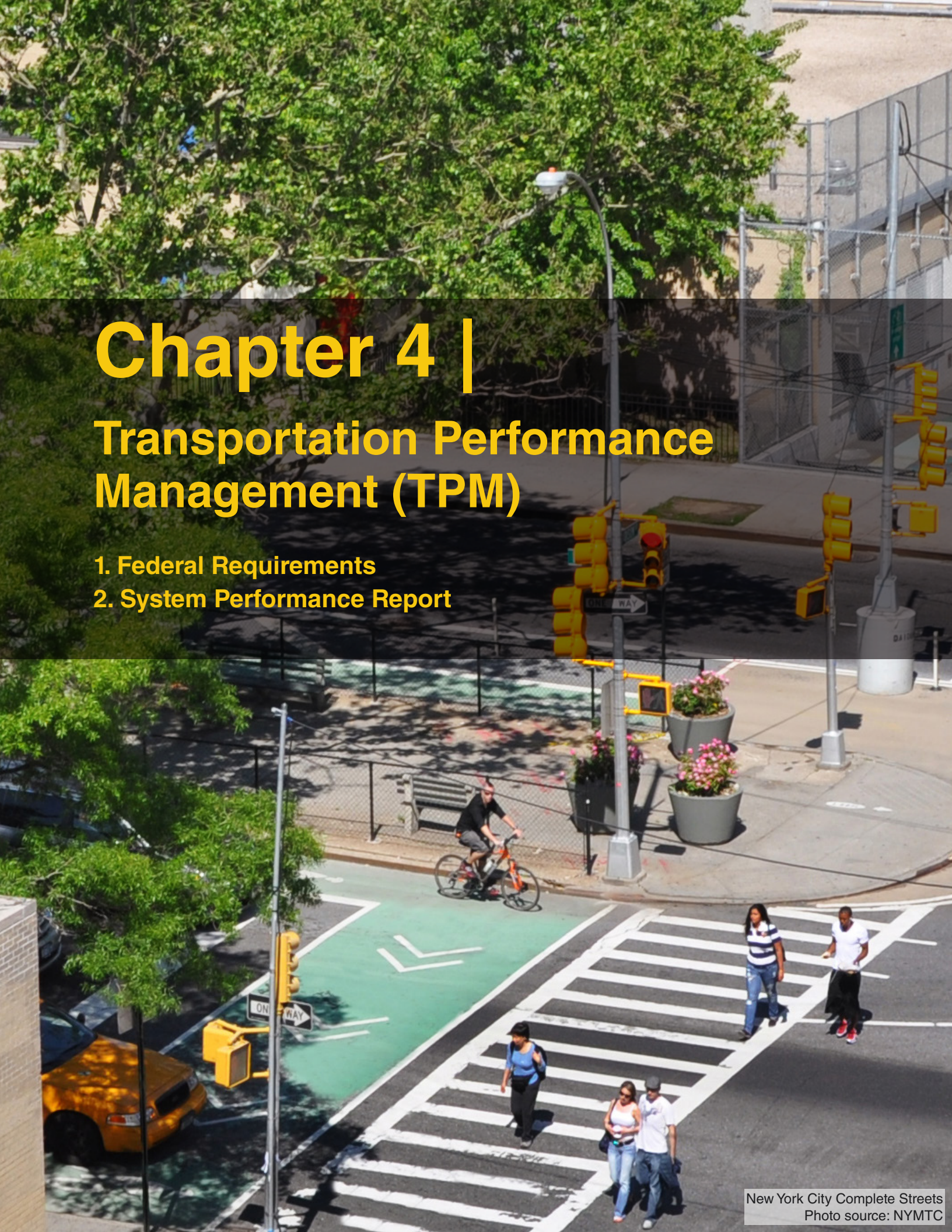


An aerial photograph of a city street intersection. A green-painted bike lane runs diagonally across the frame. Pedestrians are crossing the street at a crosswalk. A yellow taxi is visible on the left. A person is riding a bicycle in the green lane. Traffic lights and street signs are visible at the intersection. Large trees are on the left side of the image.

Chapter 4 |

Transportation Performance Management (TPM)

1. Federal Requirements
2. System Performance Report

1. FEDERAL REQUIREMENT

The current federal transportation law, the Fixing America's Surface Transportation (FAST) Act continues MAP-21 provisions on using performance-based approaches in transportation planning (including the systems performance reporting). States and MPOs must establish transportation performance measures and targets for certain goal areas, including safety, infrastructure condition, system performance and environmental sustainability.

FHWA defines Transportation Performance Management (TPM) as a strategic approach that uses transportation system information as a guide to making investment and policy decisions that are consistent with national goals (described in Chapter 1). The federal transportation legislation enacted in 2012, which was entitled the *Moving Ahead for Progress in the 21st Century Act* (MAP-21) strengthened the growing focus on using performance-based approaches in transportation planning. That law required states and MPOs to establish transportation performance targets for all of the national performance measures in areas such as safety, infrastructure condition, system performance and environmental sustainability (see Figure 4.1 below). MAP-21 further required MPOs to include in their Plans “a system performance report and subsequent updates evaluating the condition and performance of the transportation system with respect to the performance targets.”

