



Chapter 5:

Regional Performance Measures and Targets





REGIONAL PERFORMANCE MEASURES AND TARGETS

The BRTB has adopted a series of performance measures and targets. These measures and targets will help the BRTB to gauge the effectiveness of transportation investments over the 2024-2045 period.



Regional Transportation Goals

Improve System Safety

Make conditions safer for pedestrians, bicyclists, transit riders and operators, and motorists.

Improve and Maintain the Existing Infrastructure

Improve the conditions of existing transportation facilities; systematically maintain and replace transportation assets as needed.

Improve Accessibility

Help people of all ages and abilities to access specific destinations.

Increase Mobility

Help people and freight to move reliably and efficiently.

Conserve and Enhance the Environment

Pass on to future generations the healthiest natural and human environments possible.

Improve System Security

Provide a secure traveling environment for everyone; improve the region's ability to respond to natural and man-made disasters.

Promote Prosperity and Economic Opportunity

Support the revitalization of communities, the development of activity centers, and the movement of goods and services.

Foster Participation and Cooperation Among Stakeholders

Enable all interested and affected parties to participate and cooperate to find workable solutions.

Promote Informed Decision Making

Ensure that adopted transportation policies and performance measures guide the regional decision making process.

As noted in the previous chapter, in developing goals, strategies, measures, and targets, the BRTB considered:

- federal, state, regional, and local requirements and policies, including the FAST Act (the federal authorizing legislation) and its regulations (described in Chapter 1)
- factors that could affect how the region's transportation systems will perform over the next 25 years (discussed in Chapters 2 and 3)
- comments and recommendations from the public at large and from BRTB advisory groups, including the Public Advisory Committee.

Definitions

- A **goal** is a broad aspiration or guiding principle for the region (e.g., "Improve system safety").
- A **strategy** is an approach or policy to help the region implement a goal (e.g., "Eliminate hazardous or substandard conditions in high-crash locations and corridors").
- A **performance measure** is a specific metric the region can use to assess progress toward achieving a goal (e.g., "Decrease number of highway fatalities").
- A **performance target** is a specific level to be reached within a certain time frame (e.g., "Decrease number of highway fatalities to 121 by 2030").



Performance targets have been adopted for transit asset management, highway safety, traffic congestion, roadway and bridge conditions, system performance, freight movement, and on-road mobile source emissions.

Regional Performance Measures and Targets

Maximize2045 includes a series of performance measures and targets. These measures and targets are consistent with the performance-based approach to planning and programming set forth in the FAST Act and corresponding regulations. These measures and targets help the BRTB and operating agencies gauge system-wide progress relative to regional goals.

Compliant with requirements of the FAST Act and deadlines established in regulations, MDOT, public transportation providers, and the BRTB coordinated efforts to develop and adopt a series of regional performance targets. Performance targets have been adopted for transit asset management, highway safety, traffic congestion, roadway and bridge conditions, system performance, freight movement, and on-road mobile source emissions.

Out of the series of 25 federally mandated performance targets, the BRTB has adopted 21 to date. These include:

- **four transit asset management targets** (adopted in June 2017 and updated in February 2019):
 1. percentage of non-revenue service vehicles that have either met or exceeded their Useful Life Benchmarks (ULBs)
 2. percentage of revenue vehicles within an asset class that have either met or exceeded their ULBs
 3. with respect to infrastructure (rail fixed-guideway, track, signals, systems): percentage of track segments with performance restrictions
 4. percentage of facilities within an asset class rated below condition 3 on the TERM scale (see box at right for more information on the TERM scale)

TERM Values

FTA uses the Transit Economic Requirements Model (TERM) to develop values to determine its transit state of good repair (SGR) backlog. The table below shows the TERM rating scale.

