

The background of the cover features a yellow bus with the number 2207 and a wheelchair accessibility symbol. A cyclist in a red jersey and black helmet is riding a blue bicycle in the foreground. The text 'massDOT' is at the top, with 'mass' in green and 'DOT' in blue. Below it, 'Massachusetts Department of Transportation' is written in green. The word 'TRACKER' is in large, bold, blue letters, with icons for a train, wheelchair, and bicycle integrated into the letters.

# massDOT

Massachusetts Department of Transportation

# TRACKER

MassDOT's  
Annual Performance Report  
Fiscal Year 2016

Stephanie Pollack | Secretary and CEO  
Prepared by the Office of Performance Management and Innovation  
November 2016

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The data in this report represents the state fiscal year (FY) (July 1, 2015 through June 30, 2016) unless otherwise noted as federal fiscal year (FFY) or calendar year (CY).



## > A note from MassDOT CEO and Secretary Stephanie Pollack

Members of the General Court:

I am pleased to file the enclosed report to comply with Section 6.0 of Chapter 25 of the Acts of 2009, which requires that the Massachusetts Department of Transportation (MassDOT) submit a yearly Performance Management Report to the members of the House and Senate Ways and Means Committees and the Joint Committee on Transportation.

The MassDOT *Tracker*, MassDOT's sixth Annual Performance Management Report, summarizes the Department's performance for Fiscal Year 2016 (July 2015 through June 2016). Organized by division (Aeronautics, Highway, Rail and Transit, and Registry of Motor Vehicles) as well as the MBTA, the report explains how the divisions' performance measures relate to MassDOT's goals. This year's *Tracker* has expanded over that of 2015 in its scope of measures and now responds to all measures specified by the Legislature, except for a few cases where those mandated measures are still under development, as discussed in the report.

Last year's report served as a baseline document; for the first time, this year's report identifies targets set with division administrators. The target time horizons (two year, four year, and long-term) were established to align with the framework required under the Moving Ahead for Progress in the 21st Century Act (MAP-21), the federal surface transportation bill enacted in 2012.

This target-setting process included revisiting previously established targets to determine whether and how those targets needed to be adjusted. The process has been, and will continue to be, iterative. New inputs and perspectives are being added as: MAP-21 final rules come out, updated data and new data sources are available, new programs and policies are added, methods of reporting performance are refined and improved, and related MassDOT processes progress (e.g. CIP, MBTA Strategic Plan, Service Delivery Policy, etc.). As a result, some targets will inevitably change. Two-year targets were set for the MBTA performance measures. Four-year and long-term MBTA targets will be developed in coordination with the MBTA Fiscal and Management Control Board once the Strategic Plan is completed. The goal of these ongoing target-setting efforts is to significantly improve how MassDOT and the MBTA measure and assesses their performance. With improved measurement tools and a more nuanced understanding of the trends, MassDOT can respond more effectively to boost performance and improve the customer experience.

Every division of MassDOT is working hard to improve performance every day, for all users across all modes. *Tracker* helps identify those areas where MassDOT is falling short on achieving important targets. The Highway Division, for example, completed just 41 percent of its projects on-time. The Registry of Motor Vehicles has made progress toward its goal of reducing wait times in FY15, but more than 30 percent of service center customers waited for more than 30 minutes to be served. Through *Tracker*, MassDOT will continue to be transparent to the Legislature, users, and other stakeholders in reporting how well the Department is meeting these performance standards.

Performance highlights in this report include:

- > Improvement of pavement condition on MassDOT roadways;
- > The addition of metrics in the Highway Division that represent a broader spectrum of users and align with federal regulations;
- > An increase in the number of airports inspected in the course of the year;
- > An increase in the percentage of customers waiting less than 30 minutes to be served at the RMV and a decrease in the percentage of customers waiting more than 60 minutes;
- > The initial addition of performance measures on Regional Transit Agencies and rail assets to provide a more complete picture of transit and rail throughout the state;
- > Improvement in the reliability of the MBTA's bus, Commuter Rail, boat and paratransit service; and
- > Reliable service on the Blue and Orange Lines that exceed the targets.

