2022 CMMPO System Performance Report

April 2021 – March 2022

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Introduction

The Central Massachusetts Metropolitan Planning Organization's (CMMPO) System Performance Report summarizes the planning area's performance on regionally-meaningful indicators that reflect the condition of various aspects of the transportation network. It also serves as a communication tool to an external audience of interested stakeholders while also providing a transparent overview on how transportation investments are made in the CMMPO region. The identification of representative measures and the selection of appropriate targets in this report originate from federal requirements as well as regionally-customized priorities.

This document provides an overview on the CMMPO's progress towards meeting the federal requirements on Performance Management for both highway and transit and, in addition, provides a summary of the regionally-customized significant indicators for performance.

Evolution of Performance-Based Planning and Programming

Performance-Based Planning and Programming (PBPP) refers to a transportation agency's application of performance management in their ongoing planning and programming processes. The requirements for PBPP were initially federally-legislated through the Moving Ahead for Progress in the 21st Century (MAP-21) and subsequently reaffirmed in the Fixing America's Surface Transportation Act (FAST Act) and, most recently, the Bipartisan Infrastructure Law (BIL). These Acts have transformed the federal-aid highway program by establishing requirements for performance management to ensure the most efficient investment of federal transportation funds that support the following seven National Goals:

1. Safety
2. Infrastructure Condition
3. Congestion Reduction
4. System Reliability
5. Freight Movement and Economic Activity
6. Environmental Sustainability
7. Reduced Project Delays

In addition to the federal requirements for MPOs to integrate PBPP into their transportation processes, MPOs are also required to adhere to the Continuing, Cooperative, and Comprehensive (3C) Metropolitan Transportation Planning Progress. For MPOs, this includes a range of activities and products that address a number of federal Planning Emphasis Areas undertaken by a transportation agency together with other agencies, stakeholders, and the public. The Planning Emphasis Areas that receive staff focus are – 1) Safety, 2) Security, 3) State

of Good Repair, 4) Congestion, 5) Multimodal Transportation, 6) Promoting Sustainability, 7) Equity, 8) Economic Vitality and Freight Movement, 9) Stormwater Management & Infrastructure Resiliency and 10) Travel & Tourism. These emphasis areas are addressed when the CMMPO is developing strategies, projects, plans or initiatives including:

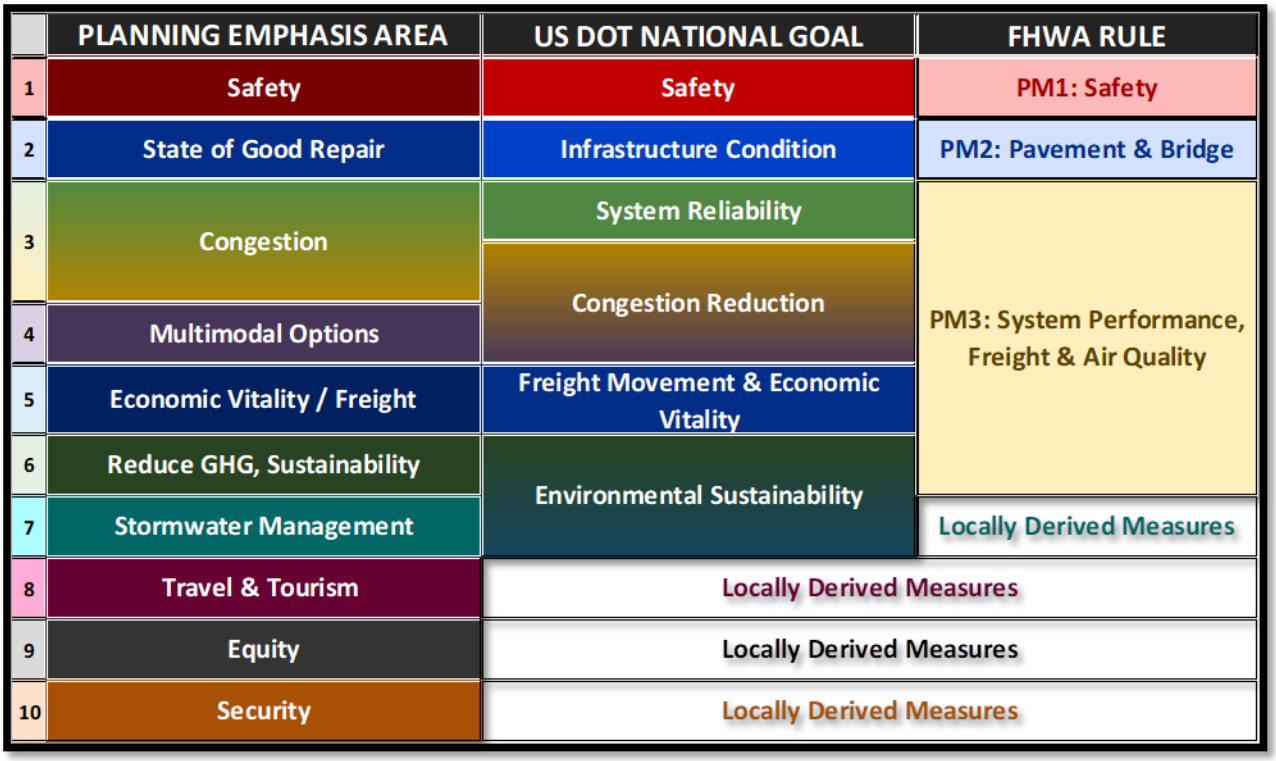
- Long-Range Transportation Plans (LRTPs)
- Other plans and processes including those that are federally-required, such as Strategic Highway Safety Plans, Asset Management Plans, the Congestion Management Process
- Transit Agency Asset Management Plans and Transit Agency Safety Plans as well as others that are not required
- Programming documents, including state and metropolitan Transportation Improvement Programs (STIPs and TIPs)

By fully considering and addressing the listed planning emphasis areas in all aspects of the transportation process, the CMMPO has been able to create more balanced and holistic transportation products for the region. Similarly, the goal of PBPP is to ensure that transportation investment decisions—both long-term planning and short-term programming—are based on the ability to meet established goals. This System Performance Report demonstrates how the CMMPO has blended the federal requirements for PBPP while addressing federal emphasis areas to develop an ongoing, regionally-customized Performance Management Program that contributes to meeting transportation goals on the regional, state and federal levels.

Putting it All Together: Meeting the National Goals

Figure 1 shows a depiction of the CMMPO's Performance Management Program. The CMMPO has accepted MassDOT's suggestion of developing goals, targets and objectives for each of the federal Planning Emphasis Areas that are listed on the left side of the figure. In the middle of the figure are six of the seven* National Goals of the US Department of Transportation. These National Goals are shown adjacent to related emphasis areas that share the same objectives. The Federal Rules that establish an implementation strategy for specific measures, targets and goals that must be reached between the MPO and state DOT are located on the right of the figure. Again, these rules are shown adjacent to the related National Goals and emphasis areas. The blank fields in the figure show where there are no Federal Rulings that require MPOs to measure specific data and collaborate on target setting. It is in these areas of Stormwater Management & Infrastructure Resiliency, Travel & Tourism, Equity and Security where the CMMPO continues to work to develop locally-meaningful performance measures to track progress towards specific goals.

Figure 1 – CMMPO Performance Management Program



	PLANNING EMPHASIS AREA	US DOT NATIONAL GOAL	FHWA RULE
1	Safety	Safety	PM1: Safety
2	State of Good Repair	Infrastructure Condition	PM2: Pavement & Bridge
3	Congestion	System Reliability	PM3: System Performance, Freight & Air Quality
4	Multimodal Options	Congestion Reduction	
5	Economic Vitality / Freight	Freight Movement & Economic Vitality	
6	Reduce GHG, Sustainability	Environmental Sustainability	
7	Stormwater Management		Locally Derived Measures
8	Travel & Tourism	Locally Derived Measures	
9	Equity	Locally Derived Measures	
10	Security	Locally Derived Measures	

**The seventh National Goal is Reduced Project Delivery Delays. This goal is to eliminate delays in the project development and delivery process, including reducing regulatory burdens and improving agency work practices.*

Part 1: Federally-Required Highway Performance Measures

This report addresses each planning emphasis area, how they relate to Performance Management Goals, and describes progress towards each of the goals. The first section contains the federally-required rules of PM1, PM2, and PM3 within the Safety, State of Good Repair, and Congestion emphasis areas. **Figure 2** shows the complete list of goals and measures for each FHWA rule.

Figure 2 Federally-Required Highway Performance Goals & Measures

EMPHASIS AREA	GOALS	MEASURES
Safety (PM1)	Reduce # and rate of fatal and serious injury crashes in the region.	# of fatalities
		Rate of fatalities per 100 million VMT
		# of serious injuries
		Serious injury rate per 100 million VMT
		# of non-motorized fatalities and serious injuries
State of Good Repair (PM2)	To maintain the highway infrastructure asset system in a state of good repair.	% of Interstate NHS pavement in good condition
		% of non-Interstate NHS pavement in good condition
		% of Interstate NHS pavement in poor condition
		% of non-Interstate NHS pavement in poor condition
		% of NHS bridges by deck area classified as good condition
		% of NHS bridge by deck area classified as poor condition
Congestion (PM3)	To achieve a significant reduction in congestion on the Nation Highway System.	Level of travel time reliability (LOTTR) on both Interstate and non-Interstate NHS
		Level of truck travel time reliability (TTTR) on both Interstate and non-Interstate NHS
		% on non-single occupancy vehicle travel (SOV)
		Peak hour excessive delay (PHED)
		Emissions reduction

PLANNING EMPHASIS AREA	US DOT NATIONAL GOAL	FHWA RULE
Safety	Safety	(PM1) Highway Safety Performance Management

Safety Performance Measures Introduction

The CMMPO is supportive of the vision to eliminate fatalities and serious injuries on the National Highway System (NHS) by working collaboratively on strategies with local stakeholders, neighboring MPOs and MassDOT. Safety is a top priority on the federal, state and regional levels. The Federal Safety Performance Management Measures regulation PM1 supports the Highway Safety Improvement Program (HSIP) and requires State Departments of Transportation and MPOs to set HSIP targets for five safety performance measures.

Most recently, the CMMPO voted to adopt MassDOT's calendar year (CY) 2022 highway safety targets for the five federally-required highway safety performance measures at a meeting held on February 16, 2022. These safety performance measures are:

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 and non-motorized serious injuries

FHWA requires states to submit the five safety performance targets annually in an HSIP report by August 31st of each year. MPOs are required to establish targets that either support the state targets or, alternatively, set their own quantifiable targets by February 28th of the calendar year for which the targets apply. Should the MPO decide to set its own targets, they would have to submit methodologies and data that supports their targets to the state DOT.

Whereas state DOTs submit their targets to FHWA via the HSIP report, MPOs must present the safety measures and targets in the Long-Range Transportation Plan (LRTP) and Transportation Improvement Program (TIP). The LRTP will describe the progress made since the baseline data was established while the TIP will provide a description of the anticipated effect of the TIP toward achieving performance targets identified in the LRTP.

Massachusetts Highway Safety Performance Measures CY 2022

FHWA requires five-year rolling averages when setting safety performance targets. For the initial target setting year of 2018, targets were compared to the annual rolling averages for

2014-2018. Targets were developed by estimating safety measure trend values based on linear trend lines that were calculated using the five-year rolling average from 2008-12 to 2014-18.

Figure 3 is a list of the current statewide rolling averages for each performance measure for the CY 2022 targets. Also shown are the corresponding CMMPO CY 2022 targets.

Figure 3
2022 Massachusetts Statewide & CMMPO Highway Safety Performance Targets

PM1 Highway Safety Performance Measure	2022 Statewide Safety Measure Target (Expected 2018-22 Rolling Average)	2022 CMMPO Safety Measure Target (Expected 2018-22 Rolling Average)
Number of fatalities	340	32
Rate of fatalities per 100 million VMT	0.56	0.58
Number of serious injuries	2,504	238
Rate of serious injuries per 100 million VMT	4.11	4.23
Number of non-motorized fatalities and non-motorized serious injuries	471	28

CMMPO Highway Safety Performance Trends

MassDOT and the CMMPO will continue to cooperatively strategize planning and programming at the state and MPO levels to support improvements in highway safety outcomes. The CMMPO supports the state's highway safety targets and the following five charts in **Figures 4 - 8** show that the CMMPO's Safety Performance Trends are similar to the state's Safety Performance Trends.

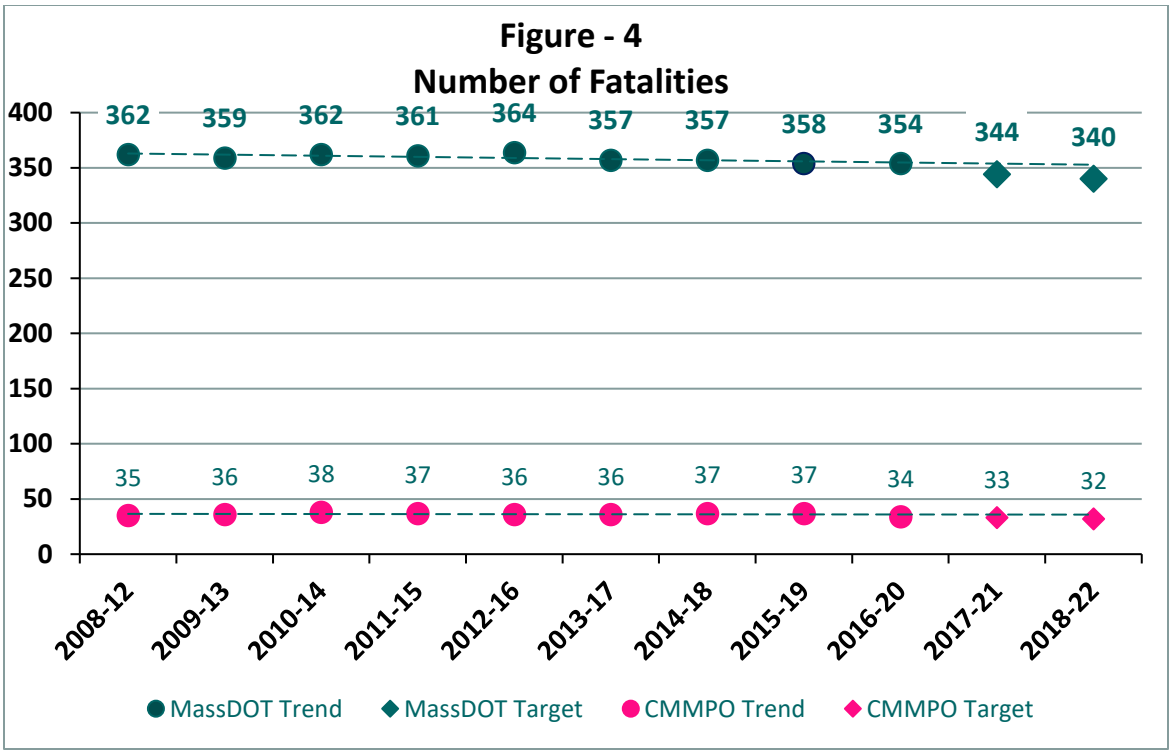


Figure - 4
Number of Fatalities
400
350
300
250
200
150
100
50
0
362 359 362 361 364 357 357 358 354 344 340
35 36 38 37 36 36 37 37 34 33 32
2008-12
2009-13
2010-14
2011-15
2012-16
2013-17
2014-18
2015-19
2016-20
2017-21
2018-22
MassDOT Trend
MassDOT Target
CMMPO Trend
CMMPO Target