General Condition Assessment Rating Scale		
Rating	Condition	Description
5	Excellent	No visible defects, new or near new condition, may still be under warranty
4	Good	Good condition, but no longer new, may have some slightly defective or deteriorated component(s), but is overall functional
3	Adequate	Moderately deteriorated or defective components but has not exceeded useful life
2	Marginal	Defective or deteriorated component(s) in need of replacement; exceeded useful life
1	Poor	Critically damaged component(s) or in need of immediate repair; well past useful life



- **five highway safety targets** (adopted in January 2018 and updated in January 2019)
 1. number of fatalities
 2. rate of fatalities per 100 million vehicle miles traveled (VMT)
 3. number of serious injuries
 4. rate of serious injuries per 100 million VMT
 5. number of non-motorized fatalities + non-motorized serious injuries – pedestrian and bicycle
- **two targets to assess traffic congestion** (applies to projects with CMAQ funding; unified MDOT/BRTB targets for the urbanized area; adopted in May 2018)
 1. annual hours of peak-hour excessive delay (PHED) per capita
 2. percentage of non-SOV (single-occupancy vehicle) travel
- **one target to assess on-road mobile source emission reductions** (applies to projects with CMAQ funding; unified MDOT/BRTB targets for the urbanized area; adopted in June 2018)
 1. total emissions reductions: 2-year and 4-year cumulative reported emission reductions of each criteria pollutant and applicable precursors (PM2.5, PM10, CO, VOC, and NOx) for which the area is designated nonattainment or maintenance [*Note: the BRTB region is in nonattainment only with respect to ozone*]
- **four targets to assess pavement condition** (adopted in October 2018)
 1. percentage of pavement on the interstate system in good condition
 2. percentage of pavement on the interstate system in poor condition
 3. percentage of pavement on the National Highway System (NHS) (excluding the interstate system) in good condition
 4. percentage of pavement on the NHS (excluding the interstate system) in poor condition





- **two targets to assess bridge condition** (adopted in October 2018)
 1. percentage of NHS bridges by deck area classified as in good condition
 2. percentage of NHS bridges by deck area classified as in poor condition
- **two targets to assess performance of the NHS under the National Highway Performance Program** (expressed as Level of Travel Time Reliability (LOTTR) (adopted in October 2018)
 1. percentage of person-miles traveled on the interstate system that are reliable
 2. percentage of person-miles traveled on the non-interstate NHS that are reliable

- **one target to assess freight movement on the interstate system** (adopted in October 2018)
 1. percentage of interstate system mileage providing for reliable truck travel times (Truck Travel Time Reliability Index – TTTR)

The BRTB, in coordination with MDOT MTA, will adopt the remaining four targets after the adoption of *Maximize2045*. This adoption date for these targets will depend on when MDOT establishes its state targets. The remaining targets are:

- **four transit safety targets** (reported by mode)
 1. number of reportable fatalities and rate per total vehicle revenue miles
 2. number of reportable injuries and rate per total vehicle revenue miles
 3. number of reportable safety events and rate per total vehicle revenue miles
 4. mean distance between major mechanical failures.

For all of the performance measure areas, the state DOT (i.e., MDOT) must develop a series of performance targets. The MPO (i.e., the BRTB) then either must adopt the state targets or develop its own regional targets.

All of the state and regional measures and targets will be used to guide MDOT and the BRTB in carrying out the requirements of the applicable FHWA and FTA laws and regulations and in assessing the performance of the state's and region's transportation systems.

System Performance Report

The following sections provide information on the condition and performance of the region’s transportation system assets as well as specific targets the BRTB can use to assess performance relative to programmed and potential improvements.

Transit Asset Management

Federal law requires every public transit operator to:

- establish Transit Asset Management (TAM) performance targets
- coordinate these performance targets with the state and MPOs
- develop a Transit Asset Management Plan (TAMP)
- report asset inventories, condition, and performance measures through the National Transit Database (NTD).

FTA’s final rule on transit asset management requires transit agencies receiving FTA funding to develop asset management plans and monitor performance for public transportation assets, including: vehicles, facilities, equipment, and other infrastructure. Under the national TAM System, FTA is required to set State of Good Repair (SGR) performance measures to support improved decision-making and provide a basis for agencies to determine whether assets are in a condition sufficient to operate at a full level of performance.

Transit Asset Management – MDOT MTA¹ Revenue Vehicle Performance Targets

% of vehicles at or past their Useful Life Benchmark				
Mode	Asset Class (NTD)	2017 Target	2018 Target	2019 Target
Bus	bus (40-ft)	4.7%	4.7%	0.0%
Bus	bus (60-ft)	0.0%	0.0%	0.0%
Light Rail	light rail vehicle	0.0%	0.0%	0.0%
Metro	heavy rail vehicle	88.9%	88.9%	88.9%
MARC	locomotive	0.0%	0.0%	0.0%
MARC	passenger coach	0.0%	0.0%	0.0%
Mobility	cutaway bus	0.0%	0.0%	0.0%
Mobility	vans	0.0%	0.0%	0.0%
Mobility	automobile	4.4%	4.4%	4.4%

¹ MDOT MTA is a Tier I agency and Maryland’s direct recipient of federal funds. Tier I providers are those transit operators with 101 or more vehicles in revenue service during peak regular service or operators of rail fixed-guideway public transportation systems.