The FAST Act, which is the current federal transportation law, was enacted in December 2015. This legislation continues the MAP-21 requirements for using performance-based approaches in transportation planning. This requirement was further stipulated in the Metropolitan Transportation Planning Final Rule issued May 27, 2016, in section 23 CFR 450.306(d). The legislation transformed the Federal-aid program by placing greater emphasis on transportation decision-making on performance-based planning, where performance measures and targets provide an objective means of informing decisions about strategies and investments.



Vision Zero
Photo source: NYMTC

FEDERAL TPM REQUIREMENTS FOR MPOs

“[MPOs]..., in cooperation with the State and public transportation operators, shall develop long-range transportation plans and transportation improvement programs through a performance-driven, outcome-based approach to planning.” 23 USC § 134(c)(1); 49 USC § 5303(c)(1).

“The metropolitan transportation planning process shall provide for the establishment and use of a performance-based approach to transportation decision-making to support the national goals....” 23 USC § 134(h)(2); 49 USC § 5303(h)(2).



FIGURE 4.1: NATIONAL PERFORMANCE MEASURES

The following national performance measures were established by MAP-21 and carried forward under the FAST Act:

- > **For the National Highway Performance Program (NHPP):**
 - Pavement conditions on the Interstate system and remainder of the National Highway System (NHS)
 - Bridge conditions on the NHS
 - Performance of the Interstate system and remainder of the NHS
- > **For the Highway Safety Improvement Program (HSIP):**
 - Number and rate per vehicle mile traveled of fatalities
 - Number and rate per vehicle mile traveled of serious injuries
- > **For the Congestion Mitigation and Air Quality (CMAQ):**
 - Traffic congestion
 - On-road mobile source emissions
- > **Freight movement on the Interstate system**
- > **Public transportation:**
 - State of good repair
 - Safety

Source: 23 USC § 150(c) and 49 USC § 5326(c) and § 5329(d)

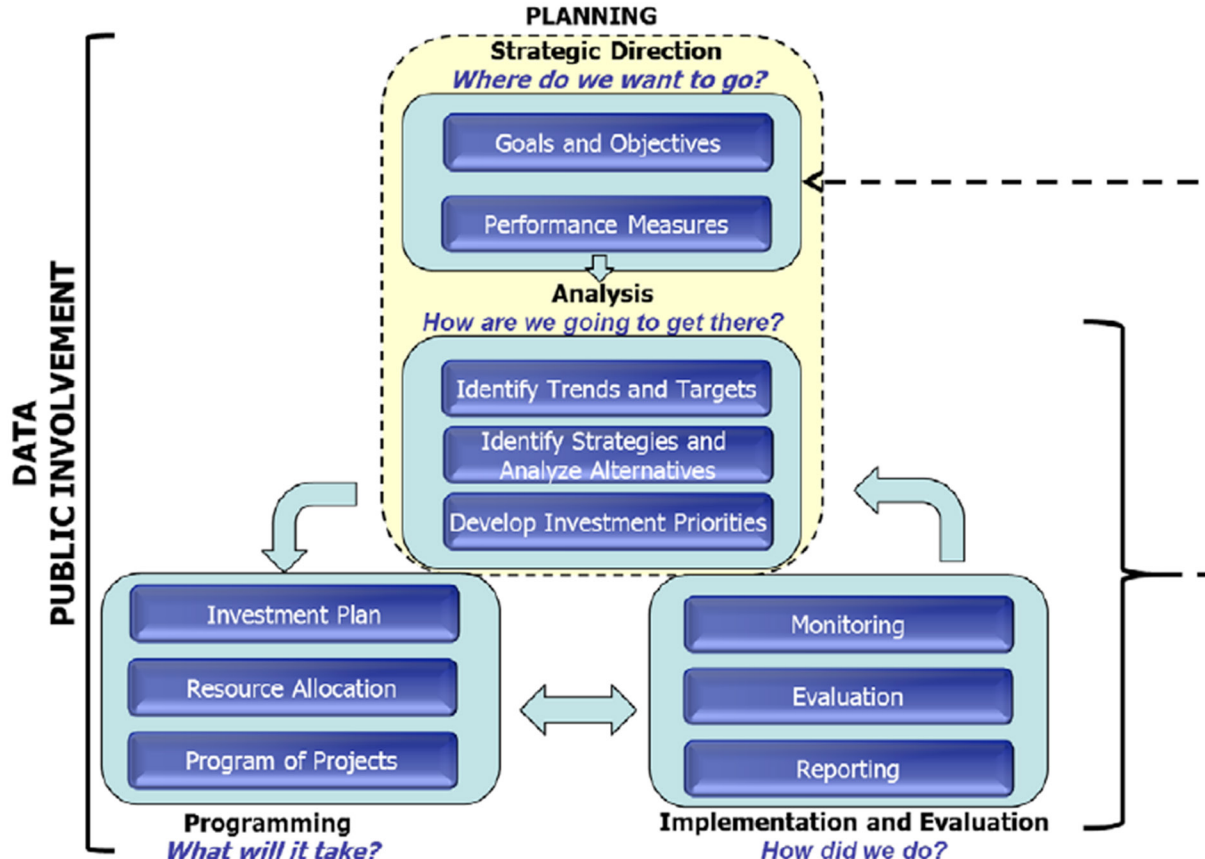
THE TPM FRAMEWORK

USDOT has recommended a particular framework for TPM which should result in a performance-based transportation plan, as shown in Figure 4.2 below. The framework is built on three phases: 1) Planning; 2) Programming; and 3) Implementation and Evaluation.