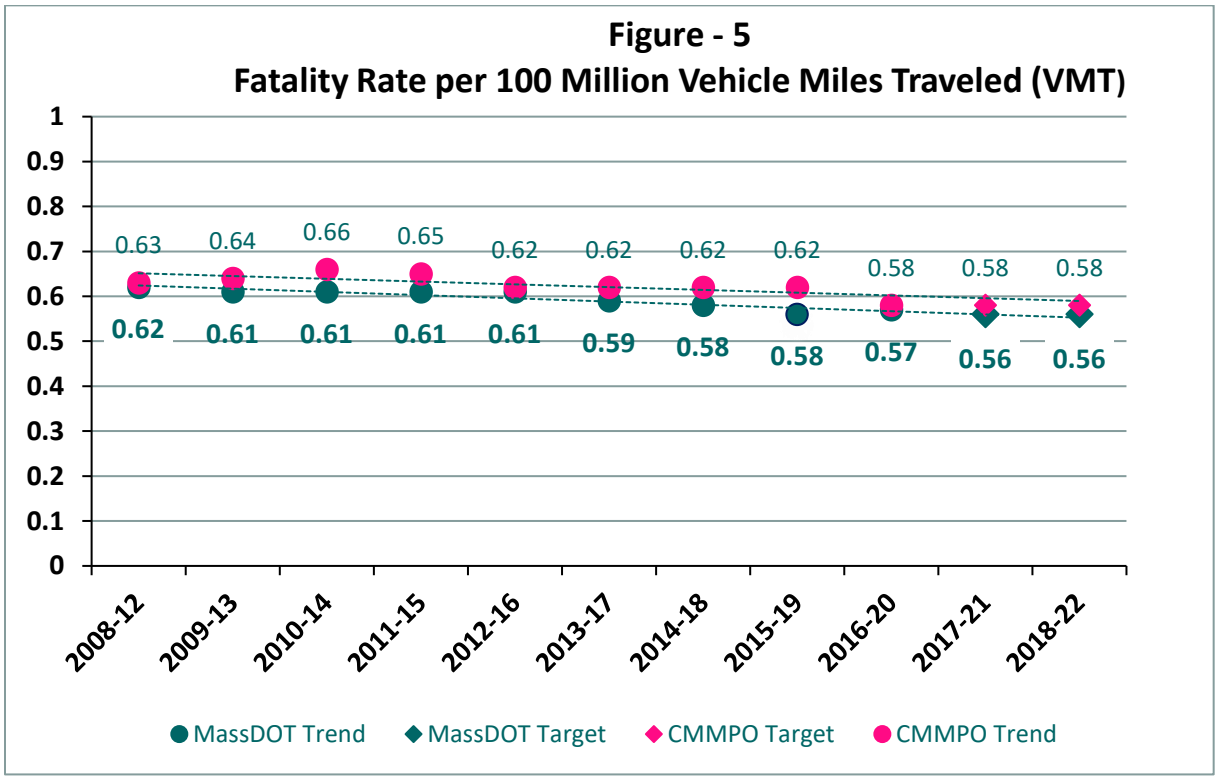


Figure - 5
Fatality Rate per 100 Million Vehicle Miles Traveled (VMT)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0.63 0.64 0.66 0.65 0.62 0.62 0.62 0.62 0.58 0.58 0.58
0.62 0.61 0.61 0.61 0.61 0.59 0.58 0.58 0.57 0.56 0.56
2008-12
2009-13
2010-14
2011-15
2012-16
2013-17
2014-18
2015-19
2016-20
2017-21
2018-22
MassDOT Trend
MassDOT Target
CMMPO Target
CMMPO Trend

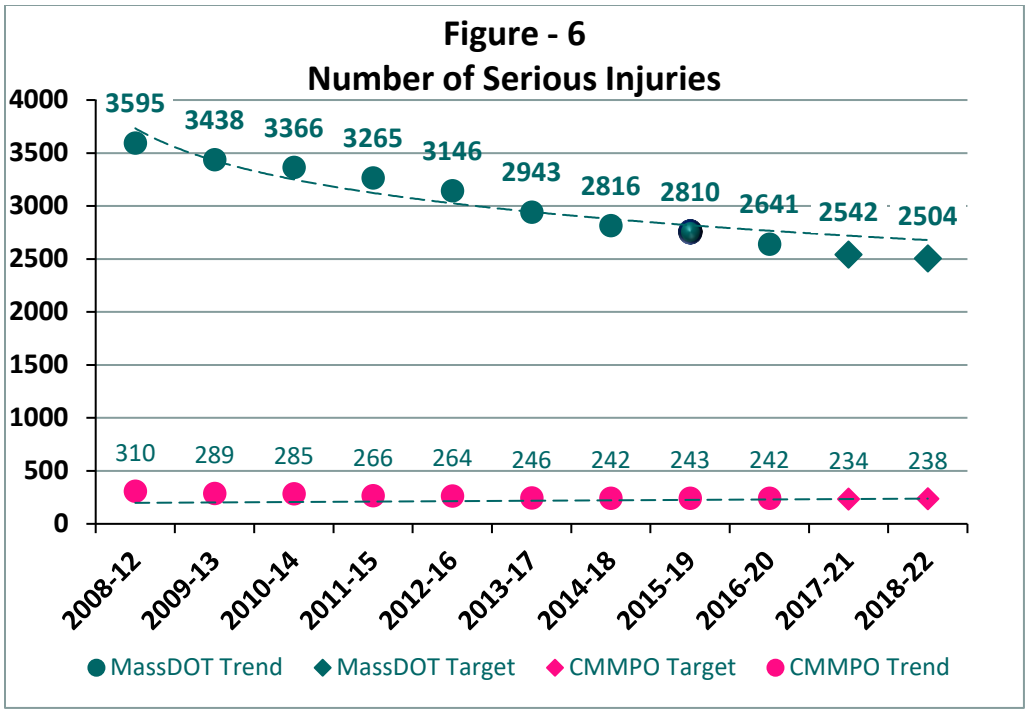


Figure - 6
Number of Serious Injuries
4000
3500
3000
2500
2000
1500
1000
500
0
3595
3438
3366
3265
3146
2943
2816
2810
2641
2542
2504
310
289
285
266
264
246
242
243
242
234
238
2008-12
2009-13
2010-14
2011-15
2012-16
2013-17
2014-18
2015-19
2016-20
2017-21
2018-22
MassDOT Trend
MassDOT Target
CMMPO Target
CMMPO Trend

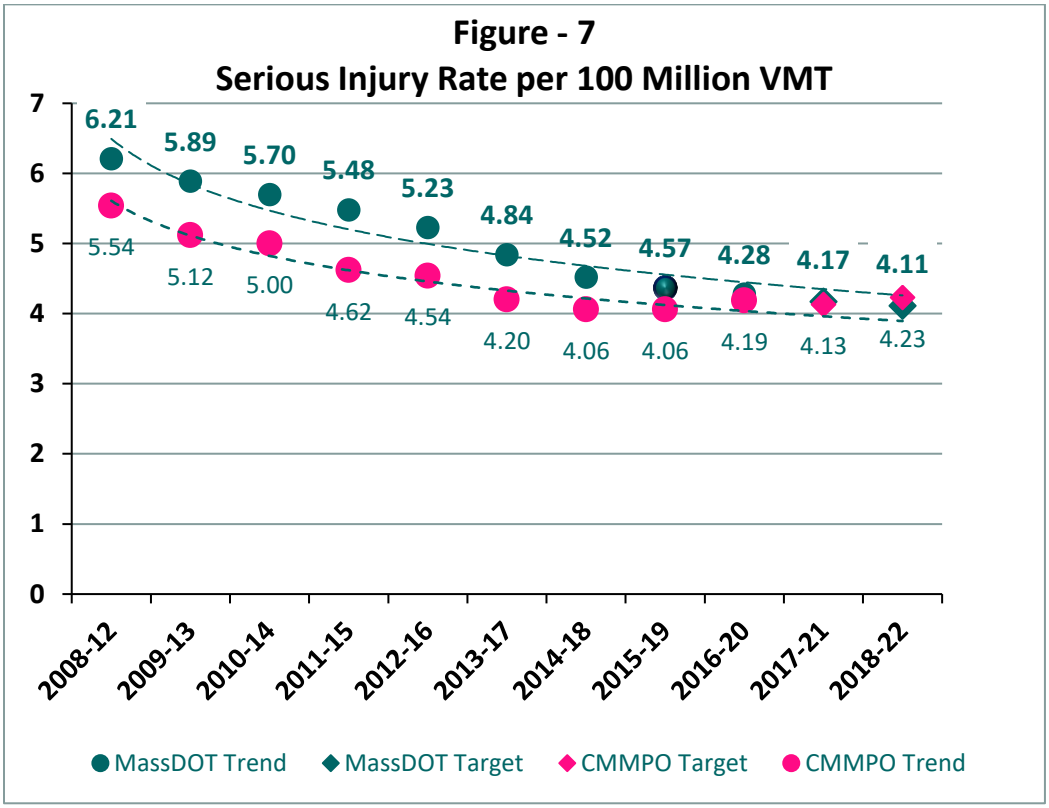
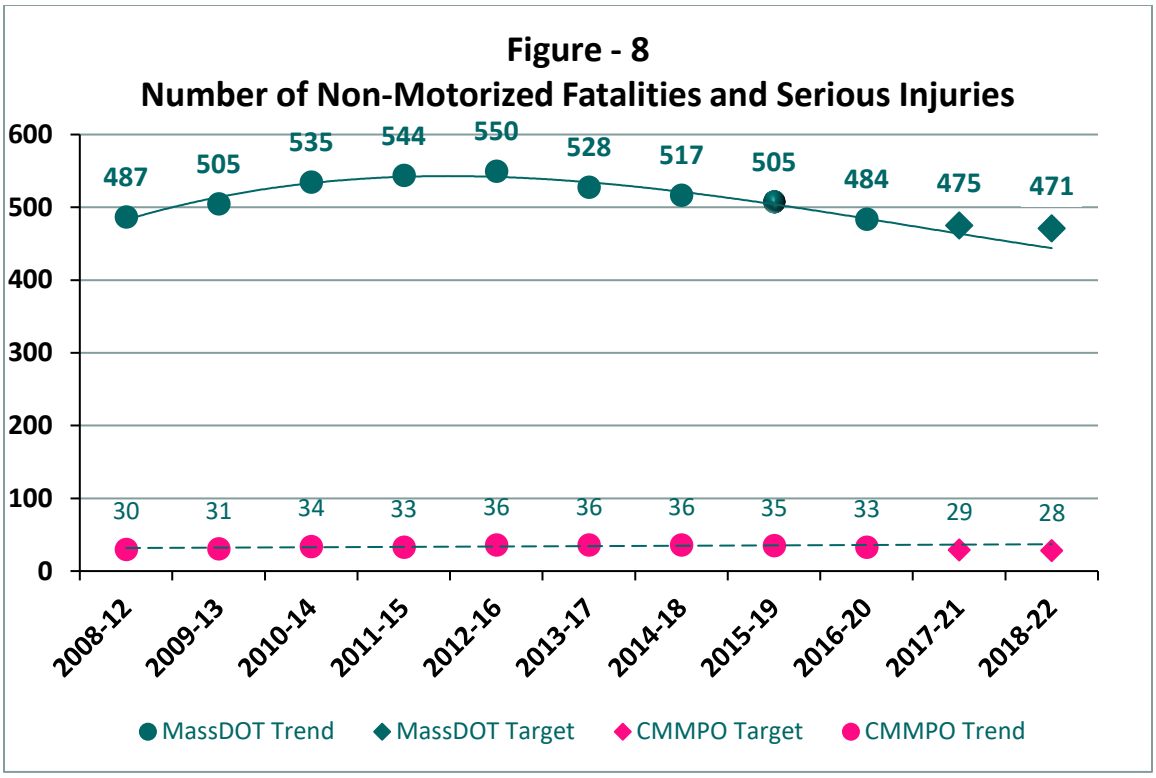


Figure - 7
Serious Injury Rate per 100 Million VMT
7
6
5
4
3
2
1
0
6.21
5.89
5.70
5.48
5.23
4.84
4.52
4.57
4.28
4.17
4.11
5.54
5.12
5.00
4.62
4.54
4.20
4.06
4.06
4.19
4.13
4.23
2008-12
2009-13
2010-14
2011-15
2012-16
2013-17
2014-18
2015-19
2016-20
2017-21
2018-22
MassDOT Trend
MassDOT Target
CMMPO Target
CMMPO Trend



CMMPO Highway Safety Performance Result

FHWA guidance indicates to start with a trend line as the target for CY 2018, then consider external factors and planned implementation in order to set targets for the following performance periods. As previously shown in **Figures 4 - 8**, the CMMPO is anticipated to either follow the Highway Safety Performance trend for each measure or improve for CY 2022, except for serious injuries and injury rate.

The results in **Figure 9** are the federally-required Safety Highway Performance measures and targets developed by MassDOT and adopted by the CMMPO. The green lights indicate the CMMPO or state is doing well; conversely a red light would indicate poor performance. As the figure shows, the results are trending in the desired direction for all five measures for the State. As for the CMMPO, the fatalities, fatality rates, and non-motorized fatalities and serious injuries are trending down, but serious injuries and injury rate is trending up.

Figure 9 CMMPO Highway Safety Performance Results

	MEASURE	PAST STATUS	5-YEAR ROLLING AVERAGE TARGET (2018-20222)	CMMPO TREND	STATE TREND	GOAL
SAFETY (PM1)	Number of fatalities		340 Fatalities			*Reduce number and rate of fatal and serious injury crashes in the region. Move towards Vision Zero Deaths*
	Rate of fatalities per 100 million VMT		0.56 Fatality Rate per 100 million VMT			
	Number of serious injuries		2,504 Serious Injuries			
	Serious injury rate per 100 million VMT		4.11 Serious Injury Rate per 100 million VMT			
	Number of non-motorized fatalities and serious injuries		471 Combined Non-Motorized Fatalities & Serious Injuries			

PLANNING EMPHASIS AREA	US DOT NATIONAL GOAL	FHWA RULE
State of Good Repair	Infrastructure Condition	(PM2) Pavement & Bridge

State of Good Repair Introduction

The CMMPO has been measuring the infrastructure condition of the region's highways, sidewalks, ADA ramps and pavement for many years. Working with MassDOT, the CMMPO has agreed to support the state's targets for Pavement and Bridge Conditions to fully comply with FHWA Rule PM2. This section of the System Performance Report includes an update on the most current performance outcome of the federally-required Bridge and Pavement measures.