Transit Asset Management – MDOT MTA Non-Revenue Vehicle Performance Targets

% of vehicles at or past their Useful Life Benchmark			
Asset Class (NTD)	2017 Target	2018 Target	2019 Target
steel wheel vehicles	61.1%	61.1%	61.1%
other rubber tire vehicles (service)	54.4%	54.4%	54.4%

Transit Asset Management – Performance Targets for MDOT MTA Facilities and Facilities-Based Equipment

% of facilities rated below condition 3 on the TERM scale *			
Asset Class (NTD)	2017 Target	2018 Target	2019 Target
administrative facility	21%	21%	21%
maintenance facility	65%	65%	50%
passenger facility	17%	17%	17%
parking lot	58%	58%	50%

* Estimates currently based on age of each facility’s components.

Per NTD requirements, MDOT MTA is completing physical inspections at a rate of 25% of facilities over a four-year period starting in 2018.

Transit Asset Management – MDOT MTA Guideway Performance Targets

% of guideway under performance restriction			
Mode	2017 Target	2018 Target	2019 Target
MARC	3.5%	3.5%	3.5%
Metro	3.5%	3.5%	3.5%
Light Rail	5.8%	5.8%	5.8%



Transit Asset Management – Tier II² Performance Targets

% of vehicles at or past their Useful Life Benchmark		
Asset Class	% at or past Useful Life Benchmark (Current Performance)	2019 Target
bus	40.7%	40.7%
cutaway bus	52.3%	52.3%
automobile	66.7%	66.7%
van	85.4%	85.4%
trucks and other rubber tire vehicles	50.0%	50.0%
administrative facility	40.9%	40.9%
combined administrative/ maintenance facility	11.1%	11.1%
maintenance facility	21.1%	21.1%
passenger/parking	25.0%	25.0%



² MDOT MTA is overseeing asset management for 22 sub-recipients (two Tier I agencies and 20 Tier II agencies). Tier II providers are those transit operators that do not operate rail fixed-guideway public transportation systems and have either 100 or fewer vehicles in fixed-route revenue service during peak regular service or 100 or fewer vehicles in general demand response service during peak regular service hours. The Baltimore region has no locally operated Tier I agencies. The LOTS (locally operated transit system) agencies are the Tier II agencies in the Baltimore region.

Highway Safety – Regional Performance Targets

The FHWA’s final rule established five performance measures for state DOTs and MPOs to use to carry out the Highway Safety Improvement Program (HSIP). MDOT and the BRTB coordinated on a methodology using crash data to develop regional targets. The source for all fatality data is the most recently available NHTSA Fatality Analysis Reporting System (FARS) data. Serious injury data were obtained through the state’s crash data system. Compliant with the final rule, the methodology uses 5-year rolling averages for each of the measures.

The rightmost column in the table below shows 2030 “TZD” targets. This refers to the state’s and the region’s continued commitment to the concept of “Toward Zero Deaths.” While MDOT and the BRTB have adopted short-term yearly highway safety targets in accordance with regulatory guidance and advice received by the FHWA, both organizations nonetheless maintain their long-term commitment to achieving zero deaths on the state’s and the region’s highways. Consistent with the state’s Highway Safety Improvement Plan, the 2030 TZD targets are half the 2008 baseline targets.

Measures related to funding under the Highway Safety Improvement Program (HSIP)					
Measure	2008 Baseline	2016 Actual	2017 Actual	2015-2019 Target	2030 TZD Target
Number of fatalities	242	228	230	184	121
Number of serious injuries	1,868	1,432	1,678	1,211	934
Fatality rate per 100 million VMT	0.93	0.83	0.83	0.70	0.47
Serious injury rate per 100 million VMT	7.21	5.23	6.05	4.62	3.60
Number of non-motorized (ped/ bike) fatalities and serious injuries	286	342	366	222	143



Unified Urbanized Area Performance Targets Related to Traffic Congestion

The Baltimore region is classified as a nonattainment area for the 8-hour ozone standard. As such, the region must work to ensure it maintains conformity with the state's air quality plan. The Congestion Mitigation and Air Quality Improvement (CMAQ) program provides funding for transportation programs and projects that reduce air pollution and mitigate congestion in the transportation system in nonattainment areas.