- > The Planning phase consists of setting a strategic direction (“where do we want to go?”), which encompasses goals and objectives and performance measures, followed by conducting an analysis of how a region will move forward in achieving identified goals and objectives through investments and policies (“how are we going to get there?”).
- > The Programming phase tries to answer the question “what will it take?”
- > The last phase of Implementation and Evaluation seeks to answer the question “how did we do?”

NYMTC is currently undertaking many of the phases and actions identified in the TPM framework and, as such, is moving toward a more performance-based approach to its metropolitan transportation planning requirements. This approach will help NYMTC undertake a more systematic approach to using transportation system performance information – past, present, and anticipated future – to develop investment strategies and priorities.

FIGURE 4.2: THE TPM FRAMEWORK



Source: FHWA Performance-based Planning and Programming Guidebook. Page iv.

REQUIRED PERFORMANCE MEASURES & TARGETS

The federal TPM regulations require MPOs to either establish targets for their planning area or support the targets set by New York State for the defined performance measures no later than 180 days after the states do so. As of this writing, Final federal rules have been promulgated for the following:

- > Highway Safety Improvement Program (HSIP) and Safety Performance Management Measures;
- > Transit Asset Management (TAM) and Public Transportation Safety Program;
- > National Highway System (NHS) Asset Management Plan (part of the National Highway Performance Program (NHPP));
- > Assessing Pavement and Bridge Conditions for the NHPP and Assessing Performance of the NHS;
- > Freight Movement on the Interstate System, and
- > Congestion Mitigation and Air Quality Improvement Program (CMAQ).

These rules outline the roles and responsibilities of the states and MPOs, and the details of the relevant performance measures, and of target-setting and reporting. They are briefly summarized here.

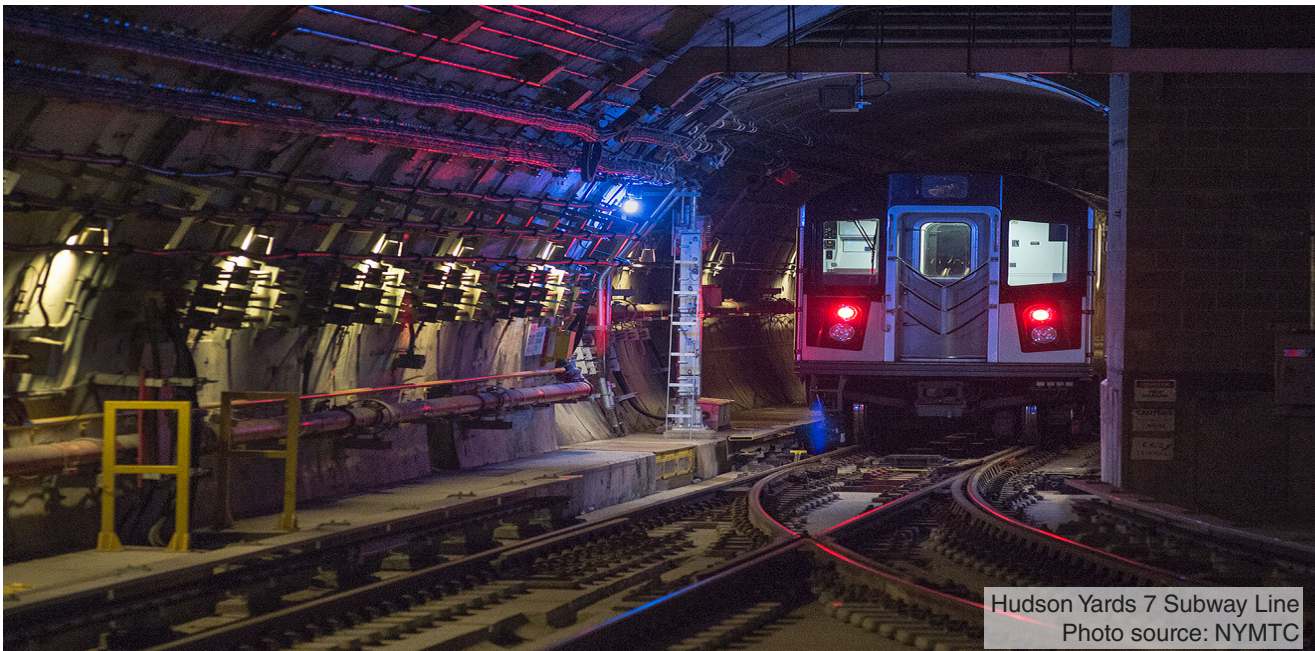
HSIP & SAFETY PERFORMANCE MANAGEMENT MEASURES¹

The final safety rule published on March 15, 2016 identified five performance measures:

- > Number of fatalities
- > Rate of fatalities
- > Number of serious injuries
- > Rate of serious injuries
- > Number of non-motorized fatalities and non-motorized serious injuries

TRANSIT ASSET MANAGEMENT (TAM)²

The FTA published this final rule on July 26, 2016 which (a) defined the term “state of good repair” (b) required public transportation providers develop and implement transit asset management (TAM) plans and (c) established state of good repair standards and four state of good repair performance measures for: (i) equipment – non-revenue, support-service and maintenance vehicles equipment; (ii) rolling stock; (iii) infrastructure – rail fixed-guideway, track, signals, and systems; and (iv) facilities. Providers’ initial TAM must be completed no later than October 1, 2018.