Bridge and Pavement Performance Measures (PM2)

The FHWA Rule PM2 is only applicable for bridge and pavement assets on the NHS. At the October 17, 2018 meeting, the CMMPO adopted the State DOTs two and four-year targets for the percentage of asset class in good condition and percent of asset class in poor condition. In CY 2020, MassDOT conducted a mid-cycle performance review of the targets and decided to not change the 2022 targets. The amount of NHS pavement miles and bridge deck area under the CMMPO's jurisdiction is minimal. As such, the CMMPO is not responsible for the performance of these assets. Accordingly, the data included in this section is only presented at the statewide level and not compared with the regional level.

NHS Bridge Inventory

- NHS bridges constitute 44% of Massachusetts National Bridge Inventory (NBI) structures, and 70% of the deck area.
- As shown in **Figure 10**, MassDOT is responsible for nearly all of the bridges in the state.
- There are only five (5) municipally-owned NHS bridges in the CMMPO region.

Figure 10

Distribution of Ownership of NHS Bridges in Massachusetts			
Owner	**By Count**	**By Area (square feet)**	**% of Ownership**
MassDOT	2178	28,619,606	97%
Municipality	72	894,270	3%
Totals	2250	29,513,876	100%

NHS Bridge Condition Measure

Historically, the primary MassDOT Highway Division measure for bridge performance has been the number of Structurally Deficient bridges (SD) within the state. Federal legislation required that states report the condition of National Highway System (NHS) bridges by the percentage of

deck area on structurally deficient structures compared with cumulative deck area of the full system, with a target not to exceed 10% of all deck area.

This measure incorporates structure size in the analysis of bridge performance and uses NBI condition ratings for Deck, Superstructure, Substructure, and Culvert. Condition is determined by the lowest rating of these items. If the lowest rating is greater than or equal to 7, the bridge is classified as Good; if it is less than or equal to 4, the bridge is classified as Poor.

The following formula is how the percentage of good and poor bridge conditions is calculated:

$$\%\ \text{Good/Poor Bridge Condition} = \frac{\text{Total bridge area in good/poor condition}}{\text{Total bridge area}}$$

NHS Bridge Condition Targets

The bridge condition targets should be determined from asset management analysis and procedures and reflect investment strategies that work toward achieving a state of good repair over the life cycle of assets at minimum practicable cost. State DOTs are required under new regulations to develop an asset management plan which includes the statewide condition of bridges.

Federal regulations state that the Poor condition threshold is 10%. Above that threshold, state DOTs must obligate a minimum amount of NHPP funds to on-systems bridges. **Figure 11** shows the state's targets for NHS Bridge Condition and the current condition reported in the 2020 Mid Performance Period Progress Report. The current condition of Good condition bridges is just above the 2020 target, but just below the 2022 target. The current condition of Poor condition bridges is above both the 2020 and 2022 targets.

Figure 11

State Targets for NHS Bridge Condition			
Measure	**Current Condition**	**2020**	**2022**
% Good	15.6	15	16
% Poor	13.5	13	12

Pavement

This rule establishes measures for State DOTs and MPOs to use to carry out the NHPP and to assess progress on achieving condition targets for NHS pavements. State DOTs and MPOs must use Highway Performance Monitoring System (HPMS) data used by FHWA to calculate Good/Poor metrics and measures. HPMS pavement data collection requirements were also revised to require an increased, comprehensive collection of data for NHS routes.

Massachusetts Statewide NHS Pavement Inventory

- NHS constitutes 14% of statewide accepted lane mileage
- 69.9% under MassDOT jurisdiction
- 25.7% under municipal jurisdiction
- Remaining owned by DCR, MassPort, and Federal
- MassDOT manages capital investment for state-owned portions of the NHS, collects condition data on entire system
- In the CMMPO region, there are 483 NHS lane miles, which makes up 10% of the total NHS lane mileage in the state

Pavement Condition Measures

This rule requires the state to set two and four-year targets for the percent of pavement in Good and Poor conditions on both the Interstate and Non-Interstate NHS. The measure is aggregated by lane miles.

Though based on similar metrics, the federal measure of International Roughness Index (IRI) differs from the Pavement Serviceability Index (PSI) used historically by MassDOT:

- Roughly, pavement that is "Good" in the FHWA IRI measure is "Excellent" in PSI.
- Some of the "Poor" in PSI is rated "Fair" by the FHWA IRI measure.

Non-Interstate NHS targets for the first and second performance periods (2020 & 2022) will be assessed using IRI only, and allow for phased implementation of full distress measures. **Figure 12** demonstrates the performance measures for pavement.

Figure 12

Pavement Condition Measures	
Interstate System	**Non-Interstate NHS**
% of pavement of the Interstate System in **Good** condition	% of pavement of the non-Interstate NHS in **Good** condition
% of pavement of the Interstate System in **Poor** condition	% of pavement of the non-Interstate NHS in **Poor** condition

Pavement Condition Targets

The setting of pavement condition targets for the first performance review period is challenging given the lack of historical data for the new measure. MassDOT's approach for all performance measures is to use past indicators for a trend, set conservative targets, and review at the mid performance period (2020).

For the first attempt at setting targets for pavement, MassDOT chose conservative targets to account for the risks associated with the new measure (single year of data, unknown variability).

The mid-cycle performance review period during 2020 was anticipated to provide three years of condition data upon which future targets can more accurately be determined. During the mid-performance review period MassDOT decided to keep the 2022 targets the same. **Figure 13** and **Figure 14** show the state targets and current condition for both Interstate and Non-Interstate NHS pavement from the 2020 Mid Performance Period Progress Report.

Figure 13

State Targets for Interstate NHS Pavement			
Measure	**Current Condition**	**2020**	**2022**
% Good	75.6	70	70
% Poor	0.1	4	4

Figure 14

State Targets for Non-Interstate NHS Pavement			
Measure	**Current Condition**	**2020**	**2022**
% Good	34.1	30	30
% Poor	31.4	30	30

CMMPO State of Good Repair Results

Figure 15 shows the CMMPO's State of Good Repair results based on the current condition from 2020. The targets for these measures were most recently analyzed in 2020 during the mid-cycle performance review. As there are no past status reviews the lights are colored silver, meaning there is no past data. The yellow lights in the CMMPO trend column indicate that there are currently no trends for these measures in the CMMPO region. Using the current condition data for bridges and pavement, the red lights indicate the trends are not moving towards the 2022 target and are below the target thresholds. However, the green lights indicate a positive trend toward the established targets.

Figure 15 CMMPO State of Good Repair Results

	MEASURE	PAST STATUS	TARGET (2022) - MID PERFORMANCE TARGET REVIEW AT 2020	CMMPO TREND	STATE TREND	GOAL
STATE OF GOOD REPAIR (PM2)	% of Interstate NHS Pavement in Good Condition		70% of Non-Interstate NHS Pavement in Good Condidtion			*To maintain the highway infrastructure asset system in a state of good repair*
	% of Non-Interstate NHS Pavement in Good Condition		30% of Non-Interstate NHS Pavement in Good Condidtion			
	% of Interstate NHS Pavements in Poor Condition		4% of NHS Interstate Pavement in Poor Condition			
	% of Non-Interstate NHS Pavement in Poor Condition		30% of NHS Interstate Pavement in Poor Condition			
	% of NHS Bridges by Deck Area Classified as Good Condition		16% of NHS Bridges by Deck Area in Good Condition			
	% of NHS Bridges by Deck Area Classified as Poor Condition		12% of NHS Bridges by Deck Area in Poor Condition			

PLANNING EMPHASIS AREA	US DOT NATIONAL GOAL	FHWA RULE
Congestion	System Reliability / Congestion Reduction	(PM3) System Performance / Freight / Air Quality

Congestion Introduction

When traffic demand approaches or exceeds the available capacity of the highway system, the end result is congestion. Congestion is recognized as a problem of both local and national importance that adversely affects both the economy and quality of life. The CMMPO has been addressing congestion by monitoring specific measures that are derived from the targets and goals in the planning region's Congestion Management Process (CMP), LRTP and TIP. On the national level, congestion is being addressed with FHWA Rule PM3 that was established to improve the efficiency of the system and freight movement, and to reduce traffic congestion and emissions.

System Performance Measures (PM3)

This rule aims to measure the performance of the Interstate System and remainder of the NHS by way of five measures that are linked to reliability, congestion and emissions. For PM3, MassDOT is responsible for most of the NHS lane miles statewide; however, the CMMPO is responsible for almost 8% of NHS lane miles. At the October 17, 2018 meeting, the CMMPO voted to adopt the five statewide targets for this rule. In CY 2020, MassDOT completed a mid-cycle performance review of the PM3 targets and, based on new available data, decided to change the 2022 targets for Non-SOV Travel and Emissions Reduction. At the February 17, 2021 meeting, the CMMPO decided to adopt the new, refined statewide targets for Non-SOV and Emissions Reduction.

Reliability

- Level of Travel Time Reliability (LOTTR) on both the Interstate System and non-Interstate NHS
- Level of Truck Travel Time Reliability (TTTR) on the Interstate System

Congestion

- Percentage of non-single occupancy vehicle (SOV) travel
- Peak hour excessive delay (PHED)

Emissions

- Total reduction of on-road mobile source emissions from projects funded under the Congestion Mitigation & Air Quality (CMAQ) program

Level of Travel Time Reliability (LOTTR)

- LOTTR is based on the amount of time it takes to drive the length of a road segment and is defined as the ratio of the 80th percentile travel time of a reporting segment to a "normal" travel time (50th percentile), using data from FHWA's free National Performance Management Research Data Set (NPMRDS) or equivalent.
- Data are collected in 15-minute segments during all time periods other than 8 PM-6 AM local time. The measures are the percent of person-miles traveled on the relevant NHS areas that are reliable.
- The metric is the percentage of person-miles traveled that are "reliable."

Here are the steps used to calculate the level of travel time reliability for statewide segments on the Interstate and Non-Interstate NHS:

1. Collect travel times from the National Performance Management Research Data Set (NPMRDS)
2. Find the 50th percentile and 80th percentile times for each time period and calculate the ratio
3. If the ratio is below 1.50 for each of the time periods recorded for that road segment, the segment is "reliable"
4. The statewide metric is the percentage of the person-miles traveled that are "reliable"

Figure 16 is an example of how road segments are calculated for their reliability.

Figure 16

Level of Travel Time Reliability (LOTTR) *(Single Segment, Interstate Highway System)*		
Monday - Friday	6am – 10am	LOTTR = $\frac{44 \text{ sec}}{35 \text{ sec}}$ = 1.26
	10am – 4pm	LOTTR = 1.39
	4pm – 8pm	LOTTR = **1.54**
Weekends	6am – 8pm	LOTTR = 1.31
Must exhibit LOTTR below 1.50 during all the time periods		**Segment is not reliable**

MassDOT LOTTR Targets and CMMPO Comparison

MassDOT was unable to use multi-year trend data to assist with the initial target setting for this measure. Between 2016 and 2017, FHWA switched contractors for maintaining the NPMRDS, resulting in significant differences in data consistency between the years. Because of the

differences, FHWA had advised that state DOTs set conservative targets based on 2017 data and adjust future targets when more data became available.

Figure 17 shows the annual results for the percent of reliable segments statewide as well as in the CMMPO region. The LOTTR targets for Interstate and Non-Interstate NHS are also shown. The targets are reached for both Interstate and Non-Interstate percentages for all five (5) years of data. The percentages in 2020 are moderately higher than previous years due to the COVID-19 pandemic as people were either required to stay home or work from home, which generated less vehicles on the roadways. The following Statewide and CMMPO interstate and non-interstate percentages are from the Probe Data Analytics Suite of the Regional Integrated Transportation Information System (RITIS) website. The actual numbers reported from the 2020 Mid Performance Period Progress Report was 69.1% for Interstate and 82.4% for Non-Interstate, which both meet the targets.

Figure 17

Year	Statewide		CMMPO		Interstate Target	Non-Interstate Target
	Interstate %	Non-Interstate %	Interstate %	Non-Interstate %		
2017	70.4%	80.1%	89.7%	87.1%	68%	80%
2018	69.8%	80.4%	87.3%	89.6%		
2019	69.1%	82.8%	84.6%	88.9%		
2020*	94.4%	91.3%	99.1%	94.1%		
2021	84.2%	87.9%	96.4%	92.9%		

**COVID-19 pandemic occurred during 2020*

Truck Travel Time Reliability (TTTR)

TTTR is the amount of time it takes trucks to drive the length of a road segment. This measure is *only* calculated for the Interstate System. The following steps are used to calculate the TTTR measure:

1. Calculate the travel times from the five time periods used in this measure (**Figure 18**)
2. Find and calculate the TTTR ratio from the 50th and 95th percentile times for each time period
3. 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 the Interstate segment.

Figure 18

Level of Truck Travel Time Reliability (TTTR) *(Single Segment, Interstate Highway System)*		
Monday - Friday	6am – 10am	TTTR = $\frac{55 \text{ sec}}{35 \text{ sec}}$ = 1.57
	10am – 4pm	TTTR = 1.25
	4pm – 8pm	**TTTR = 2.52**
Weekends	6am – 8pm	TTTR = 1.2
All Days	8pm – 6am	TTTR = 1.05

MassDOT TTTR Targets and CMMPO Comparison

MassDOT was unable to use multi-year trend data to assist with the initial target setting for this measure. Between 2016 and 2017, FHWA switched contractors for maintaining the NPMRDS, resulting in significant differences in data consistency between the years. Because of the differences, FHWA had advised that state DOTs set conservative targets based on 2017 data and then adjust future targets when more data became available.

Figure 19 shows the annual results for the TTTR ratio for both statewide and CMMPO Interstate highways. The Interstate TTTR target of 1.85 is also included. For an Interstate segment to be considered reliable, the TTTR ratio must be under 1.85. As the data shows, the statewide Interstate ratio has met the target for four (4) of the five (5) years of data. For the CMMPO region, the target was met for all five (5) years. The TTTR ratio's in 2020 are well below the previous three (3) years of data due to the COVID-19 pandemic as people were either required to stay at home or work from home, which generated less vehicles on the Interstate System. The following Statewide and CMMPO interstate and non-interstate percentages are from the Probe Data Analytics Suite of the Regional Integrated Transportation Information System (RITIS) website. The actual numbers reported from the 2020 Mid Performance Period Progress Report was 1.86 Interstate TTTR, which is just above the target.

Figure 19

Year	Statewide Interstate TTTR Ratio	CMMPO Interstate TTTR Ratio	Interstate TTTR Target
2017	1.81	1.71	1.85
2018	1.88	1.79	
2019	1.84	1.77	
2020*	1.44	1.22	
2021	1.61	1.59	

**COVID-19 pandemic occurred during 2020*

Peak Hour Excessive Delay (PHED)

This measure is only applicable for Urbanized Areas (UZA) of more than 1 million people with NHS mileage in nonattainment or maintenance areas for ozone, carbon monoxide, or particulate matter. All MPOs and state DOTs must coordinate on one target if they are a part of the UZA in a nonattainment area.

- The metric for PHED indicates annual hours of excessive delay per capita on the NHS between 6am – 10am and 3pm – 7pm
- For the purpose of this measure, 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.