We look forward to building on these successes and will continue to identify ways to improve how we serve our customers, how we monitor and report our performance, and how we develop internal and external strategies to turn this information into better outcomes for the Commonwealth and its transportation systems.

*Respectfully submitted,*

**Stephanie Pollack**

*Secretary & Chief Executive Officer of the Massachusetts Department of Transportation*



# Introduction

## > Purpose of this report

*Tracker* responds to Chapter 25 of the Acts of 2009 requiring that “a report of the project information system and performance measurements shall be published annually and made available to the public.”

The Massachusetts Department of Transportation’s Office of Performance Management and Innovation (OPMI) is charged with:

- > Evaluating the goals and measures established by the Department and its divisions and monitoring reported results;
- > Recommending changes to proposed goals and measures as are appropriate to align them with the strategic priorities of the Secretary; and
- > Reporting regularly to the public on the progress the Department and its divisions are making to achieve stated goals. For example, the MBTA launched its dashboard ([mbtabackontrack.com](http://mbtabackontrack.com)) in March, 2016. The website is updated daily (where possible) with reliability, financial, ridership and customer satisfaction measures.

Since its inception in 2009, MassDOT has utilized performance management throughout the agency. Now seven years old, MassDOT has fully integrated the concepts and tools of performance monitoring and management into its processes and practices. Among other benefits, this approach helps the executive leadership team make strategic decisions, allows management level staff to best allocate personnel resources on a daily basis, and provides front-line employees with a picture of the impact their work is having to improve our transportation system and the experience of our customers.

Moving Ahead for Progress in the 21st Century (MAP-21), the federal transportation legislation enacted in 2012, embraced performance-based management and the reliance on performance measures as a core principle for recipients of federal transportation funding. Subsequent legislation – Fixing America’s Surface Transportation (FAST) Act – signed in December, 2015, supports the performance management aspects of MAP-21, with small reporting adjustments. As draft and final rule-making about the mandated MAP-21 performance measures have been released, MassDOT has been working actively to prepare for and adhere to these regulations. MassDOT’s established commitment to performance management provides a good foundation from which to engage and collaborate with transportation partners to meet the new federal requirements. Where applicable, these federal requirements are noted throughout this report.

This report provides an overview of performance across MassDOT for fiscal year 2016 (July 2015 through June 2016). Instances where the calendar is different are noted. It presents trends tracked through selected performance measures. This report is descriptive; it is not intended to solve problems but instead to identify areas of both successes and weaknesses. Those problems are addressed through many other related processes and plans throughout the Department. *Tracker* is organized by five operational divisions (Highway, Aeronautics, the Registry of Motor Vehicles, Rail & Transit, and the MBTA). Each Division section is organized by the five MassDOT performance goals described in the next section.

## > MassDOT performance goals

The Secretary of Transportation established five goals for MassDOT and the MBTA. The purpose of these goals is to articulate the critical drivers for the agency's programs and processes, and to provide a framework for the interrelated activities that occur across the operational divisions. The five performance goals were developed based on a review of the goals that peer state DOTs have defined, and a consideration of the strategic direction and values of the administration. The goals are:



### **Customer Experience**

Provide reliable and accessible services to MassDOT and MBTA customers and ensure that they are satisfied with the services provided.



### **System Condition**

Ensure that the transportation system is well maintained and follows best practices for maintaining, preserving, and modernizing assets.



### **Budget and Capital Performance**

Maximize capital investment effectively and efficiently by delivering programs and projects that produce the greatest benefits to the Commonwealth, its residents, and its visitors.



### **Safety**

Provide and support a multi-modal transportation network that is safe for our workers and all users.



### **Healthy and Sustainable Transportation**

Invest in and support a transportation system that promotes and protects the health of all users and the natural environment.

These performance goals, together, inform the work that MassDOT and MBTA employees conduct each day, and provide a framework for prioritizing resources. Each operational division's performance measures have been organized by the performance goal categories.