Hudson Yards 7 Subway Line
Photo source: NYMTC

PUBLIC TRANSPORTATION SAFETY PROGRAM³

This final rule published on August 11, 2016 established substantive and procedural rules for FTA's administration of a comprehensive safety program to improve the safety of the nation's public transportation systems. It provides the framework for FTA to monitor, oversee and enforce transit safety, based on the methods and principles of Safety Management Systems.

ASSESSING PAVEMENT & BRIDGE CONDITIONS FOR THE NHPP⁴

This final rule was issued on January 18, 2017 with an effective date of February 17, 2017, which was subsequently extended to March 21, 2017. The performance measures identified in this rule are:

- > The condition of pavements on the Interstate System;
- > The condition of pavements on the NHS – excluding the Interstate; and
- > The condition of bridges on the NHS.

ASSESSING PERFORMANCE OF THE NHS, FREIGHT MOVEMENT ON THE INTERSTATE SYSTEM, & CONGESTION MITIGATION AND AIR QUALITY IMPROVEMENT PROGRAM⁵

Like the Pavement and Bridge Conditions rule, this rule was issued on January 18, 2017 and subject to the same extended effective date of March 21, 2017. The performance measures identified in this rule are for:

- > NHS Travel Time Reliability;
- > Greenhouse gas (GHG) emissions for the NHS;
- > Freight movement on the Interstate System; and
- > Traffic congestion.

New York State is required to set targets for the various performance measures within timeframes established in the rules. Similarly, in keeping with the requirements of these rules and the Metropolitan Transportation Planning Regulations, NYMTC will then have to set its performance targets no later than 180 days after the date on which the State establishes its targets. For example, in the case of the HSIP and Safety Performance Management Measures, NYSDOT is scheduled have targets in place by August 2017 and NYMTC by February of 2018. Figure 4.3 below provides a basic flowchart of performance measures and performance targets. After the performance targets are selected, the Plan and TIP will be amended by NYMTC, as needed, to reflect them.

2. SYSTEM PERFORMANCE REPORT

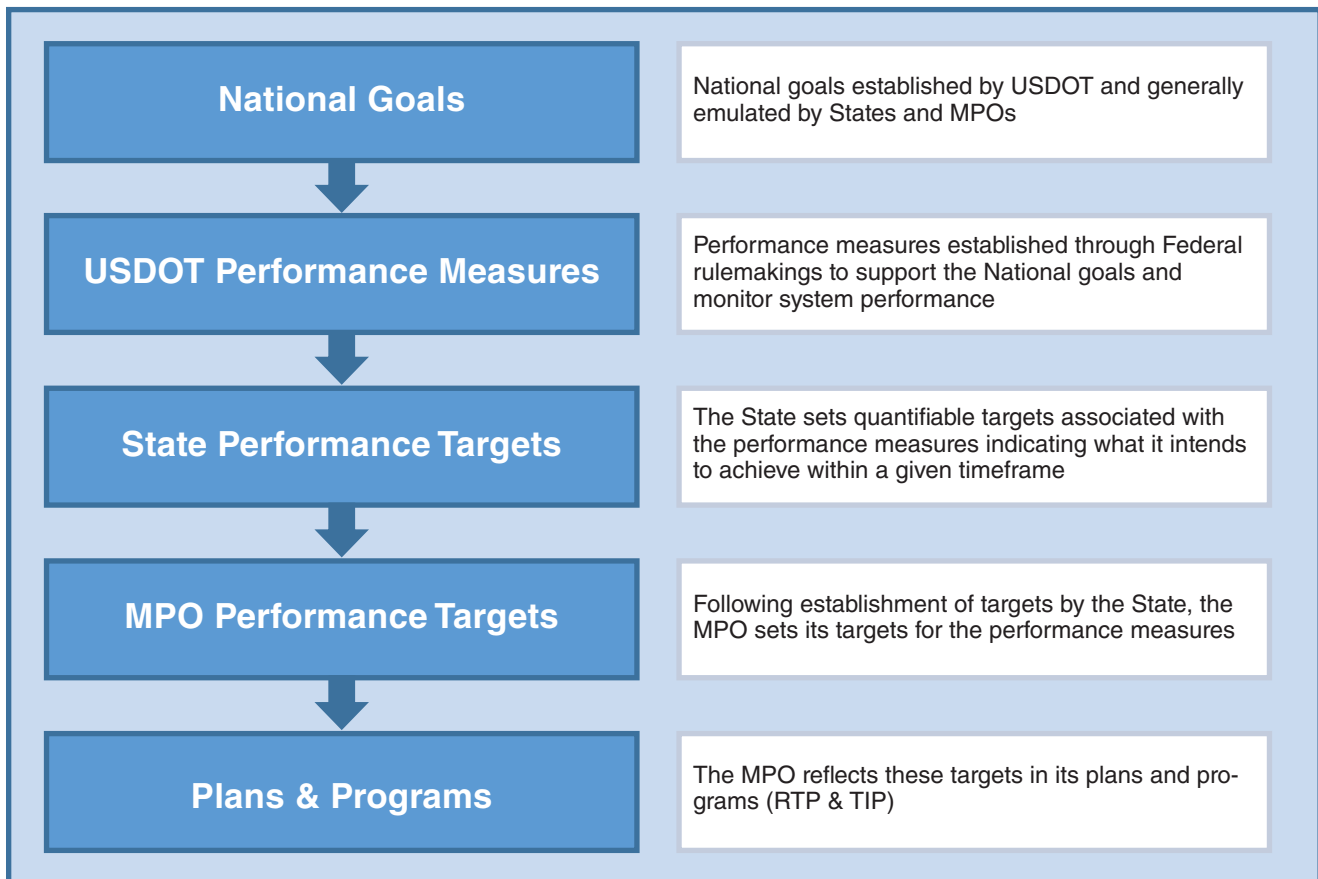
As previously mentioned, MPOs are required to produce a metropolitan transportation system performance report on all the required performance measures and this report needs to be included in the long-range transportation plan. Figure 4.3 below shows how and when this occurs. The report describes the baseline condition/performance and progress toward achievement of the targets for the associated performance measures described in Section 1 of this chapter.