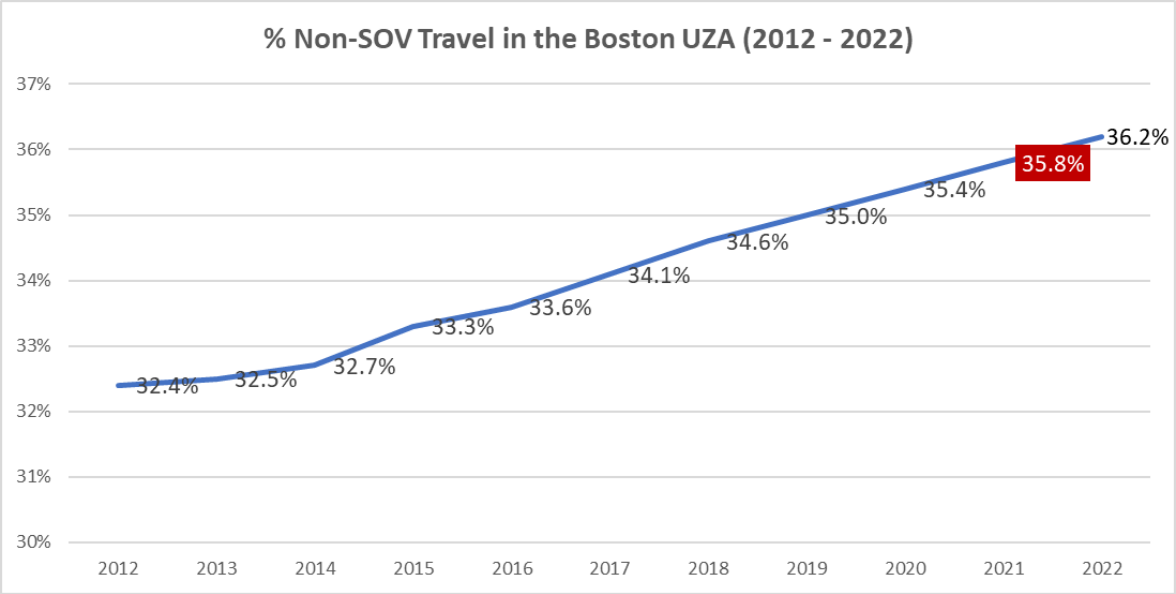
The 2017 PHED per capita for MA-NH and the Worcester MA-CT UZA was 18.3% and also served as the initial target for the first performance period. During MassDOT's mid-cycle performance review the target was not changed, the data showed a PHED of 25.6%, which does not currently meet the target.

Percentage of Non-SOV Vehicle Travel

The metric for non-SOV travel is based on the percentage of people commuting to work using a mode other than a Single Occupancy Vehicle (e.g. carpool, van, public transit, walking, bicycling or telecommuting). During the mid-cycle performance review conducted in 2020, MassDOT used new data from 2017 and 2018 that indicates the non-SOV travel percentages originally projected were exceeded. Based on the new data, a new trend line was used to revise the four-year target from 35.1% to 35.8%.

Figure 20 shows the trend line increasing each year between 2012 and 2022. The percentage highlighted in red is the new updated 2022 target for non-SOV travel. Currently, the 34.6% non-SOV travel does not meet the target, but the data in the chart indicates it is moving in the desired direction.

Figure 20



Emissions Reductions

The on-road mobile source emissions measure is calculated by summing 2 and 4-year totals of emissions reductions in kilograms per day. This calculation is done for all projects located in municipalities classified as air quality maintenance areas (Waltham, Lowell, Worcester and Springfield) or non-attainment areas (Oak Bluffs) funded with CMAQ funds.

Figure 21 shows CMAQ-funded projects included on the TIP between 2018 and 2021 that will contribute to the 2022 target. The 2022 Emissions target was updated during the 2020 mid-cycle performance review period and now includes the projects and analyses results in the figure. Within the CMMPO region, the Worcester project for signal and intersection improvements at the Holden Street, Drummond Avenue, and Shore Drive intersection estimates the highest emissions reduction for the CMAQ projects.

Figure 21 CMAQ-Eligible Projects

Year	City	MPO	Project #	Project Name	VOC Reductions (kg/day)	Nox Reductions (kg/day)	CO Reductions (kg/day)
N/A	Waltham	Boston	N/A	N/A	N/A	N/A	N/A
N/A	Lowell	Northern Middlesex	N/A	N/A	N/A	N/A	N/A
2019	Worcester	Central Mass	603251	WORCESTER- SIGNAL & INTERSECTION IMPROVEMENTS @ HOLDEN STREET, DRUMMOND AVENUE & SHORE DRIVE, INCLUDES CULVERT EXTENSION OF W-44-122, SHORE DRIVE OVER (UNNAMED) STREAM	.541	1.441	6.386
2019	Tisbury	Martha's Vineyard	607411	TISBURY- BIKE & PEDESTRIAN IMPROVEMENTS ALONG BEACH ROAD, FROM THE TERMINATION OF THE EXISTING SHARED USE PATH WESTERLY TO THE FIVE CORNERS INTERSECTION	0.003	.002	.049
2021	Oak Bluffs	Martha's Vineyard	608142	OAK BLUFFS- CONSTRUCTION OF A SHARED USE PATH ALONG BEACH ROAD, FROM THE LAGOON POND BRIDGE NORTHERLY TO THE EASTVILLE AVENUE/COUNTY ROAD INTERSECTION	.002	.006	.082
2021	Springfield	Pioneer Valley	608782	SPRINGFIELD- INTERSECTION IMPROVEMENTS AT COTTAGE STREET, INDUSTRY AVENUE AND ROBBINS ROAD	.013	.261	.013
				TOTAL	**0.559**	**1.71**	**6.53**

Congestion Results

Figure 22 summarizes how the CMMPO is currently performing in relation to the federally-required targets. A green light indicates the CMMPO or State is doing well; conversely a red light indicates poor performance. The silver lights indicate that the measure has no past data. The yellow lights indicate that a trend has yet to be established.

Figure 22 CMMPO Congestion Results

	MEASURE	PAST STATUS	TARGET (2022) - MID PERFORMANCE TARGET REVIEW AT 2020	CMMPO TREND	STATE TREND	GOAL
CONGESTION (PM3)	Level of Travel Time Reliability (LOTTR) on both Interstate and non-Interstate NHS		68% Interstate, 80% Non-Interstate			*To achieve a significant reduction in congestion on the National Highway System*
	Level of Truck Travel Time Reliability (TTTR) on Interstate NHS		1.85			
	% of non-single occupancy vehicle travel (SOV)		35.80%			
	Peak hour excessive delay (PHED)		18.30%			
	Emissions Reduction		6.53kg CO, 0.559kg VOC, and 1.71kg Nox			

Federal Highway Measures System Performance Report Card Overall Summary

Figure 23 shows the results of all federally-required highway performance measures. For Safety (PM1), all trends for the State are doing well for all five (5) measures and targets. As for the CMMPO, three (3) out of the five (5) measures and targets are doing well, with serious injuries and injury rates that are slightly higher. For this category, targets are updated annually from five-year rolling averages. The State of Good Repair (PM2) category is showing good progress in meeting the pavement targets except the NHS Interstate pavement in poor condition. As for the bridges, the 2022 targets are not being met as of the 2020 review period. The CMMPO trend has not been calculated and the past status has also not been determined. For Congestion (PM3), only the LOTTR for both Interstate and Non-Interstate is currently meeting the target.

The targets for both PM2 and PM3 were created for four (4) years (2022). In 2020, MassDOT conducted a mid-cycle performance review of the four-year targets. The State of Good Repair (PM2) targets remained the same, but a couple of the Congestion (PM3) targets were updated. Due to updated data and analysis for Non-SOV travel and emissions reduction, MassDOT decided to adjust the four-year targets.

Figure 23 - 2022 Federal Highway Measures System Performance Report Card

	MEASURE	PAST STATUS	5-YEAR ROLLING AVERAGE TARGET (2018-20222)	CMMPO TREND	STATE TREND	GOAL
SAFETY (PM1)	Number of fatalities		340 Fatalities			*Reduce number and rate of fatal and serious injury crashes in the region. Move towards Vision Zero Deaths*
	Rate of fatalities per 100 million VMT		0.56 Fatality Rate per 100 million VMT			
	Number of serious injuries		2,504 Serious Injuries			
	Serious injury rate per 100 million VMT		4.11 Serious Injury Rate per 100 million VMT			
	Number of non-motorized fatalities and serious injuries		471 Combined Non-Motorized Fatalities & Serious Injuries			
	MEASURE	PAST STATUS	TARGET (2022) - MID PERFORMANCE TARGET REVIEW AT 2020	CMMPO TREND	STATE TREND	GOAL
STATE OF GOOD REPAIR (PM2)	% of Interstate NHS Pavement in Good Condition		70% of Non-Interstate NHS Pavement in Good Condidtion			*To maintain the highway infrastructure asset system in a state of good repair*
	% of Non-Interstate NHS Pavement in Good Condition		30% of Non-Interstate NHS Pavement in Good Condidtion			
	% of Interstate NHS Pavements in Poor Condition		4% of NHS Interstate Pavement in Poor Condition			
	% of Non-Interstate NHS Pavement in Poor Condition		30% of NHS Interstate Pavement in Poor Condition			
	% of NHS Bridges by Deck Area Classified as Good Condition		16% of NHS Bridges by Deck Area in Good Condition			
	% of NHS Bridges by Deck Area Classified as Poor Condition		12% of NHS Bridges by Deck Area in Poor Condition			
	MEASURE	PAST STATUS	TARGET (2022) - MID PERFORMANCE TARGET REVIEW AT 2020	CMMPO TREND	STATE TREND	GOAL
CONGESTION (PM3)	Level of Travel Time Reliability (LOTTR) on both Interstate and non-Interstate NHS		68% Interstate, 80% Non-Interstate			*To achieve a significant reduction in congestion on the National Highway System*
	Level of Truck Travel Time Reliability (TTTR) on Interstate NHS		1.85			
	% of non-single occupancy vehicle travel (SOV)		35.80%			
	Peak hour excessive delay (PHED)		18.30%			
	Emissions Reduction		6.53kg CO, 0.559kg VOC, and 1.71kg Nox			

Part 2: Federally-Required Transit Performance Measures

The second part of the System Performance Report includes performance management results for the federally-required transit performance measures included in the WRTA's Transit Asset Management (TAM) Plan and the Public Transportation Agency Safety Plan (PTASP). **Figure 24** shows the complete list of goals and measures included in both the TAM Plan and PTASP.

Figure 24 Federally-Required Transit Performance Goals & Measures

EMPHASIS AREA	GOALS	MEASURES
Transit Assets	Maintain its facilities, ancillary components, and fleet in a state of good repair.	Useful Life Benchmark (ULB) of Rolling Stock (Buses & Vans)
		Useful Life Benchmark (ULB) of Equipment (Support Vehicles)
		Useful Life Benchmark (ULB) of Facilities (Admin, Maintenance, Passenger, & Parking)
Safety	Provide management and labor a comprehensive, collaborative approach to managing safety for both Fixed-Route and Demand Response.	Total Fatalities
		Rate of Fatalities per 1,000,000 Vehicle Revenue Miles
		Total Injuries
		Rate of Injuries per 1,000,000 Vehicle Revenue Miles
		Total Safety Events
		Rate of Safety Events per 1,000,000 Vehicle Revenue Miles
		System Reliability (Miles between Failures)

WRTA Transit Asset Management (TAM) Plan

As a recipient of Federal Transit Administration (FTA) funds, the WRTA is required to develop and maintain a Transit Asset Management (TAM) Plan per FTA Final Rule of 49 CFR Part 625. As defined in the Final Rule, TAM is the strategic and systematic practice of processing, operating, inspecting, maintaining, rehabilitating, and replacing transit capital assets to manage their performance, risks, and costs over their life cycles to provide safe, cost effective, and reliable public transportation.

The WRTA TAM Plan identifies the assets that the WRTA owns and has direct capital responsibility. The performance measures included in the Final Rule correspond to these assets. FTA required completion of the TAM Plan in October 2018. The WRTA's TAM Plan covers the period beginning on October 1, 2018 and ending on September 30, 2023. The TAM Plan will be amended during the FTA-specified four-year horizon period when the WRTA implements significant changes involving its assets and/or operations. Previously, at the May 15, 2017 meeting, the CMMPO endorsed the WRTA TAM Plan targets.

The WRTA's TAM Plan must contain the following elements:

1. An **Inventory of Assets Portfolio**: an inventory of the number of capital assets to include: Rolling Stock, Facilities, and Equipment;
2. A **Condition Assessment of Inventoried Assets**: a condition assessment of those inventoried assets for which the WRTA has direct ownership and capital responsibility;
3. A **Description of a Decision Support Tool**: a description of the analytical process and decision support tool that the WRTA uses to assist in capital asset prioritization, and
4. A **Prioritized List of Investments**: the prioritized list of projects that the WRTA will use to manage or improve the State of Good Repair (SGR) of capital assets.

The WRTA's SGR Policy is that a capital asset is in a State of Good Repair when each of the following objective standards are met:

1. If the asset is in a condition sufficient to operate at a full level of performance;
2. The asset is able to perform its function according to its manufacturer's design function;
3. The asset's use in its current condition does not pose an identified unacceptable safety risk and/or deny accessibility, and
4. The asset's life cycle investment needs have been met or recovered, including all scheduled maintenance, rehabilitation, and replacements.

Performance Measures and Targets

Under the TAM Final Rule, FTA established three performance measures for transit providers to use when assessing State of Good Repair (SGR) for three categories of capital assets. These

measures are aiding the WRTA in setting targets that support funding prioritization, and are included in **Figure 25**.

Figure 25

WRTA ASSET CONDITION PERFORMANCE TARGETS		
Category	**Class**	**Performance Target**
Rolling Stock	Buses	100% of fleet meets or exceeds ULB of 12 years
	Short Buses	100% of fleet meets or exceeds ULB of 10 years
	Vans	100% of fleet meets or exceeds ULB of 5 years
Equipment	Automobile	100% of fleet meets or exceeds ULB of 4 years
Facilities	Admin/Maintenance Facility	0% of facilities rated under 3.0 on TERM scale
	Passenger/Parking Facility	0% of facilities rated under 3.0 on TERM scale

In the above Figure, the Useful Life Benchmark (ULB) is defined as the expected life cycle or acceptable period of use in service for a capital asset as determined by a transit provider. The TERM Scale is a five-category rating system used in the Federal Transit Administration's Transit Economic Requirements Model (TERM) to describe an asset's condition: 5.0 – Excellent, 4.0 – Good, 3.0 – Adequate, 2.0 – Marginal, and 1.0 – Poor.

Figures 26 shows the results for the Rolling Stock and Equipment performance category for FY 2019 through FY 2021. The data shows that the WRTA has met their asset condition targets for these categories in all three years.