## > MassDOT performance measures

The performance measures selected for inclusion in this report are the result of a number of inputs. The publication of *Tracker* is grounded in the 2009 legislation (updated in 2013), which provides specific performance measures to be included in the report. In addition, OPMI has worked to add to, or align, these measures with those that are federally mandated in final rulemaking through MAP-21. Along with those, each operating division has selected measures that provide the most accurate picture to legislators, partners and the public of performance on core practices.

Each year in the production of *Tracker*, OPMI works in coordination with each operating division to reassess the performance measures. This year, however, this process was more rigorous due to the target-setting effort (see more below). Beginning in February 2016, OPMI met with each division and the MBTA to discuss performance measures and establish performance targets for the publication of the FY16 *Tracker*. OPMI pulled all performance measures from previous *Tracker* reports, as well as other relevant reports and studies to create an inventory of possible measures. These measures were fully vetted by division staff and administrators, and a final set was presented to the Secretary for comment and approval.

## > MassDOT performance targets

Once the set of performance measures were established, OPMI provided a historical trend analysis for each measure. These analyses were placed in the context of Massachusetts legislated targets, fiscal constraints and associated projections (e.g. the Planning for Performance tool used for the 2017-2021 Capital Investment Plan (CIP)) and any other previous or existing targets identified by the division in related efforts (e.g. the MBTA's updated Service Delivery Policy). Using this context, the operating divisions recommended a set of targets to the Secretary for approval.

To best align with the horizons established for federal performance measures (through MAP-21 and FAST), MassDOT has adopted three time horizons: two year, four year, and long-term/aspirational. At each two year mark, the four year target will be revisited and potentially revised as a new two year target, and a new four year target will be selected. Long-term targets may also be revised at this point, as new factors, conditions, priorities and funding realities come into play. In addition, the targets associated with the federal performance measures may shift as MassDOT continues to comply with the regulations and follows the target setting process defined through the final rule-makings.

## > Peer state comparisons

Tracking performance over time within an agency is fundamental to performance management. However, it is also instructive to understand how an agency performs within the context of its peers. To provide a backdrop for MassDOT's performance within the nation, this year's *Tracker* includes a comparison on select measures to six peer states. These peer states – Connecticut, Maryland, New Hampshire, New Jersey, Rhode Island, and Washington – were selected as a group in a study conducted by Dr. Patricia Hendren and Dr. Debbie A. Niemeier. Published in 2008, their research is presented in a paper titled "Identifying peer states for transportation system evaluation and policy analyses."<sup>1</sup> The peer states were grouped based on historical data for 42 variables (including population, geographic location, transportation infrastructure, economic factors, etc.). The peer measures presented in *Tracker* are those for which data are easily available to MassDOT.

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1 Hendren, P. & Niemeier, D.A. Transportation (2008) 35: 445. doi:10.1007/s11116-008-9158-8

## > The data behind performance

MassDOT and the MBTA collect large amounts of data, across a diverse set of activities and programs. These data are collected in many time increments – annually, monthly, daily, hourly, etc. - depending upon what they measure. OPMI works closely with the many divisions to leverage these data to provide the most useful outputs and resources to understand performance trends, provide accountability and transparency, analyze the impacts of interventions, inform policy decisions, and guide resource allocation. To provide the best possible data resource, OPMI and its partners throughout the agency are continually striving to improve data sources, data collection, and data analysis. The outcome of this work is often improved reporting, but it can also lead to a disconnect between one year and another (where the data collection or measure changed), or to a lack of historical data. Despite this, the ongoing work allows MassDOT and the MBTA to improve the performance of our operations through more accurate information and better tools.