Federal regulations also require that metropolitan transportation plans adopted or amended after the following dates must include performance targets

for the measures associated with the following performance management rulemakings:

- > May 27, 2018 – Highway Safety Improvement Program (HSIP) and Highway Safety
- > October 1, 2018 – Transit Asset Management
- > October 1, 2018 – Public Transportation Safety Program
- > May 20, 2019 – Pavement and Bridge Condition
- > May 20, 2019 – System Performance/Freight/Congestion Mitigation & Air Quality Improvement Program

FIGURE 4.3: FLOWCHART OF PERFORMANCE MEASURES PERFORMANCE AND TARGETS



HSIP and Highway Safety

As mentioned in Section 1 of this chapter, on March 15, 2016 the FHWA published the final rule for HSIP and Safety Performance Management (Safety PM) Measures in the Federal Register with an effective date of April 14, 2016. The requirement was for targets to be set for the following performance measures:

- > Number of Fatalities
- > Fatality Rate (per 100 million vehicle miles traveled - VMT)
- > Number of Serious Injuries
- > Serious Injury Rate (per 100 million vehicle miles traveled - VMT)
- > Number of Non-Motorized Fatalities and Serious Injuries

BASELINE/CURRENT CONDITION IN THE NYMTC PLANNING AREA AND NEW YORK STATE

NYMTC staff and members collaborated the development of baseline conditions for the NYMTC planning

area using data from: The Fatality Analysis Reporting System (FARS); the Department of Motor Vehicles Accident Inventory Reporting system (AIS); and FHWA approved data from New York State DOT (NYSDOT), including Vehicle Miles Traveled (VMT) data from the Highway Data Services Bureau. Using these same data sources, New York State DOT (NYSDOT) worked collaboratively with the State's MPOs to establish baseline conditions (and performance targets as described below) for the State. The results of the baseline calculations, based on 2012-2016 five-year rolling averages are shown in Table 4.1 below.

PERFORMANCE TARGETS

On January 18, 2018 through Resolution 458, NYMTC agreed to support the NYSDOT statewide 2018 targets for the above-mentioned Safety Performance Measures based on five-year rolling averages per Title 23 Part 490.207 of the Code of Federal Regulations. These targets are shown in Table 4.1 below.

Table 4.1: 2018 Safety Measures Baseline and Targets

	Number of Fatalities	Rate of Fatalities per 100M Vehicle Miles Traveled (VMT)	Number of Serious Injuries	Rate of Serious Injuries per 100M VMT	Number of Nonmotorized Fatalities and Serious Injuries
NYSDOT Baseline	1,143	0.89	11,547	8.99	2,872
NYMTC Baseline	548	0.97	4,880	8.68	2,032
NYSDOT Targets	1,086	0.87	10,854	8.54	2,843

ACHIEVING TARGETS

The 2017 New York Strategic Highway Safety Plan (SHSP) is intended to reduce “the number of fatalities and serious injuries resulting from motor vehicle crashes on public roads in New York State.” The SHSP guides NYSDOT, the MPOs, and other safety partners in addressing safety and defines a framework for implementation activities to be carried out across New York State. The NYSDOT Highway Safety Improvement Program (HSIP) annual report documents the statewide performance targets.

In supporting the State’s targets, NYMTC will address areas of concern for fatalities and serious injuries within its planning area through continued coordination with NYSDOT and programming of projects in the Transportation Improvement Program (TIP). The current 2017-2021 TIP includes a description of the anticipated effects of projects in achieving the above-mentioned targets, effectively linking investment priorities to the safety targets. Additionally, this Plan includes a safety goal thereby allowing outcomes, performance measures and targets to be integrated into the transportation planning process.

EXISTING NYMTC PERFORMANCE MEASURES

Currently, NYMTC has a number of performance measures in place as part of its Congestion Management Process (CMP). These performance measures are used to assess the effectiveness and efficiency of the roadway system, and are reported in the CMP Status Report published with each new Regional Transportation Plan.