Figure 26 – Performance Results for Rolling Stock & Equipment

Percentage of Fleet that Meets or Exceeds ULB				
Category	**Class**	**FY 2019**	**FY 2020**	**FY 2021**
Rolling Stock	Buses > 30'	100%	100%	100%
	Buses ≤ 30'	100%	100%	100%
	Demand Response Vans	100%	100%	100%
Equipment	Support Vehicles	100%	100%	100%

Figure 27 contains the current TERM scale condition rating for the Maintenance & Operations (M&O) and Hub facilities. The rating is on a scale of 1 to 5, with 5 being excellent. As the figure shows, both facilities are meeting the performance targets.

Figure 27 – Performance Results for Facilities

Assessed Condition Rating		
Category	**Class**	**Current TERM Scale Rating**
Facilities	Admin/Maintenance Facility (M&O)	4.8
	Passenger/Parking Facility (Hub)	4.7

TAM Plan Results

Figure 28 is a snapshot of how the WRTA is performing in relation to the federally-required transit TAM targets. The green lights indicate the WRTA is doing well; conversely a red light would indicate poor performance. The silver lights indicate that the measure has no past data. A yellow light would indicate that a trend has yet to be established.

Figure 28 WRTA TAM Results

	MEASURE	PAST STATUS	TARGET	WRTA TREND	GOAL
ASSET MANAGEMENT	Useful Life Benchmark (ULB) of Buses > 30'		100% of fleet meets or exceeds ULB of 12 years		*Maintain facilities, ancillary components, and fleet in a state of good repair.*
	Useful Life Benchmark (ULB) of Buses <= 30'		100% of fleet meets or exceeds ULB of 10 years		
	Useful Life Benchmark (ULB) of Demand Response		100% of fleet meets or exceeds ULB of 5 years		
	Useful Life Benchmark (ULB) of Support Vehicles		100% of fleet meets or exceeds ULB of 4 years		
	Useful Life Benchmark (ULB) of Admin/Maintenance Facility		0% of facilities rated under 3.0 on TERM scale		
	Useful Life Benchmark (ULB) of Passenger/Parking Facility		0% of facilities rated under 3.0 on TERM scale		

WRTA Public Transportation Agency Safety Plan (PTASP)

The Public Transportation Agency Safety Plan (PTASP) details the safety processes and procedures for the Worcester Regional Transit Authority (WRTA). The plan utilizes existing agency safety practices and best practices to be implemented to meet the new regulation set in 49 CFR Part 673 of the federal guidelines. The Federal Transit Administration (FTA) required RTAs to develop a safety plan by July 20, 2020. Due to the COVID-19 public health emergency, the FTA pushed back the deadline to December 31, 2020 and again pushed back the deadline a second time until July 21, 2021. The PTASP was finalized and endorsed by the WRTA Advisory Board in November 2020. At the February 15, 2021 meeting, the CMMPO endorsed the WRTA PTASP targets.

The PTASP includes formal documentation to guide the agency in proactive safety management policy, safety risk management, safety assurance, and safety promotion. The goal is to provide management and labor a comprehensive, collaborative approach to managing safety. The plan includes the process and schedule for an annual review of the plan to review the safety performance measures and update processes that may be needed to improve the organization's safety practices. The plan must be updated and certified by the transit agency annually.

Performance Measures and Targets

Figure 29 contains the safety targets for both fixed route and demand response vehicles. The targets for FY 2021 are based on a five-year rolling average. The years used for this average are from 2015 to 2019. The rates are calculated per 1,000,000 vehicle revenue miles. The safety targets will be updated on an annual basis from the most recent five years of safety data. The WRTA has yet to update the safety targets for FY 2022.

Figure 29 – FY 2021 PTASP Safety Targets

Mode of Transit Service	Fatalities (Total)	Fatalities (Rate)	Injuries (Total)	Injuries (Rate)	Safety Events (Total)	Safety Events (Rate)	System Reliability (Miles between Failures)
Fixed Route	0	0	10	5.1	9	4.6	10,000
Demand Response	0	0	1	0.8	1	0.8	100,000

Safety Results

Figure 30 is a snapshot of how the WRTA is performing in relation to the federally-required safety targets. A green light would indicate the WRTA is doing well; conversely a red light would indicate poor performance. The silver lights indicate that the measure has no past data. The yellow lights indicate that a trend has yet to be established.

Figure 30 WRTA Safety Results

	MEASURE	PAST STATUS	TARGET	WRTA TREND	GOAL
SAFETY	Total Fatalities (Fixed Route)		0 Fatalities		
	Total Fatalities (Demand Response)		0 Fatalities		
	Total Fatality Rate (Fixed Route)		0 Fatality rate per 1,000,000 vehicle revenue miles		
	Total Fatality Rate (Demand Response)		0 Fatality rate per 1,000,000 vehicle revenue miles		
	Total Injuries (Fixed Route)		10 Injuries		
	Total Injuries (Demand Response)		1 Injury		
	Total Injury Rate (Fixed Route)		5.1 Injury Rate per 1,000,000 vechicle revenue miles		*Provide management and labor a comprehensive, collaborative approach to managing safety for both Fixed Route and Demand Response.*
	Total Injury Rate (Demand Response)		0.8 Injury Rate per 1,000,000 vechicle revenue miles		
	Total Safety Events (Fixed Route)		9 Safety Events		
	Total Safety Events (Demand Response)		1 Safety Event		
	Total Safety Events Rate (Fixed Route)		4.6 Safety Event Rate per 1,000,000 vehicle revenue miles		
	Total Safety Events Rate (Demand Response)		0.8 Safety Event Rate per 1,000,000 vehicle revenue miles		
	System Reliability (Fixed Route)		10,000 miles between failures		
	System Reliability (Demand Response)		100,000 miles between failures		

Federal Transit Measures System Performance Report Card Overall Summary

Figure 31 shows the results of all federally-required transit performance measures included in the WRTA's Transit Asset Management (TAM) Plan and the Public Transportation Agency Safety Plan (PTASP). As for the TAM Plan targets, the WRTA is currently meeting the targets. For the PTASP targets, it is still early on in the process and a trend has yet to be established. More data will become available in future years as the WRTA updates the PTASP on an annual basis.

Figure 31 - 2022 Federal Transit Measures System Performance Report Card

	MEASURE	PAST STATUS	TARGET	WRTA TREND	GOAL
ASSET MANAGEMENT	Useful Life Benchmark (ULB) of Buses > 30'		100% of fleet meets or exceeds ULB of 12 years		*Maintain facilities, ancillary components, and fleet in a state of good repair.*
	Useful Life Benchmark (ULB) of Buses <= 30'		100% of fleet meets or exceeds ULB of 10 years		
	Useful Life Benchmark (ULB) of Demand Response		100% of fleet meets or exceeds ULB of 5 years		
	Useful Life Benchmark (ULB) of Support Vehicles		100% of fleet meets or exceeds ULB of 4 years		
	Useful Life Benchmark (ULB) of Admin/Maintenance Facility		0% of facilities rated under 3.0 on TERM scale		
	Useful Life Benchmark (ULB) of Passenger/Parking Facility		0% of facilities rated under 3.0 on TERM scale		
SAFETY	MEASURE	PAST STATUS	TARGET	WRTA TREND	GOAL
	Total Fatalities (Fixed Route)		0 Fatalities		*Provide management and labor a comprehensive, collaborative approach to managing safety for both Fixed Route and Demand Response.*
	Total Fatalities (Demand Response)		0 Fatalities		
	Total Fatality Rate (Fixed Route)		0 Fatality rate per 1,000,000 vehicle revenue miles		
	Total Fatality Rate (Demand Response)		0 Fatality rate per 1,000,000 vehicle revenue miles		
	Total Injuries (Fixed Route)		10 Injuries		
	Total Injuries (Demand Response)		1 Injury		
	Total Injury Rate (Fixed Route)		5.1 Injury Rate per 1,000,000 vechicle revenue miles		
	Total Injury Rate (Demand Response)		0.8 Injury Rate per 1,000,000 vechicle revenue miles		
	Total Safety Events (Fixed Route)		9 Safety Events		
	Total Safety Events (Demand Response)		1 Safety Event		
	Total Safety Events Rate (Fixed Route)		4.6 Safety Event Rate per 1,000,000 vehicle revenue miles		
	Total Safety Events Rate (Demand Response)		0.8 Safety Event Rate per 1,000,000 vehicle revenue miles		
	System Reliability (Fixed Route)		10,000 miles between failures		
	System Reliability (Demand Response)		100,000 miles between failures		

Part 3: Regionally-Customized Performance Measures

The third part of the System Performance Report includes performance management results for the CMMPO's regionally-customized measures for the seven remaining national emphasis areas of Multimodal, Sustainability, Equity, Economic Vitality, Security, Stormwater Management, and Travel & Tourism. **Figure 32** shows the complete list of goals and measures for each regionally-customized measure.

Figure 32 CMMPO Regionally-Customized Transportation Goals & Measures

EMPHASIS AREA	GOALS	MEASURES
Multimodal	Improve and/or expand transportation accessibility for all modes (bicycle, pedestrian, transit) in the region.	Condition of sidewalks
		Condition of ADA ramps
		Miles of bicycle lanes
		WRTA ridership
Sustainability	Encourage compact and mixed-use development.	Jobs to housing ratio
Equity	Achieve geographic and population equity across the region.	% of EJ and vulnerable populations intersecting WRTA fixed route bus service
		% of subregion costs per capita that benefit from a TIP project
Economic Vitality	To improve the accessibility to jobs in the CMMPO region.	Make employment opportunities accessible and available allowing for job expansion and reducing transportation costs
Security	Enhance the transportation security coordination and preparedness in the region.	To be determined
Stormwater Management	Create a transportation network that is resilient to the impacts of stormwater.	Number of culvert assessments on the federal-aid highway network
Travel & Tourism	To enhance the access, safety and effectiveness of the region's transportation network that serves places of touristic value.	To be determined

Planning Emphasis Area	US DOT National Goal	FHWA Rule
MULTIMODAL	CONGESTION / INFRASTRUCTURE CONDITION	(PM3) System Performance, Air Quality

Multimodal Introduction

The CMMPO regionally-customized measures developed for the Multimodal performance area contributes to improved system performance and improved air quality performance which are the basis of the federal rules under PM3. Although PM3 measures (detailed above) are not applied to this performance area, the additional CMMPO measures contribute to the region's overall performance for PM3. It is a goal of the CMMPO to expand and improve the bicycle, pedestrian and transit networks within the region. The CMMPO envisions Central Massachusetts as a growing region of 40 well connected, livable communities with reduced congestion, and improved multimodal mobility along with air quality. The four measures the CMMPO uses for this performance area are:

1. Miles of sidewalks in good condition
2. Number of Americans with Disability Act (ADA) Ramps in good condition
3. Miles of roadways available for bicyclists to ride safely
4. Worcester Regional Transit Authority (WRTA) ridership

CMMPO Multimodal Performance Measures and Targets

Miles of Sidewalks in Good Condition

Sidewalks provide a location for pedestrians to travel safely and separately from vehicles. Individuals should be able to travel the length of a sidewalk without having to encounter various hazards. Sidewalks should be constructed to standards that are accommodating for all pedestrians including those with mobility challenges and visual impairments. Newly constructed sidewalks should be no less than 4 feet in width according to MassDOT and US Access Board specifications.

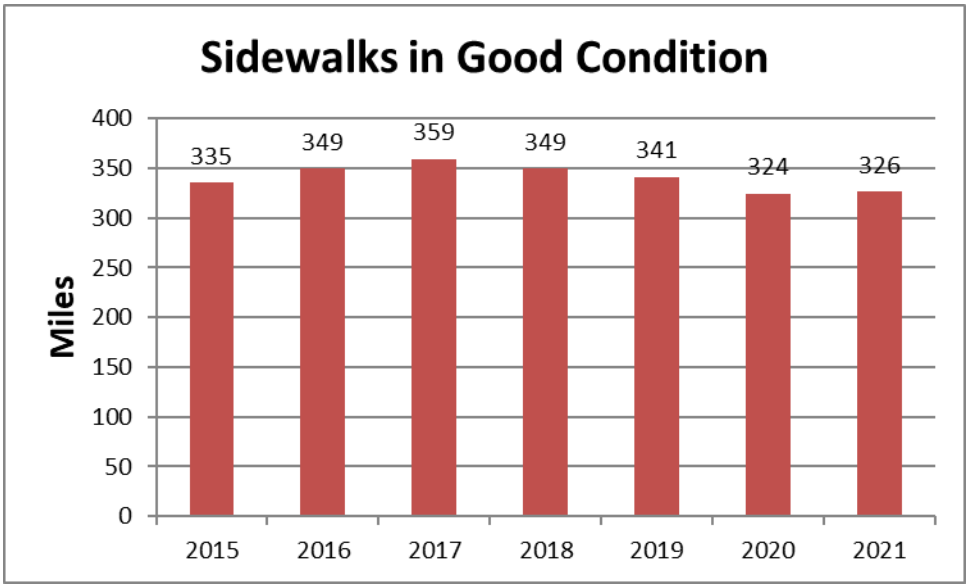
The CMMPO staff has been collecting sidewalk condition data on federal-aid roadways since 2015. Sidewalk conditions are surveyed and inventoried on a qualitative scale of *Poor*, *Fair*, *Good* and *Excellent*. The following provides further description of these categories:

- **Poor Condition**: These sidewalks have an uneven surface that prohibits safe usage along the length of the sidewalk. It has significant cracking and crumbling with sections of path completely missing. The surrounding vegetation is overgrown and/or water has settled in the area.

- **Fair Condition**: These sidewalks have an uneven surface that makes it slightly difficult for pedestrians to safely use. It has significant cracking but does not have large missing sections. There may be areas with settled water and vegetation, but they are less frequent and do not pose a major hazard to one's safety.
- **Good Condition**: These sidewalks have a smooth surface that provide pedestrians, those with and without mobility challenges, the ease of traveling the length of the pathway. The sidewalk may have areas with few, but minimal cracking and no overgrown vegetation or settled water.
- **Excellent Condition**: An excellent sidewalk has a smooth and even surface that is free of any cracks, missing sections, vegetation, and settled water.