# Tracker Numbers



**15 RTAs**

providing public transportation across the Commonwealth



**29 RMV**

**Service Centers**

in Massachusetts serving 2.9 million customers in FY16



**1,700**

**bikes and counting**

Hubway bike-share bicycles, stations and users continue to grow, contributing to sustainable public transportation



**36 airports**

public-use, general aviation



**170 bus routes,**



**19 rail lines**

operated by MBTA



**5.1 million**

**drivers**

currently licensed by the Commonwealth



**1.3**

**million**

**daily MBTA passengers**

in FY16



**1.3 million**

vehicles registered in Massachusetts in FY16



**3,483**

**bridges**

owned by MassDOT



**> 9,500**

**lane miles**

of state roadways maintained by MassDOT



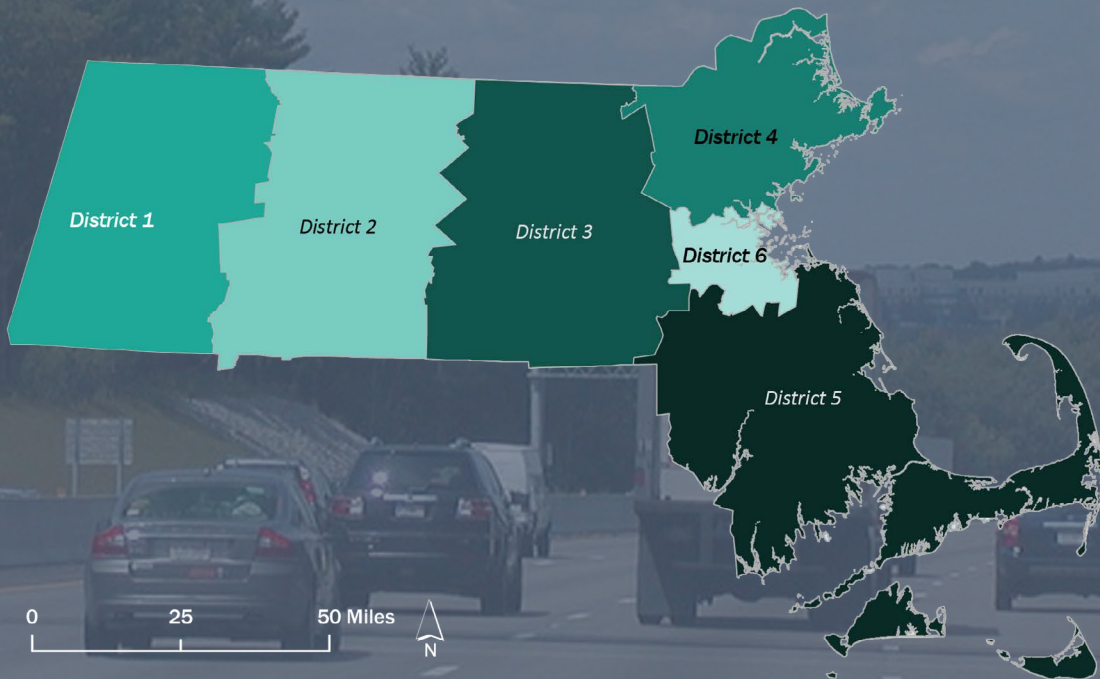
# Highway Division






## Overview

The Highway Division's 2,800 employees work to maintain a safe and durable highway network to facilitate transportation for people and goods. Efficient movement throughout the state is key to our quality of life, economy, and environment. The Division's core responsibilities are to: ensure highway safety; design, construct, and preserve highway infrastructure; and maintain and operate the highway network.

The Highway Division is comprised of six Districts spanning the Commonwealth. The Division owns 9,578 lane miles of roadways including all interstates and limited-access freeways. Likewise, the Division is responsible for over 5,000 bridges and of those, owns 3,458. Additionally, MassDOT oversees the design and construction of municipal projects that are federally funded. As such, the Highway Division plays a key role in coordinating across all levels of roadway design, construction, maintenance, and operation in the Commonwealth.