The FHWA's final rule established three performance measures for state DOTs and MPOs to use to report on traffic congestion to carry out the CMAQ program. This final rule requires state DOTs and MPOs to coordinate and report on a single unified set of performance targets for each of the measures for the urbanized area.

These three measures are:

1. annual hours of peak-hour excessive delay (PHED)
2. percentage of non-single-occupancy (non-SOV) travel
3. on-road mobile source emission reductions.

The PHED measure represents the annual hours of peak-hour excessive delay that occur within an urbanized area on the National Highway System (NHS). The threshold for excessive delay is based on the travel time at 20 miles per hour or 60% of the posted speed limit travel time, whichever is greater, and is measured in 15-minute intervals. Peak travel hours are defined as 6-10 a.m. local time on weekday mornings; the weekday afternoon period is 3-7 p.m. or 4-8 p.m. local time, providing flexibility to State DOTs and MPOs. MDOT calculated the PHED values by uploading posted speed limit data on segments of the NHS in the Baltimore urbanized area into a tool in the Regional Integrated Transportation Information System (RITIS).

The non-SOV travel measure is the percentage of non-SOV vehicles traveling within an urbanized area, calculated using American Community Survey (ACS) commuting (journey to work) data from the U.S. Census Bureau.

The on-road mobile source emissions measure tracks the total emission reductions attributed to projects funded through the CMAQ program. Total emissions reduction is calculated by summing 2- and 4-year totals of emissions reductions of an applicable criteria pollutant and precursor, in kilograms per day, for all projects funded with CMAQ funds.

In accordance with the final rule, MDOT coordinated with the BRTB and the Transportation Planning Board (MPO for the Washington, DC area) on methods and values for unified 2-year and 4-year targets for the Baltimore urbanized area.



The table below shows the unified performance targets for the three CMAQ-related measures for the Baltimore urbanized area.

Measures related to funding under the Congestion Mitigation and Air Quality Improvement (CMAQ) Program			
Measure	2017 Baseline	2-year Targets (2018-2019)	4-Year Targets (2018-2021)
Annual per capita hours of peak-hour excessive delay (PHED)	20.2 hours	<21.8 hours	<22.6 hours
Percentage of non-SOV (single-occupancy vehicle) travel	24.85%	24.85%	24.85%
Reduction of VOC (kg/day)	6.19	6.59	7.87
Reduction of NOx (kb/day)	83.23	88.57	123.39

Note that the federal rule does not require MPOs to set a 2-year target for the PHED measure (only state DOTs are required to do so). However, to maintain consistency, the BRTB chose to show a 2-year target for the PHED measure.



Regional Pavement and Bridge Condition Performance Targets

The FHWA’s final rule established six performance measures for state DOTs and MPOs to use to assess the performance of the NHS under the National Highway Performance Program (NHPP). These include four measures of pavement condition and two measures of bridge condition. MDOT and the BRTB coordinated on a methodology for developing 2- and 4-year targets for the Baltimore region.

Pavement condition is based on a calculation using measures of international roughness index (IRI), cracking, and rutting or faulting. A pavement section condition rating (good, fair, poor) is based on the worst measure (IRI, cracking, rutting or faulting) for the section.

Bridge condition is based on National Bridge Inventory (NBI) condition ratings for items 58 - Deck, 59 - Superstructure, 60 - Substructure, and 62 - Culvert. Condition is determined by the lowest rating of deck, superstructure, substructure, or culvert. If the lowest rating is greater than or equal to 7, the bridge is classified as good; if is less than or equal to 4, the classification is poor. (Bridges rated below 7 but above 4 will be classified as fair; the final rule does not include a performance measure related to fair condition.) Deck area is computed using NBI items 49 - Structure Length and 52 - Deck Width or 32 - Approach Roadway Width (for some culverts).