For this performance measure, the CMMPO aims for an increase in miles of sidewalk in good condition on a yearly basis. **Figure 33** shows the miles of sidewalk in good condition since 2015. Sidewalks in good and excellent condition were combined into the condition analysis. As the figure shows, miles of sidewalk in good condition increased in 2016 and 2017, then decreased in 2018, 2019, and 2020, but increased slightly in 2021

Figure 33



Number of ADA Ramps in Good Condition

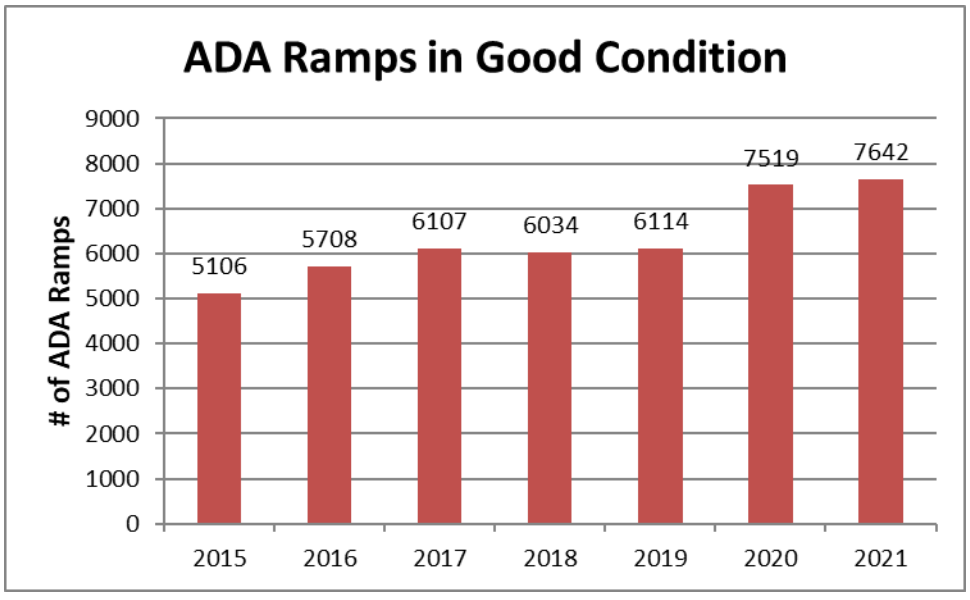
Americans with Disability Act (ADA) ramps are vital to all pedestrians, especially those members of the community who have physical disabilities that include visual or hearing impairments, and/or require a wheelchair. There are multiple components that a ramp requires in order to be built to proper specifications including flares, slopes, Detectable Warning Panels, landing measurements, and sidewalk width. Improper construction of curb ramps impacts both the accessibility and the safety of individuals with physical disabilities.

The CMMPO maintains an inventory of ADA ramps along federal-aid roadways that includes scoring the compliance of a ramp based on the presence of Detectable Warning Panels, flares, landing areas and the general condition of the ramp. This inventory allows for the region's communities to better determine the state of their assets and compliancy with ADA requirements. ADA ramp data has been collected since 2015. When data was first collected it was inventoried on a scale of *No Ramp*, *Non-Compliant*, *Historic*, and *Compliant*. In 2019, the categories were changed to *Good*, *Poor*, and *No Ramp* to provide better clarity to the communities on ramp condition. The following provides a description of the updated categories:

- **Good**: A scoring of good indicates that the ramp has no major physical imperfections, is accessible, and not littered with debris that hinders pedestrian use.
- **Poor**: A scoring of poor indicates that there are major physical imperfections such as deteriorating ramp components.
- **No Ramp**: A scoring of no ramp indicates the absence of a curb ramp at the end of a sidewalk or at a street crossing.

For this performance measure, an increase in the number of ADA ramps in good condition is preferred on a yearly basis. **Figure 34** shows the number of ADA ramps in good condition since 2015. The results show an increase from 2015 to 2017 and then a small decline in 2018, before increases in 2019, 2020, and 2021.

Figure 34



Miles of Roadways Available for Bicyclists to Ride Safely

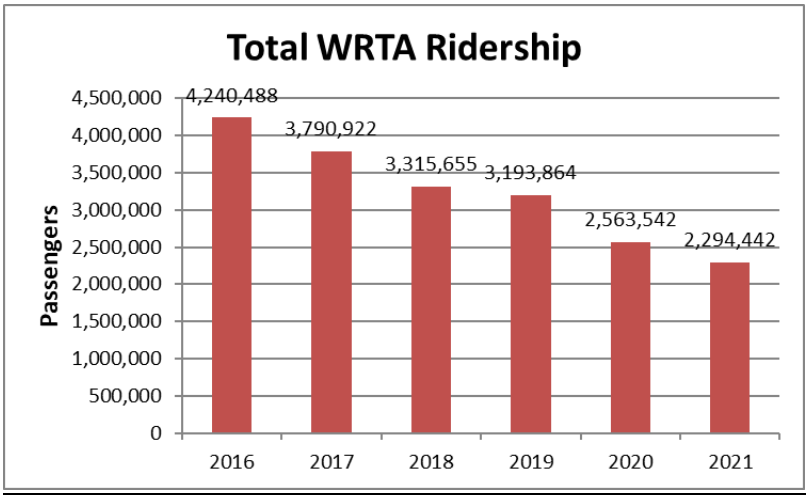
For this performance measure, the CMMPO has measured the number of bicycle lane miles available in the region. Bicycle lane data is gathered in two ways: 1) is a dedicated bicycle lane available on the roadway and, 2) roadways that have shoulders on either side that measure a minimum of five feet. Roadways that have sufficiently wide shoulders are considered viable to safely ride a bicycle.

Using Cartegraph, CMRPC's pavement management program, the CMMPO maintains shoulder width measurements for all federal-aid roadways in the region. Previously, as new data was collected each year, previous shoulder width measurements were replaced with any updated data. Due to this former methodology, the CMMPO is unable to look back on the bicycle lane miles in previous years. As such, 2019 is now considered the base year for this performance measure and this data will be tracked on an annual basis going forward. In 2019, the data shows that there are 247 miles of federal-aid roadways that are considered to have adequate bicycle lanes. 2020 and 2021 data was not collected due to the COVID-19 pandemic. The next data collection cycle is planned for 2022.

Worcester Regional Transit Authority (WRTA) Ridership

This performance measure pertains to the WRTA ridership totals for the entire system which includes fixed-route buses, ADA Paratransit, Councils on Aging (COAs) and Taxi service. The timeframe for the data is by Fiscal Year (FY), which is from July 1st to June 30th. **Figure 35** shows the WRTA ridership totals for FY2016 through FY 2021. The overall goal of this measure is to increase the WRTA ridership each year, however as the figure shows, the total ridership has declined every year since 2016. Over 90% of the ridership totals are from the fixed-route bus service. Due to the COVID-19 pandemic in 2020, ridership totals saw a sharp decline in 2020 and continued to decline in 2021.

Figure 35



Multimodal Results

Figure 36 displays the results of how the CMMPO is performing for the regionally-customized multimodal targets. The green light indicates the CMMPO is doing well in increasing the number of ADA ramps and miles of sidewalks in good condition; conversely the red lights indicate poor performance for increasing the WRTA ridership. The silver light indicates that the bicycle lane miles measure does not have past data. The yellow light indicates that a trend has yet to be established to determine if the CMMPO region is increasing bicycle lane miles.

Figure 36 CMMPO Multimodal Results

	MEASURE	PAST STATUS	TARGET	CMMPO TREND	GOAL
MULTIMODAL	Condition of sidewalks		Increase the mileage of sidewalks in good condition in the CMMPO Region		*Improve and/or expand the transportation accessibility for all modes (bicycle, pedestrian, and transit) in the region.*
	Condition of ADA ramps		Increase the number of ADA ramps in good condition in the CMMPO Region		
	Miles of bicycle lanes		Increase bicycle lane miles in the CMMPO Region		
	WRTA ridership		Increase ridership on the WRTA system		

PLANNING EMPHASIS AREA	US DOT NATIONAL GOAL	FHWA RULE
Sustainability	Environmental Sustainability	None

Sustainability Introduction

Sustainability focuses on meeting the needs of the present without compromising the ability of future generations to meet their needs as well. There are many forms of sustainability such as economic, environmental and social. Promoting sustainability through transportation planning can be approached by detailed TIP screening for projects that serve to mitigate environmental impacts and are near CMRPC identified Priority Development Areas (PDAs). Currently, the only performance measure for sustainability is the Jobs to Housing ratio. This is considered a regionally customized measure, exceeding the requirements of the FHWA rules.

CMMPO Sustainability Performance Measures and Targets

Jobs to Housing Ratio

Jobs to Housing ratio is one of a range of measures or variables used by city planners to examine the proportions of residents, jobs, and services in urban areas and to guide development planning for efficient city plans and public transit networks. A Jobs to Housing ratio in the range of 0.75 to 1.5 is considered beneficial for reducing Vehicle Miles Traveled (VMT). Ratios higher than 1.5 could indicate that there may be more workers commuting due to a surplus of potential employment. An imbalance in jobs and housing can create longer commute times, more single occupancy vehicle (SOV) commutes, loss of job opportunities for workers without vehicles, traffic congestion, and poor air quality.

Housing data is gathered using parcel counts from the Massachusetts Department of Revenue (DOR) based on single family, condominiums, miscellaneous residential, 2-family, 3-family, and apartments. The totals in each category are tabulated and an overall total of housing units is determined for all bench mark years. For employment data, the projections included in the 2020 Update to the Long-Range Transportation Plan (LRTP) were used.

The CMMPO's target for this performance measure is to maintain a balance of jobs to housing with a ratio of 1 or above, meaning that there is one job (or more) available per household. **Figure 37** shows the Jobs to Housing ratio for the Central Massachusetts region from 2015 – 2021.

Figure 37 Jobs to Housing Ratios

	Total Housing Units	Total Jobs	J/HB Ratio
2015	223,498	238,170	1.07
2016	224,498	238,233	1.06
2017	225,002	238,296	1.06
2018	226,055	238,359	1.05
2019	227,719	238,423	1.05
2020	229,458	238,486	1.04
2021	230,656	238,736	1.04

Sustainability Results

Figure 38 displays the results on how the Central Massachusetts region is doing in maintaining a balanced Jobs to Housing ratio. A green light indicates the CMMPO is doing well; conversely a red light would indicate poor performance. A silver light would indicate that the measure has no past data available and a yellow light would indicate that a trend has yet to be established.

Figure 38 CMMPO Sustainability Results

	MEASURE	PAST STATUS	TARGET	CMMPO TREND	GOAL
SUSTAINABILITY	Jobs to Housing Ratio		Maintain a jobs to housing balance between 0.75 to 1.50		*Encourage compact and mixed use development*

PLANNING EMPHASIS AREA	US DOT NATIONAL GOAL	FHWA RULE
Equity	None	None

Equity Introduction

The CMMPO's goal for the Equitable Transportation focus area is to achieve geographic and population equity across the region. Ideally all six subregions and citizens will equally benefit from a TIP project and all Environmental Justice & Vulnerable populations have access to fixed bus service. The two measures for this area are:

- Percent of EJ & Vulnerable Populations that intersect WRTA fixed route bus service
- Percent of subregion costs per capita that benefit from a TIP project

CMMPO Equity Performance Measures and Targets

Access to WRTA Bus Service for EJ & Vulnerable Populations

The CMMPO is committed to ensuring that traditionally underserved and underrepresented populations receive a fair share of the regional transportation system's benefits, and are not subject to undue burdens. Access to essential services such as employment opportunities can be challenging for underserved populations living in EJ & Vulnerable population areas. This measure evaluates how much of the EJ & Vulnerable populations have access to frequent WRTA bus routes within ¼ mile. The target is to make sure that the same or greater percentage of the EJ & Vulnerable populations intersect with a frequent WRTA bus route every year. As this measure was adjusted in 2020, a 2019 baseline with the new data will now be used going forward.

Figure 39 shows the percentage of EJ & Vulnerable populations intersecting WRTA bus routes decreasing in 2020 and then staying the same between 2020 and 2021.

Figure 39

	2019	2020	2021
Total EJ & Vulnerable Block Group Populations intersecting 2019 WRTA Routes:	**413,154**	**399,580**	**399,580**
Total EJ & Vulnerable Block Group Populations:	**510,057**	**510,057**	**510,057**
% of EJ & Vulnerable Block Group Populations intersecting WRTA Routes:	**81.0**	**78.3%**	**78.3%**

Geographic Equity for TIP Projects

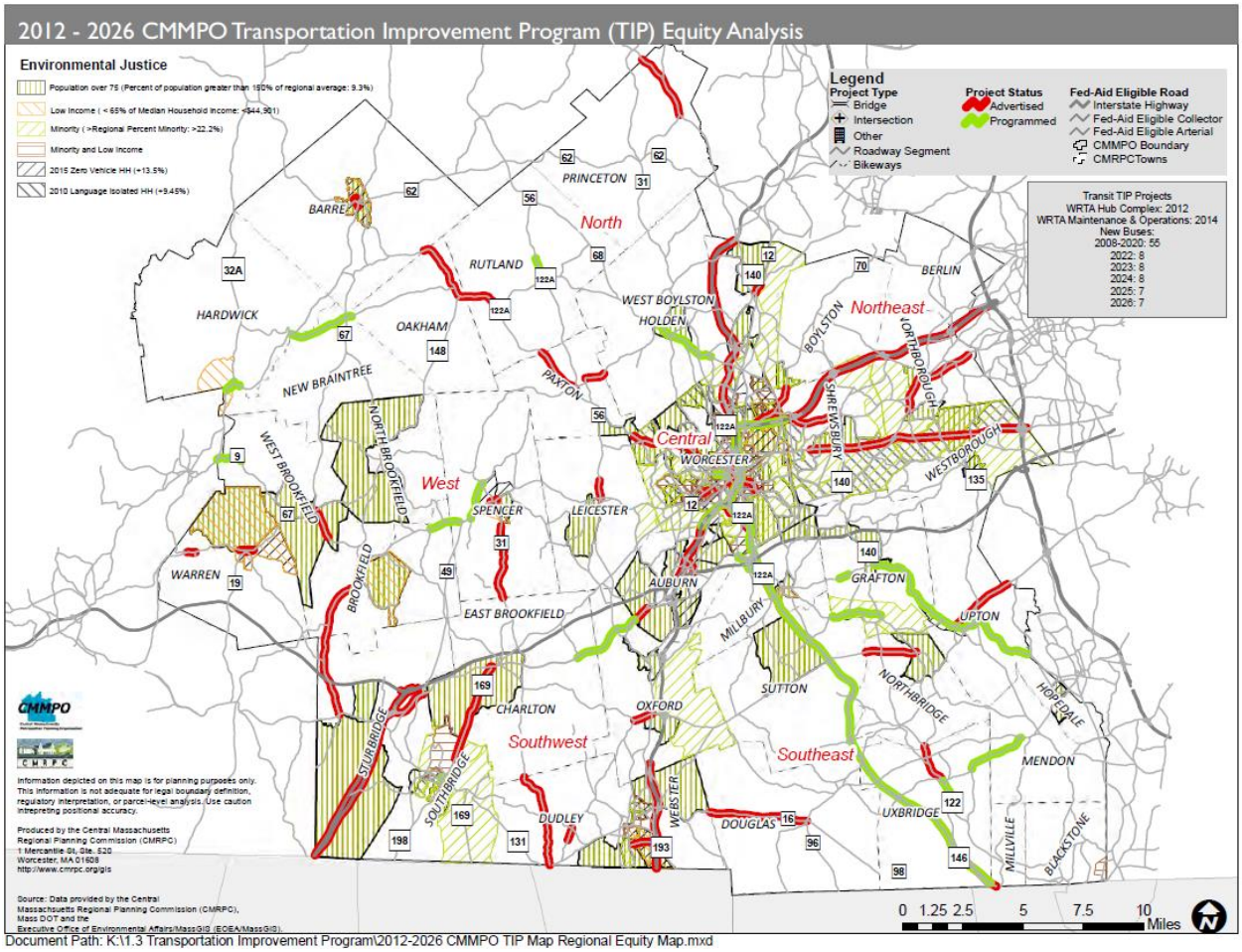
The CMMPO intends to ensure that transportation improvements are geographically equitable throughout the entire region. The CMMPO Region is made up of six subregions; North, Northeast, Southeast, South, West, and Central/Worcester. This measure evaluates the geographic equity of TIP projects, making sure that all subregions have the same opportunity to benefit from a TIP project. The target for this measure is to ensure that no subregion's TIP project costs per capita calculation be more than 33% below the average total project costs per capita calculation of the CMMPO region. As long as the TIP project costs per capita remains below 33% of the CMMPO region's average project costs per capita for all six subregions, the CMMPO will be considered within the target of this goal.