## HIGHWAY DIVISION - 2016 SCORECARD



| PURPOSE   | PERFORMANCE MEASURE                                      | CURRENT (FY16)   | CHANGE FROM FY15                                     | 2-YEAR TARGET                 | 4-YEAR TARGET           | LONG-TERM TARGET                      |
|---|--|--|--|-------------------------------|-------------------------|---------------------------------------|
|    | E-ZPass payment rate (vs cash)                           | <b>79%</b>   | +1%  | 90%                           | 92%                     | 95%                                   |
|   | E-ZPass payment rate (vs pay-by-plate)-Tobin Bridge only | <b>85%</b>   | +1%  | 90%                           | 92%                     | 95%                                   |
|   | Average commute time <sup>1</sup>                        | <b>28.3 minutes</b> (CY 2010-2014 5-year ACS estimate) | +0.3 minutes (from CY 2009-2013 5-year ACS estimate) | Context only - no targets set |                         |                                       |
|    | PSI - Interstate (% good and excellent condition)        | <b>82%</b> (FFY15)                                     | +1.7% (FFY14)  | 85%                           | 88%                     | 90%                                   |
|   | PSI - Non-interstate (% good and excellent condition)    | <b>62%</b> (FFY15)                                     | -2.3% (FFY14)  | 62%                           | 62%                     | 62%                                   |
|   | PSI - Interstate (% poor)                                | <b>2.2%</b> (FFY15)                                    | -0.1% (FFY14)  | No more than 5%               | No more than 5%         | Less than 5%                          |
|   | PSI - Non-interstate (% poor)                            | <b>12.6%</b> (FFY15)                                   | -0.8% (FFY14)  | 12.6%                         | 12.6%                   | 12.6%                                 |
|   | Pavement repair backlog                                  | <b>3,030 lane miles</b> (FFY15)                        | +90 lane miles (FFY14)                               | Context only - no targets set |                         |                                       |
|   | Structurally deficient bridge count                      | <b>448</b>   | +6   | Context only - no targets set |                         |                                       |
|   | Structurally deficient deck area (NHS only)              | <b>14.71%</b>  | +0.33%   | 14%                           | 13%                     | Less than 10%                         |
|   | Bridge Health Index                                      | <b>85.05</b>   | +0.73  | 88                            | 92                      | 95                                    |
|  | Failed or missing curb ramps                             | <b>6,700</b> (FY12)                                    | no data  | 40% reduction from FY12       | 60% reduction from FY12 | Move towards 100% reduction from FY12 |
|   | Percent of contracts completed on or under budget        | <b>74%</b>   | +3%  | n/a <sup>2</sup>              | 75%                     | 80%                                   |
|   | Percent of contracts completed on time                   | <b>41%</b>   | -14%   | n/a <sup>2</sup>              | 75%                     | 80%                                   |
|   | Number of contracts in construction phase                | <b>320</b>   | no data  | Context only - no targets set |                         |                                       |
|   | Number of contracts planned for next year <sup>3</sup>   | <b>50</b>  | no data  | Context only - no targets set |                         |                                       |
|   | Number of construction contracts completed in year       | <b>191</b>   | +13  | Context only - no targets set |                         |                                       |
| Percent of STIP projects advertised in year   | <b>86%</b> (FFY16)                                       | +5% (FFY15)  | 80%  | 90%                           | 95%                     |                                       |