The pavement and bridge condition targets adopted by the BRTB are based on projecting current conditions out to the target years, considering planned and programmed maintenance. The targets do not necessarily represent what the BRTB would like to accomplish with respect to pavement and bridge conditions. The results of this target setting may be considered as a factor in redirecting funds if deemed appropriate.

Measures related to pavement and bridge conditions			
Measure	Baseline	2-Year Targets (2018-2019)	4-Year Targets (2018-2021)
Percentage of NHS interstate pavement in good condition (2016 baseline)	63.8%	60.0%	60.0%
Percentage of NHS interstate pavement in poor condition (2016 baseline)	0.4%	2.0%	2.0%
Percentage of NHS non-interstate pavement in good condition (2016 baseline)	29.7%	30.0%	30.0%
Percentage of NHS non-interstate pavement in poor condition (2016 baseline)	8.6%	7.0%	8.0%
Percentage of NHS bridges in good condition (2017 baseline)	29.7%	20.0%	20.0%
Percentage of NHS bridges in poor condition (2017 baseline)	5.0%	3.0%	5.0%

Regional Performance Targets Related to Travel Time Reliability

The FHWA’s final rule established three performance measures for state DOTs and MPOs to use to assess the performance of the NHS under the National Highway Performance Program (NHPP). These include two measures related to Level of Travel Time Reliability (LOTTR)—(1) percentage of person-miles traveled on the Interstate System that are reliable and (2) percentage of person-miles traveled on the non-interstate NHS that are reliable—as well as a Truck Travel Time Reliability (TTTR) Index: ratio of Interstate System mileage indicating reliable truck travel times.

Level of Travel Time Reliability (LOTTR) compares the time it takes to travel segments of the NHS in congested conditions (as shown by the 80th percentile time) relative to the time it takes to make a trip in “normal” conditions (as shown by the 50th percentile time). If the 80th percentile travel time divided by the 50th percentile travel time is less than 1.5, then travel time is considered to be reliable. As an example, traffic that takes 45 minutes to travel a segment that in normal conditions takes 30 minutes results in a ratio of 1.5. This is the threshold below which travel times are considered to be “reliable.” This measure uses data from FHWA’s National Performance Management Research Data Set (NPMRDS) or equivalent. Data are collected in 15-minute segments during all time periods between 6 a.m. and 8 p.m. local time.

The TTTR index compares the time it takes trucks to travel segments of the NHS in congested conditions (as shown by the 95th percentile time) relative to the time it takes to make a trip in “normal” conditions (as shown by the 50th percentile time). The TTTR ratio is generated by dividing the 95th percentile time by the normal time (50th percentile) for each segment. For example, say a truck takes 56 minutes to travel a segment of the NHS that normally takes 30 minutes. This translates into a ratio of 56 minutes / 30 minutes, or 1.87. Reporting for purposes of calculating the TTTR index is divided into five periods: morning peak (6-10 a.m.), midday (10 a.m. - 4 p.m.) and afternoon peak (4-8 p.m.) Mondays through Fridays; weekends (6 a.m. - 8 p.m.); and overnights for all days (8 p.m. - 6 a.m.). The TTTR index is generated by multiplying each segment’s largest ratio of the five periods by its length, then dividing the sum of all length-weighted segments by the total length of Interstate.

MDOT and the BRTB coordinated on a methodology for developing 2- and 4-year targets for the Baltimore region.

The table below shows the regional performance targets related to travel time reliability.

Measures related to travel time reliability			
Measure	2017 Baseline	2-year Targets (2018-2019)	4-Year Targets (2018-2021)
LOTTR (Interstate) measure: Percentage of person-miles traveled on the Interstate System that are reliable	71.5%	72.1%	72.1%
LOTTR (non-Interstate) measure: Percentage of person-miles traveled on the non-Interstate NHS that are reliable	82.0%	not applicable *	81.7%
TTTR Index: Ratio of Interstate System mileage indicating reliable truck travel times	1.87	1.87	1.88

* For the first performance period only, FHWA does not require state DOTs and MPOs to set a 2-year target for the LOTTR non-interstate measure.

Future Performance Monitoring

In cooperation with the Maryland Department of Transportation and its modal agencies, as well as its other state agency partners, the BRTB will continue to monitor the performance of the region's transportation systems throughout the life of this update of the plan.

The BRTB will use the established targets to help in identifying strategies and in making investment decisions about programs and projects.