All TIP projects that have been programmed and advertised from 2012-2026 were counted throughout the region to get a project cost per capita for CMMPO region. The average project cost per capita for the entire CMMPO region is 1,149, which is slight increase from the previous year. The project cost per capita number for each subregion is compared against the average project cost per capita of 1,149 for the CMMPO region from 2012-2026. **Figure 40** is a chart that breaks down the subregions with their population and the total costs of TIP projects that have either been completed, advertised or still programmed from 2012-2026. Following a trend from 2019 and 2020, the West and Southwest subregions are the only two regions above the target percentage. **Figure 41** is a map of the 2012-2026 CMMPO TIP Equity Analysis.

Figure 40

Subregion	Total Cost of Projects in each Subregion	Subregion Population	Total Cost Per Capita in Subregions	Percent away from CMMPO Average
West	$75,504,000	46,029	1,640	43%
North	$64,204,000	49,966	1,285	12%
Northeast	$77,534,000	76,693	1,011	-12%
Southeast	$105,920,000	114,843	922	-20%
Southwest	$175,773,000	98,852	1,778	55%
Central/Worcester	$158,879,000	186,272	853	-26%
CMMPO Totals	$657,814,000	572,655	Avg = 1,149	

Figure 41



Equity Results

Figure 42 displays the results on how the region is doing in providing both geographic equity and access to public transportation equity to the Central Massachusetts region. A green light indicates the CMMPO is doing well; conversely a red light indicates poor performance. A silver light indicates that measure has no past data. The yellow light means a trend does not currently exist.

Figure 42 CMMPO Equity Results

	MEASURE	PAST STATUS	TARGET	CMMPO TREND	GOAL
EQUITY	Percent of EJ & Vulnerable Populations intersecting WRTA fixed route bus service		To maintain or increase the % of EJ & Vulnerable populations that intersect WRTA bus routes		*Achieve geographic and population equity across the region*
	Percent of subregion costs per capita that benefits from a TIP project		Maintain an average % of people that benefit from a TIP project		

PLANNING EMPHASIS AREA	US DOT NATIONAL GOAL	FHWA RULE
Economic Vitality	Freight Movement & Economic Vitality	System Performance / Freight / Air Quality (PM3)

Economic Vitality Introduction

Regional economic vitality through transportation planning is an important characteristic to incorporate into the aspects of performance-based planning. The CMMPO has attempted to derive a measure for the region that answers the question: How can transportation support or be consistent with strategies for economic vitality, both strengthening the existing economy and creating new opportunities?

One measure that is indicative of economic vitality is through reliable freight movement. This measure is covered and discussed under the Federal PM3 for System Performance & Air Quality. A regionally-customized measure that the CMMPO decided to use pertains to the accessibility to jobs.

CMMPO Economic Vitality Performance Measures and Targets

Access to Jobs

Accessibility to jobs is an important factor associated with the economic vitality of the CMMPO region. Being able to travel to/from a job within a reasonable time period should be available for all populations and all modes of travel. There is a higher number of jobs in the urban area so one would expect a greater amount of the population to navigate in that direction. Congestion plays a prominent role in allowing this to happen. The more congestion there is the less likely a person would travel a greater distance to find a job. Other factors considered are income and the cost of housing.

Ideally, TIP projects that improve mobility on the overall roadway network will create more job opportunities. These improvements will often also address the modes of bicycling and walking, as required, in addition to automobile and trucking mobility. If these types of improvements reduce congestion along the roadways, people can travel further for jobs in the same amount of time as it currently takes, especially during the peak commute periods.

For this Performance Measure, the CMMPO compared how many jobs residents lose access to within a 45-minute travel time, by automobile, during the peak AM travel period (8 AM) compared to free-flow conditions (2 AM). Accordingly, the goal of this measure is to reduce the number of jobs lost that residents have access to within the 45-minute travel time. As 2017 was the first time this type of data was used, it is now considered the base year for this analysis

going forward. **Figures 43 through 45** show the results for each of the six subregions and the overall likely total job loss in the CMMPO region for 2017, 2019 and 2020.

Figure 43: Job Loss Comparison in the CMMPO Region (2017)

CMMPO Subregion	# of Jobs Accessible at 2AM	# of Jobs Accessible at 8AM	Jobs Lost	Percent Loss
North	22,529,805	15,579,460	6,950,345	31%
Northeast	103,986,374	38,944,304	65,042,070	63%
Southeast	93,836,720	50,849,425	43,017,295	46%
Southwest	71,770,505	42,551,621	29,218,884	41%
West	21,097,362	15,588,096	5,509,266	26%
Central	217,936,187	106,248,333	111,687,854	51%
Region Total:	531,156,953	269,731,239	261,425,714	49%

Figure 44: Job Loss Comparison in the CMMPO Region (2019)

CMMPO Subregion	# of Jobs Accessible at 2AM	# of Jobs Accessible at 8AM	Jobs Lost	Percent Loss
North	26,145,263	15,474,559	10,670,704	41%
Northeast	117,078,488	36,424,413	80,654,075	69%
Southeast	107,789,236	51,057,258	56,731,978	53%
Southwest	86,436,530	45,077,678	41,358,852	48%
West	24,742,686	17,009,213	7,733,473	31%
Central	272,278,473	106,289,984	165,988,489	61%
Region Total:	634,470,676	271,333,105	363,137,571	57%

Figure 45: Job Loss Comparison in the CMMPO Region (2020)

CMMPO Subregion	# of Jobs Accessible at 2AM	# of Jobs Accessible at 8AM	Jobs Lost	Percent Loss
North	1,100,113,391	658,171,303	441,942,088	40%
Northeast	4,431,648,700	1,402,823,600	3,028,825,100	68%
Southeast	4,836,488,949	2,250,038,604	2,586,450,345	53%
Southwest	3,360,610,741	1,784,399,019	1,576,211,722	47%
West	1,092,787,803	749,277,824	343,509,979	31%
Central	5,999,384,646	2,277,220,169	3,722,164,477	62%
Region Total:	20,821,034,230	9,121,930,519	11,699,103,711	56%

Congestion on the region's roadways results in significant delay for people traveling to their workplace. It perhaps even prevents people from pursuing higher paying jobs because the travel times are simply too lengthy. The above tables show the total number of jobs lost

between driving at 2 AM (free flow) and 8 AM (peak congestion) for 2017, 2019 and 2020. The comparison was based on a travel time of 45 minutes. The results are shown for each CMMPO subregion as well as total potential job loss for the region.

As the results show, the number of accessible jobs at 2 AM have increased over 100 Million between 2017 and 2019. Due to the increase, the number of jobs lost within the region also increased over 100 Million. The northeast still had the highest percent loss with a total of 69% while the west subregion had the smallest percent loss with a total of 31%. As a whole region, the CMMPO loses 57% of available jobs due to congestion, which is an increase of 8% over 2017. For 2020, the data is slightly different than 2017 and 2019. The 2017 & 2019 data is from Census Block Groups while the 2020 data is from Census Blocks. The 2019 and 2020 data are similar in the percentage loss for the region. The target for this measure is to reduce the percent loss of jobs in the CMMPO region.

Economic Vitality Results

Figure 46 shows the results of the region's Economic Vitality using the aforementioned performance measures. The silver light indicates that the measure has no past data. A green light would indicate the CMMPO is doing well; conversely a red light indicates declining performance. A yellow light would indicate a trend that has yet to be established.

Figure 46 CMMPO Economic Vitality Results

	MEASURE	PAST STATUS	TARGET	CMMPO TREND	GOAL
ECONOMIC VITALITY	Make Employment Opportunities Accessible and Available Allowing for Job Expansion and Reducing Transportation Costs		Reduce the amount of jobs lost		*To improve the accessibility to jobs in the CMMPO region*

PLANNING EMPHASIS AREA	US DOT NATIONAL GOAL	FHWA RULE
Security	System Reliability	None

Security Introduction

The objective of the security performance measure is to enhance the transportation security coordination and preparedness in the CMMPO region. A dependable, secure and resilient transportation network is extremely important to facilitate evacuation efforts during an unforeseen natural disaster or other disruptive event. Pre-disaster and hazard mitigation planning in conjunction with transportation planning need to overlap to enhance security preparedness, protocols, awareness and coordination for the region's roadway network. Projects that keep evacuation routes in good condition and projects that improve known vulnerable locations in the region can play a key role in the security of the region.

CMMPO Security Performance Measures and Targets

At this time, CMMPO staff is currently in the process of determining quantitative performance measures and targets for this emphasis area that can be tracked and analyzed on an ongoing basis. Presently, staff does use this emphasis area in the scoring of TIP projects. The following criteria are used for TIP project scoring:

- The TIP project roadway is a primary established evacuation route.
- The TIP project roadway is listed in the host community's Hazard Mitigation Plan or Municipal Vulnerable Preparedness Plan as a potential hazardous location.

In addition to project scoring, staff also incorporates the security emphasis area in Corridor Profile study efforts. Staff collects various types of transportation-related data, analyzes it, and then suggests improvements that would make the study corridor safer and more resilient for travel by all modes.

Once the decision on which performance measures and targets to apply to the security emphasis area, the resulting data and analysis will be included in a future System Performance Report.

PLANNING EMPHASIS AREA	US DOT NATIONAL GOAL	FHWA RULE
Stormwater Management	Environmental Sustainability	None

Stormwater Management Introduction

Extreme and more frequent rainfall events affect transportation infrastructure by disrupting public travel safety, the commercial transport of goods and services, and adversely impacting natural resources including water quality.

Each of the 40 communities in the CMRPC planning region have and will continue to be confronted with various decisions concerning the most effective ways to handle stormwater. Transportation impacts from stormwater can range from traffic disruptions to flooded evacuation routes to weather-related mass transit delays. Communities must also need to consider the structural, operational and safety impacts to roadways, bridges and culverts as well as the overall impact on transportation system capacity.

Fairly recently, the CMMPO developed a Nature-Based Solutions (NBS) Toolkit in order to introduce and encourage CMRPC's host communities to integrate NBS that both consider and address stormwater management at the early stages of the transportation planning process. In the Toolkit, the user will find information culled from numerous local, state and federal resources that describe how NBS can be located as well as integrated with the roadway network to realize the full potential of managing stormwater runoff, improving multi-modal mobility, enhancing street aesthetics, and achieving the full performative value of a "living" infrastructure. The Toolkit provides definitions, analysis and examples of NBS so that community decision makers can select those strategies which will likely provide the most benefit for their roadway network, helping their community prepare against the threat of extreme weather events. The NBS described serves to reduce the negative impacts of and increase resilience against extreme weather. Further, they also support the CMMPO's Performance Management goals that are related to promoting sustainability, stormwater management and infrastructure resiliency. As such, the CMMPO encourages all 40 communities in the planning region to incorporate NBS in their local ordinances.

In addition to the NBS Toolkit, staff began a Culvert Assessment Program in Federal Fiscal Year (FFY) 2021. Since that time, a number of staff have been trained to identify and assess stream crossing structures by the Massachusetts Division of Ecological Restoration (MassDER), which partners with the North Atlantic Aquatic Connectivity Collaborative (NAACC). The Non-Tidal Aquatic Connectivity Protocol and Scoring System is used by staff to assess both the stream crossing and the structure itself as it relates to non-tidal crossings. Notably, the CMMPO program focuses only on culverts located along federal-aid eligible roadways in the CMRPC planning region. Ultimately, the overall goal of the program is to help communities build

resiliency through flood risk protection & mitigation by identifying culvert locations and prioritizing those that need either repair/restoration or replacement.

CMMPO Stormwater Management Performance Measures and Targets

Culvert Assessments

With the evolution of stronger and more frequent storms, it is now ever important to assess the current stormwater infrastructure in the region. By using the NAACC Protocol and Scoring System, culverts in the region are assessed to determine which structures are barriers to fish & wildlife passage, particularly those that are increasingly vulnerable to damage or failure during a storm event that causes flooding. By identifying both "severe" and "significant" culvert barriers, the communities are able to prioritize which culverts need to be repaired or replaced, improving resiliency. When culverts are replaced, they must meet the Massachusetts Stream Crossing Standards. By meeting these standards, the properly-sized culverts allow streams and rivers to flow unrestricted, thus minimizing the risk of flood damage. Other benefits include public safety, improved habitat and ecosystem function, reduced maintenance & repair costs, improved water quality, and improved fish & wildlife passage.

For this Performance Measure, staff will continue to annually collect culvert assessment data for culverts on the federal-aid highway network in the CMMPO region. The total number of culverts in the CMMPO region is 5,150, of which, 1,862 are on the federal-aid roadways. Staff intends to increase the number of surveyed culverts each year and track the progress. The following **Figure 47** shows the location of all known culverts in the CMMPO region on the federal-aid roads as well as the current "barrier type" status for each of those surveyed. Accompanying the map, **Figure 48** summarizes the number of culverts within each barrier type scoring category.