1 Based on US Census American Community Survey (ACS)

2. Due to the multi-year process associated with construction contracts, a 2-year target was not set.

3. These projects are in addition to the 320 active projects going into 2017.

**HIGHWAY DIVISION - 2016 SCORECARD**

| PURPOSE   | PERFORMANCE MEASURE  | CURRENT (FY16)                                    | CHANGE FROM FY15                             | 2-YEAR TARGET                       | 4-YEAR TARGET                       | LONG-TERM TARGET                 |
|---|--|---|--|-------------------------------------|-------------------------------------|----------------------------------|
|    | Fatalities in roadway work zones   | <b>5</b> (CY10-CY14 rolling average)              | -1 (from CY09-CY13 rolling average)          |                                     |                                     |                                  |
|   | Number of fatalities <sup>4</sup>  | <b>362</b> (CY10-CY14 rolling average)            | +0.83% (+3 from CY09-CY13 rolling average)   |                                     |                                     |                                  |
|   | Number of fatalities per 100 million VMT <sup>4</sup>  | <b>0.65</b> (CY10-CY14 rolling average)           | No change from CY09-CY13 rolling average     |                                     |                                     |                                  |
|   | Number of non-motorized fatalities and serious injuries <sup>4</sup>                           | <b>923</b> (CY10-CY14 rolling average)            | -2.3% (-22 from CY09-CY13 rolling average)   |                                     |                                     |                                  |
|   | Number of serious injuries <sup>4</sup>  | <b>4,397</b> (CY10-CY14 rolling average)          | -3.3% (-151 from CY09-CY13 rolling average)  | 2% reduction from CY10-CY14 average | 4% reduction from CY10-CY14 average | Move Towards Zero                |
|   | Number of serious injuries per 100 million VMT <sup>4</sup>                                    | <b>7.89</b> (CY10-CY14 rolling average)           | -4.6% (-0.35 from CY09-CY13 rolling average) |                                     |                                     |                                  |
|   | Number of pedestrian fatalities  | <b>74</b> (CY10-CY14 rolling average)             | +7.3% (+5 from CY09-CY13 rolling average)    |                                     |                                     |                                  |
|   | Number of bicycle fatalities   | <b>8</b> (CY10-CY14 rolling average)              | No change from CY09-CY13 rolling average     |                                     |                                     |                                  |
|   | Number of motorcycle fatalities  | <b>44</b> (CY10-CY14 rolling average)             | -6.4% (-3 from CY09-CY13 rolling average)    |                                     |                                     |                                  |
|  | Fuel efficiency of MA vehicles (effective miles per gallon)                                    | <b>20.84</b> (CY14, quarter 4 average)            | +0.17 (CY13)                                 | Context only - no targets set       |                                     |                                  |
|   | Daily vehicle miles traveled per capita  | <b>23.7</b> (CY14)                                | +0.4 (CY13)                                  | 23.0 (2008 levels)                  |                                     |                                  |
|   | Pedestrian facilities (including sidewalks and existing or under construction multi-use paths) | <b>18,017 miles</b> (including non-state-owned)   | n/a  | 250 miles new or rebuilt            | 425 miles new or rebuilt            | Pedestrian plan network complete |
|   | Multi-use paths existing or under construction   | <b>927 lane miles</b> (including non-state-owned) | n/a  | TBD                                 | TBD                                 | Bicycle plan network complete    |
|   | On-road bicycle facilities existing or under construction                                      | <b>934 lane miles</b> (including non-state-owned) | n/a  | TBD                                 | TBD                                 | Bicycle plan network complete    |
|   | Number of Complete Street policies registered/passed   | <b>105/51</b>                                     | n/a  | 200/100                             | 300/150                             | 351 passed                       |

4. required by MAP-21

# Customer Experience

## > E-ZPass payment rate (vs cash)

E-ZPass, MassDOT’s electronic toll collection program, allows users to pay tolls via a transponder attached to the windshield. Currently, E-ZPass is accepted at all toll booth locations throughout the Commonwealth. The use of E-ZPass can be tracked by the E-ZPass payment rate, which is the percentage of all toll transactions that are completed using a transponder. The E-ZPass payment rate has increased steadily since FY12. This metric is especially critical with the launch of the All Electronic Tolling System (AET). This program was live as of October 2016 and completely automated toll collection statewide through either E-ZPass or Image Based Tolling, with no in-lane toll payment accepted. Customers who pass through the tolls without a transponder receive a bill in the mail.