No single metric adequately defines traffic congestion on a regional basis. That being the case, NYMTC's CMP analyzes the performance of the roadway system using a number of different measures which are described in detail in the Congestion Management Status Report (see <https://www.nymtc.org/Required-Planning-Products/Congestion-Management-Process>):

- > **Demand-to-Capacity Ratio (D/C)**: this measure reflects the level of mobility and the quality of travel of a roadway or section of a roadway. It compares the roadway capacity with the estimated trip demand generated directly from the travel demand models.
- > **Vehicle Hours of Delay (VHD)**: the sum total of delay experienced by all vehicles on the network. Delay is defined as the difference between estimated (actual) travel and free flow travel speed.
- > **Person Hours of Delay (PHD)**: vehicle hours of delay multiplied by the average person occupancy rate per vehicle.
- > **Average Travel Speed (ATS)**: is the calculation for a weighted average of travel speed and helps to provide an average "system experience" of travelers for each portion of the road system.
- > **Lane-Miles of Congestion (LMC)**: measures the road space that functions at less than free-flow speeds during the peak period, and compares actual roadway volume with maximum acceptable volume for the roadway. For the purposes of this performance measure a roadway is defined as congested if the volume is greater than or equal to 85 percent of the maximum acceptable volume of that roadway (essentially Level of Service E volume).

- > **Travel Time Index (TTI)**: is the ratio of peak period travel time to free-flow travel time. It expresses the average amount of extra time it takes in the peak relative to free flow travel and is used as a reliability measure for the roadway system.
- > **Vehicle Miles of Travel (VMT)**: is the sum of distances traveled by all motor vehicles in a specified region and is an aggregate performance measure. This measure helps estimate mobile source emissions of air pollutants.

The NYBPM is used with related post-processing software to estimate and forecast the above metrics. Two types of forecasts of traffic congestion are performed: regional forecasts and county/borough-level forecasts. The regional forecasts assess traffic congestion and the performance of the entire transportation system as a whole. They provide a means for assessing the effectiveness of system-level transportation investment strategies in addressing regional traffic congestion. County/borough-level forecasts are subsets of the regional forecasts which focus on subarea congestion and system performance. These forecasts can identify local areas of congestion in greater detail, as well as the influence of more localized transportation improvement approaches on congestion.

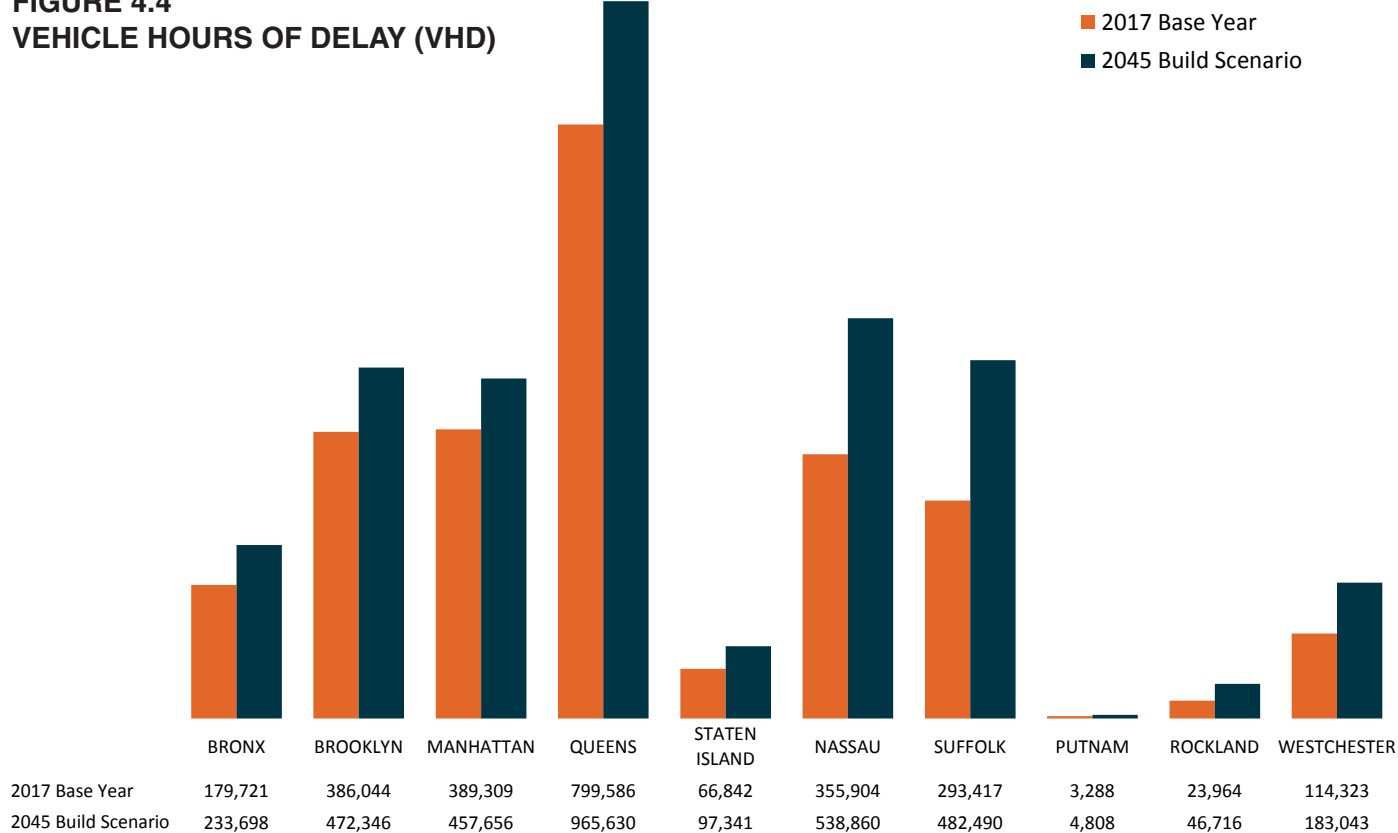
Figure 4.4, 4.5 and 4.6 are examples of selected CMP performance metrics at the county/borough level from NYMTC's 2017 CMP Status Report.