Figure 47 CMMPO Culvert Inventory

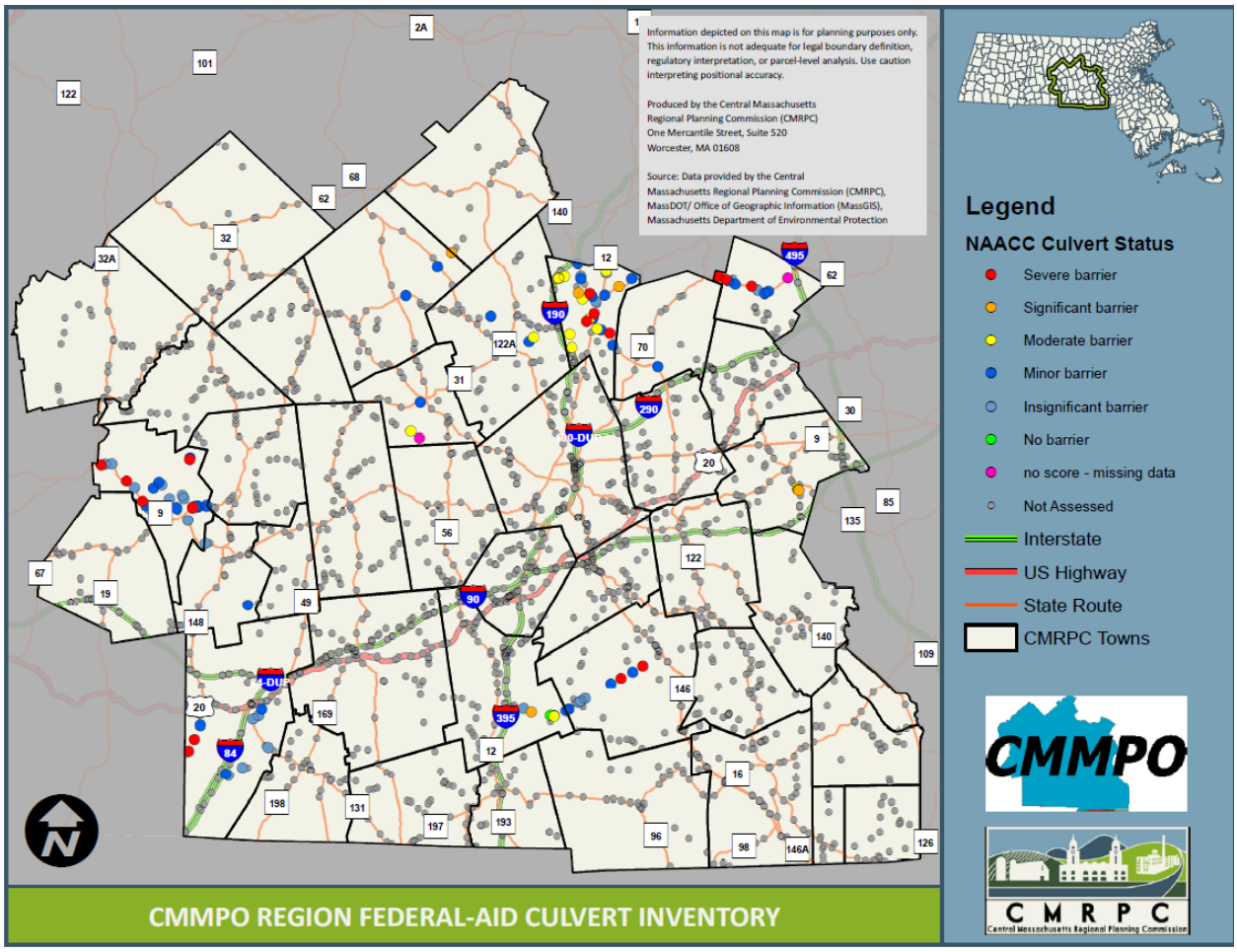


Figure 48 NAACC Culvert Aquatic Passability Scoring Results

Aquatic Passability Score	Barrier Type	# of Culverts
1.0	No Barrier	2
0.80 – 0.99	Insignificant Barrier	29
0.60 – 0.79	Minor Barrier	35
0.40 – 0.59	Moderate Barrier	15
0.20 – 0.39	Significant Barrier	5
0.00 – 0.19	Severe Barrier	16
Total		**102**

As shown in **Figure 48,** there have been a total of 102 culverts assessed within the planning region as of January 1, 2022. The data was collected by CMRPC staff and other agency staff that are trained in the NAACC scoring system. Most of the assessed culverts were determined

to have either “insignificant” or “minor” barriers. There were only two (2) culverts that had “no” barriers while a total of 21 culverts were determined to have either “significant” or “severe” barriers.

Stormwater Management Results

Figure 49 shows the results of the region’s Stormwater Management using the aforementioned performance measures. The silver light indicates that the measure has no past data. A green light would indicate the CMMPO is doing well; conversely a red light indicates declining performance. A yellow light would indicate a trend that has yet to be established.

Figure 49 CMMPO Stormwater Management Results

	MEASURE	PAST STATUS	TARGET	CMMPO TREND	GOAL
STORMWATER MANAGEMENT	Culvert assessments on the federal-aid highway network		Increase the # of culverts assessed in the CMMPO region on the federal-aid network		*Create a transportation network that is resilient to the impacts of stormwater*

PLANNING EMPHASIS AREA	US DOT NATIONAL GOAL	FHWA RULE
Travel & Tourism	None	None

Travel and Tourism Introduction

Transportation is an integral part of the tourism industry. It is largely due to the improvement of transportation that tourism has expanded in many parts of the country, including the CMMPO region. Tourism, as an economic activity, depends on a reliable and preferably multi-modal transportation network to bring tourists to destinations. Transportation can also be a recreational activity, such as bicycling or bus tours through a city. Because of the symbiotic relationship between the travel and tourism industry and transportation planning, it is important that decision-making involves a range of stakeholders related to a range of various tourist destinations.

Increases in visitors to a certain area may mean worsening congestion and faster deterioration of infrastructure. Additionally, maintaining a balance of tourist-to-host population is important so that the local community is comfortable with an influx of visitors and there are minimal conflicts regarding available resources.

Transportation projects related to Travel and Tourism reflect a variety of needs and motivations and are defined to address the following:

- Alleviating traffic congestion and air quality concerns near visitor attractions
- Creating better access and mobility to meet the special needs of different traveler segments
- Investing in tourism as a means of economic development
- Improving traveler information resources
- Preserving valued historic, cultural, and environmental assets
- Linking existing but currently separate tourism attractions
- Competing travel demand needs of area residents and visitors

The CMMPO recognizes the Travel and Tourism federal emphasis area in the Regional Performance Measures TIP Scoresheet. The main objective is to enhance the region's travel and tourism opportunities. The goal is to improve traveler access, mobility and linkages to sites of touristic value and balance the travel demand needs of area residents and visitors. The following criteria are currently used in project scoring:

- The project is improving the mobility to/from tourist attractions and recreational areas.

As with other transportation planning emphasis areas, Travel and Tourism is incorporated into Corridor Profile studies. Although not a main focus, tourist attractions and recreational areas are noted and improvements are suggested near these locations, if warranted.

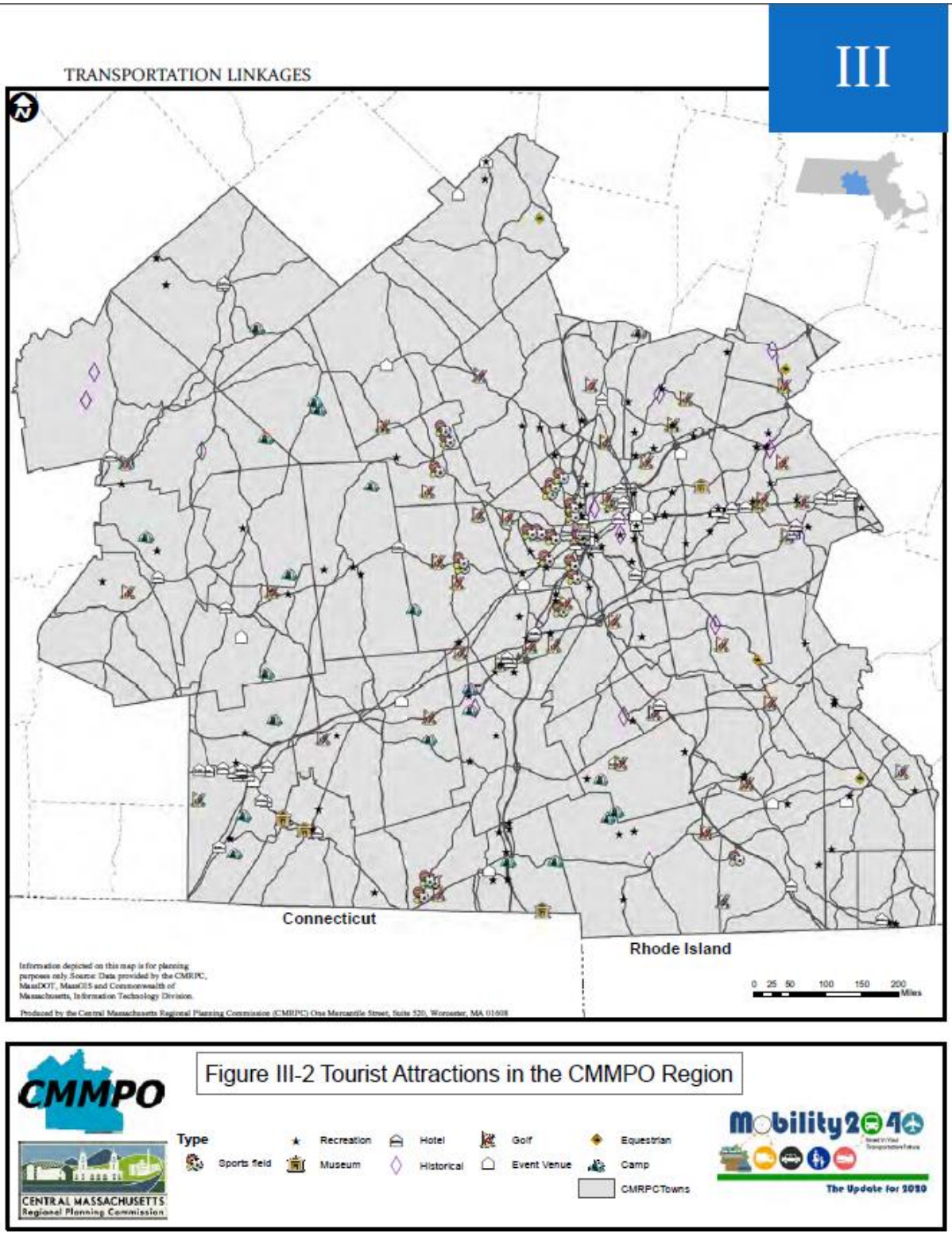
CMMPO Travel & Tourism Performance Measures and Targets

It has yet to be determined at this time as to what performance measures staff will use for this planning emphasis area. The tourism industry caters to different markets, population segments and trends. The CMMPO region is vibrant and eclectic, and therefore opportunities for tourism are not singular. Rather, the region boasts activities that fall under different categories within the tourism umbrella. This includes, but is not limited to the following:

- **Adventure Tourism** – It is a type of niche tourism, involving exploration or travel with a certain degree of risk, and which may require special skills and physical exertion. This may include activities such as mountaineering, trekking, bungee jumping, mountain biking, skiing, cycling, canoeing, scuba diving, rafting, kayaking, zip-lining, paragliding, hiking, exploring, sandboarding, caving and rock climbing.
- **Agritourism** – Any agriculturally-based operation or activity that brings visitors to a farm or ranch. It refers to farms stays, buying produce direct from a farm stand, picking fruit, navigating corn mazes, feeding animals, among other activities.
- **Sports Tourism** – Refers to traveling to observe or participate in a sporting event while staying apart from the tourist usual environment. This can include visiting a city to attend a sporting event, visiting halls of fame or meeting with professional athletes, or participating in a sporting event, like golf.
- **Cultural Tourism** – Includes tourism in urban areas, particularly historic or large cities and their cultural facilities such as museums and theatres. It can also include tourism in rural areas showcasing the traditions, values, or lifestyle of indigenous cultural communities.
- **Ecotourism** – Refers to visiting fragile, pristine, and relatively undisturbed natural areas, intended as a low impact and small-scale alternative to standard commercial mass tourism. Conserving the environment and improving well-being of local residents are some of the intentions of ecotourism.

Figure 50 shows some of the tourist locations previously summarized. The map was first created for the 2020 Long Range Transportation Plan (LRTP). Staff plans to update the map for the 2024 LRTP as additional tourist attractions become known.

Figure 50

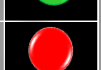

III
TRANSPORTATION LINKAGES
Connecticut
Rhode Island
Information depicted on this map is for planning purposes only. Source: Data provided by the CMRPC, MassDOT, MassGIS and Commonwealth of Massachusetts, Information Technology Division.
Produced by the Central Massachusetts Regional Planning Commission (CMRPC) One Mercantile Street, Suite 520, Worcester, MA 01608
0 25 50 100 150 200 Miles
CMMPO
Figure III-2 Tourist Attractions in the CMMPO Region
Type
Sports field
Recreation
Museum
Hotel
Historical
Golf
Event Venue
Equestrian
Camp
CMRPCTowns
CENTRAL MASSACHUSETTS Regional Planning Commission
Mobility2040
The Update for 2020

As the CMMPO's Travel and Tourism performance measures evolve, the resulting data and analysis will be provided in a future System Performance Report to determine if the CMMPO is meeting the regionally-customized targets and measures.

CMMPO Regionally-Customized Measures System Performance Report Card Overall Summary

Figure 51 shows the results of all of the CMMPO's regionally-customized measures for numerous federal emphasis areas. The categories included are Multimodal, Sustainability, Equity, Economic Vitality, Security, Stormwater Management, and Travel & Tourism. At this time, as noted above, there are no currently established measures and targets for Security and Travel & Tourism. Staff is working to determine what measures and targets will be used. The trends for the other categories have been updated using the most recent data available. The Sustainability, Equity and Economic Vitality targets are mostly doing well except for the average percentage of people that benefit from a TIP project. For the Multimodal category, the WRTA ridership targets are doing poorly, the sidewalk and ADA ramps target are doing well, and the bicycle lanes target still needs a trend to develop.

Figure 51 - 2022 Regionally-Customized Measures System Performance Report Card

	MEASURE	PAST STATUS	TARGET	CMMPO TREND	GOAL
MULTIMODAL	Condition of sidewalks		Increase the mileage of sidewalks in good condition in the CMMPO Region		*Improve and/or expand the transportation accessibility for all modes (bicycle, pedestrian, and transit) in the region.*
	Condition of ADA ramps		Increase the number of ADA ramps in good condition in the CMMPO Region		
	Miles of bicycle lanes		Increase bicycle lane miles in the CMMPO Region		
	WRTA ridership		Increase ridership on the WRTA system		
SUSTAINABILITY	MEASURE	PAST STATUS	TARGET	CMMPO TREND	GOAL
	Jobs to Housing Ratio		Maintain a jobs to housing balance between 0.75 to 1.50		*Encourage compact and mixed use development*
EQUITY	MEASURE	PAST STATUS	TARGET	CMMPO TREND	GOAL
	Percent of EJ & Vulnerable Populations intersecting WRTA fixed route bus service		To maintain or increase the % of EJ & Vulnerable populations that intersect WRTA bus routes		*Achieve geographic and population equity across the region*
	Percent of subregion costs per capita that benefits from a TIP project		Maintain an average % of people that benefit from a TIP project		
ECONOMIC VITALITY	MEASURE	PAST STATUS	TARGET	CMMPO TREND	GOAL
	Make Employment Opportunities Accessible and Available Allowing for Job Expansion and Reducing Transportation Costs		Reduce the amount of jobs lost		*To improve the accessibility to jobs in the CMMPO region*
SECURITY	MEASURE	PAST STATUS	TARGET	CMMPO TREND	GOAL
	To Be Determined		To Be Determined		*Enhance the transportation security coordination and preparedness regionwide*
STORMWATER MANAGEMENT	MEASURE	PAST STATUS	TARGET	CMMPO TREND	GOAL
	Culvert assessments on the federal-aid highway network		Increase the # of culverts assessed in the CMMPO region on the federal-aid network		*Create a transportation network that is resilient to the impacts of stormwater*
TRAVEL & TOURISM	MEASURE	PAST STATUS	TARGET	CMMPO TREND	GOAL
	To Be Determined		To Be Determined		*To enhance the access, safety and effectiveness of the region's transportation network that serves places of touristic value*