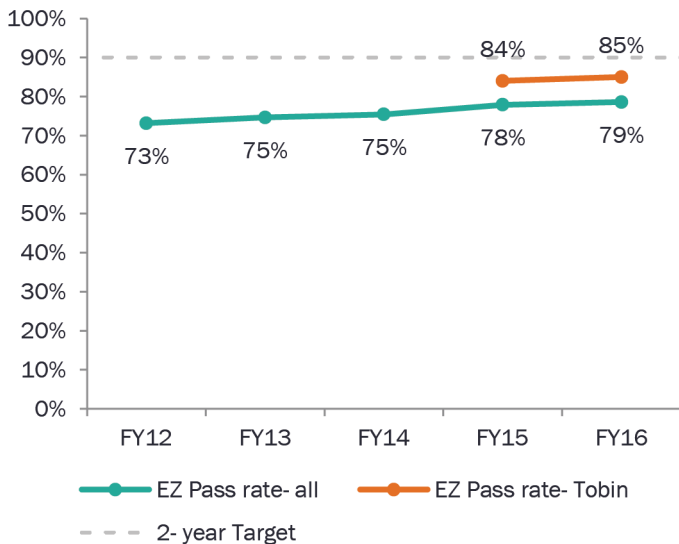


Figure 1. E-ZPass payment rates

## > E-Z Pass payment rate (vs pay-by-plate) –Tobin Bridge

AET has been operational on the Tobin Bridge since July 21, 2014. This provides an early view of the E-ZPass payment rate. The rate of transponder use is important for MassDOT, as more pay-by-plate customers translate into increased administrative costs and decreased system efficiency. The percent of transactions completed via E-ZPass has increased since the Tobin program began.



### About the measure

#### E-ZPass payment rate vs. cash

The percentage of customers paying tolls using a transponder. A transponder is a small electronic device that attaches to the inside of the vehicle windshield.



### About the measure

#### E-ZPass payment rate vs. pay-by-plate

The percentage of customers paying tolls using a transponder on the Tobin Bridge (where cash is not accepted). Customers who do not have a transponder and therefore do not pay the toll are identified via their license plate and mailed a request for payment.

This is the basis for the AET program. This measure, specific to the Tobin Bridge, provides a preview of the rate of transponder use throughout the Commonwealth.

| PERFORMANCE MEASURE  | FY16 (ANNUAL) PERFORMANCE | 2-YEAR TARGET | 4-YEAR TARGET | LONG-TERM TARGET |
|--|---------------------------|---------------|---------------|------------------|
| E-ZPass payment rate   | 79%                       | 90%           | 92%           | 95%              |
| E-ZPass Payment rate (vs. pay-by-plate) - Tobin Bridge only* | 85%                       | 90%           | 92%           | 95%              |

\*In future Trackers, E-ZPass payment vs. pay-by-plate will be the only toll measure reported, as AET will be fully operational on all toll roads.



## > Average commute time

The time that it takes residents of the Commonwealth to travel to work is an indicator of a number of factors:

- > the congestion on the roadways (which can increase as the economy improves and is a function of capacity on the roadway network);
- > land use patterns that influence where residents live and work;
- > and the available travel modes that residents choose to utilize.

While the extent of some of these factors are not directly impacted by MassDOT, average commute time is a useful context performance measure to gauge system efficiency. Therefore, MassDOT does not have a target for this measure. However, a downward trend is desirable (from the standpoint of the health of the environment).

The US Census' American Community Survey (ACS) is the best annually updated data source available for average commute times. The ACS surveys a sample of the US population on a range of topics each year, including average commute time. These data, reported by calendar year, allow us to track annual trends and compare to peer states. Figure 3 shows that there has been a general upward trend in commute time since

CY06. However, the good news is that 57% of residents spend less than 30 minutes getting to work.

### Average commute time by mode

A presentation of commute time by mode provides a picture of who is spending the most time traveling to work. Public transportation commuters experience the highest percentage of commutes of more than half an hour. Decreasing this average commute time on public transit (e.g. by offering additional express transit service in key locations) could result in both more commuters choosing public transit and reducing the commute times