INTEGRATION OF PERFORMANCE MEASURES FROM OTHER PLANS & PROCESSES

The Metropolitan Transportation Planning Regulations⁶ require that the Plan should integrate performance measures from various relevant plans and planning processes, including:

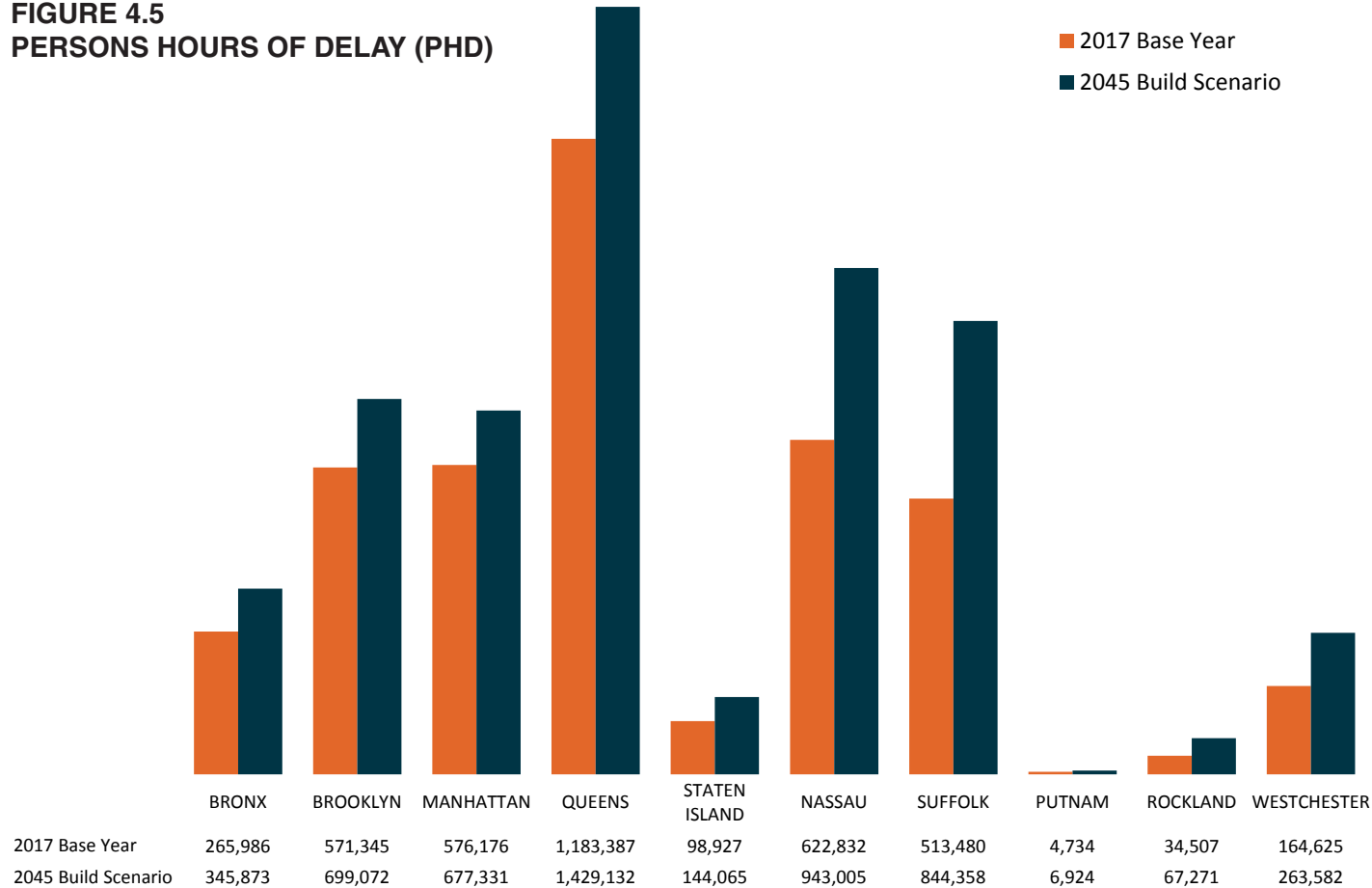
- > The State Transportation Asset Management Plan (TAMP): a risk-based asset management plan for the National Highway System (NHS).
- > The State's Strategic Highway Safety Plan (SHSP): a statewide coordinated safety plan that provides a comprehensive framework for reducing highway fatalities and serious injuries on all public roads.

FIGURE 4.4
VEHICLE HOURS OF DELAY (VHD)

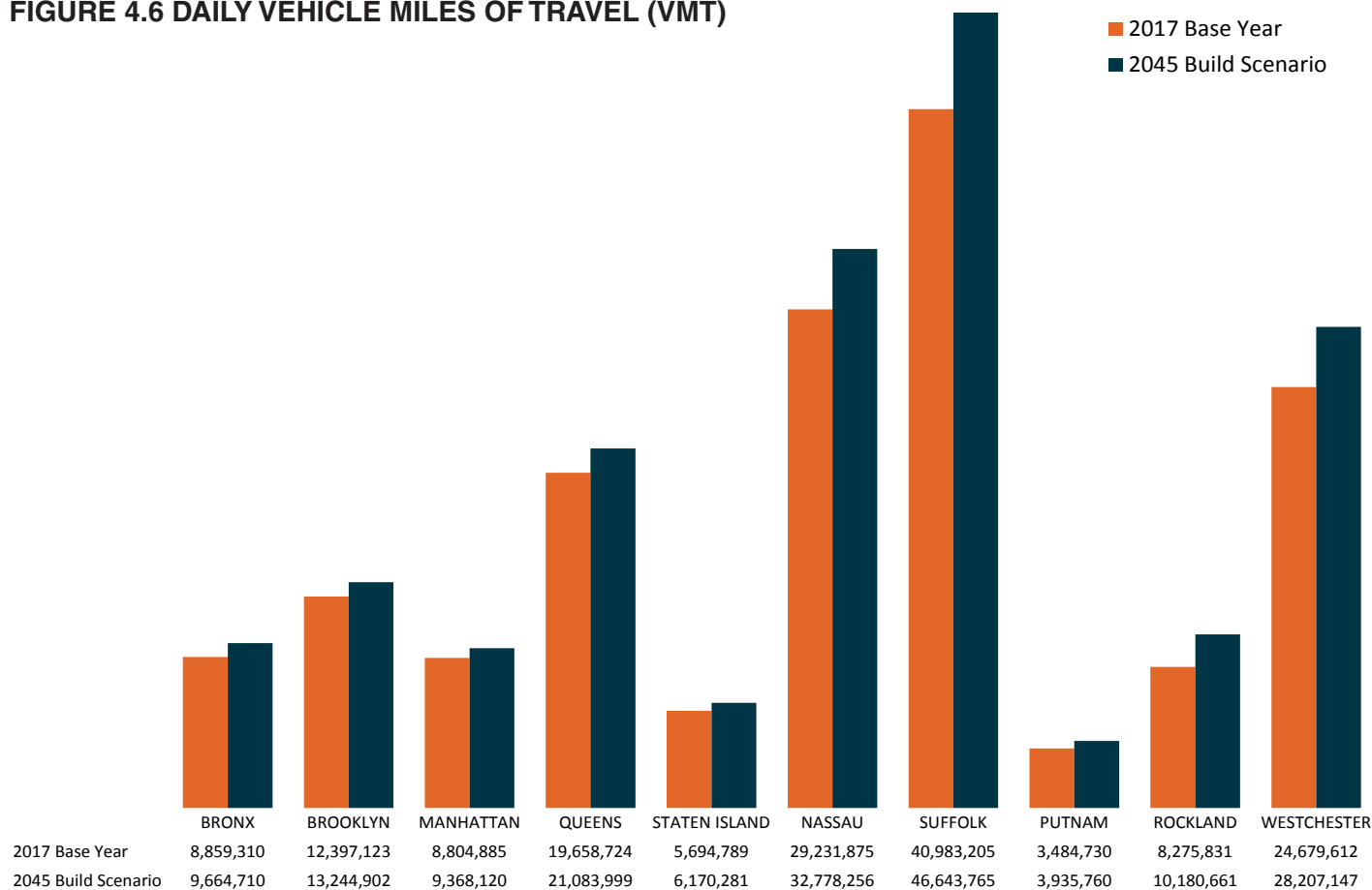


Source: NYMTC

FIGURE 4.5
PERSONS HOURS OF DELAY (PHD)



Source: NYMTC

FIGURE 4.6 DAILY VEHICLE MILES OF TRAVEL (VMT)

Source: NYMTC

- > The Public Transportation Agency Safety Plan: a safety plan that includes (a) methods for identifying and evaluating safety risks and (b) strategies to minimize the exposure of the public, personnel, and property to hazards and unsafe conditions.
- > The Congestion Mitigation and Air Quality Improvement Program Performance Plan, which includes (a) a baseline level for traffic congestion and on-road mobile source emissions; (b) progress made in achieving performance targets; and (c) a description of projects for funding and how projects will contribute to achieving emission and traffic congestion reduction targets.
- > The Congestion Management Process (described in previous sections of this Plan).
- > The State Freight Plan (appropriate metropolitan portions): a statewide multi-modal and

intermodal plan to improve freight movement and connections to markets and supporting the economic importance of freight movement.

- > The Transit Asset Management Plan: developed by FTA designated recipients, this plan should include at a minimum capital asset inventories, assessments of condition, and investment prioritization.
- > Other relevant State or regional plans and processes (e.g. pedestrian and bicycle plans).

The integration of performance measurement in this fashion will be demonstrated in the System Performance Report which is amended into *Plan 2045* in the timeframes specified by the relevant regulations.

ENDNOTES

¹ <https://www.federalregister.gov/documents/2016/03/15/2016-05202/national-performance-management-measures-highway-safety-improvement-prog>

² <https://www.federalregister.gov/documents/2016/07/26/2016-16883/transit-asset-management-national-transit-database>

³ <https://www.federalregister.gov/documents/2016/08/11/2016-18920/public-transportation-safety-program>

⁴ <https://www.federalregister.gov/documents/2017/01/18/2017-00550/national-performance-management-measures-assessing-pavement-condition-for-the-national-highway>

⁵ <https://www.federalregister.gov/documents/2017/01/18/2017-00681/national-performance-management-measures-assessing-performance-of-the-national-highway-system>

⁶ 23 CFR Part 450.306(d)(4)