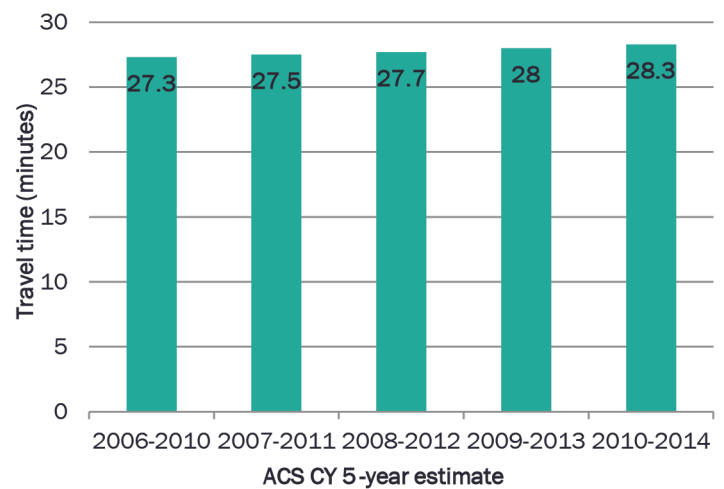


Figure 3. Mean travel time to work of workers 16 years and over who did not work at home (Source: ACS)

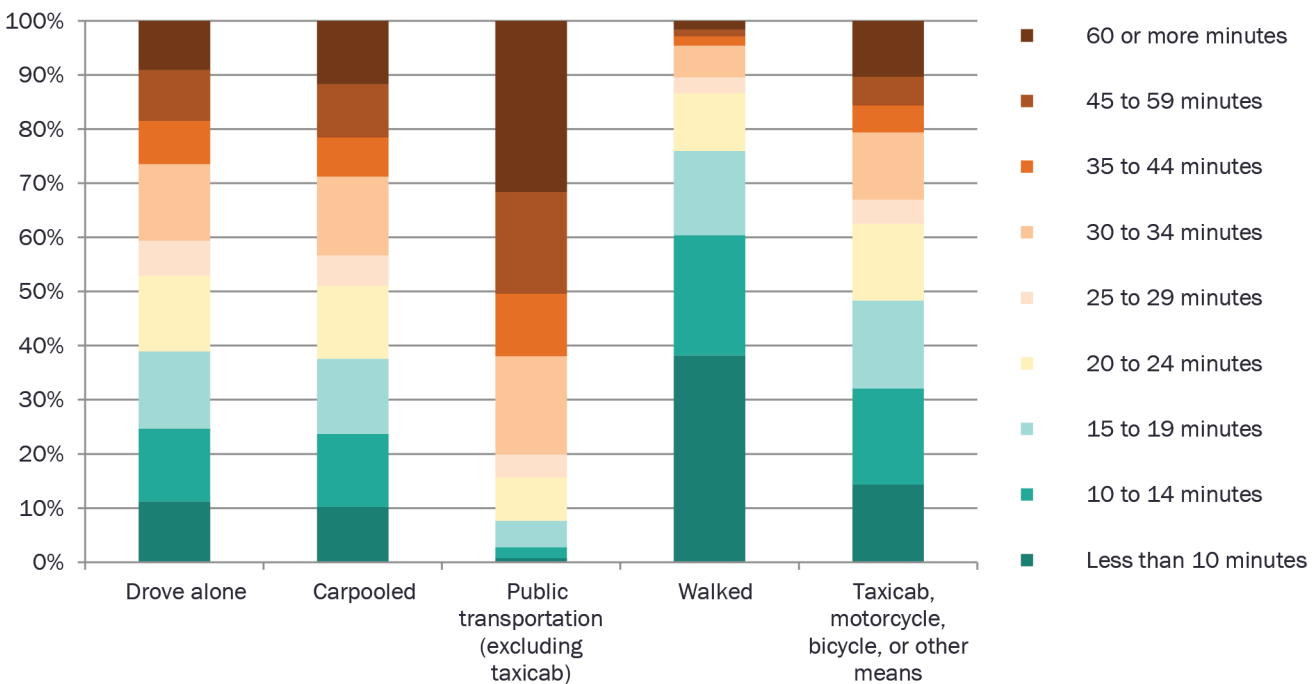


Figure 2. Commute time by mode (Source: ACS CY10-CY14 5-year estimate)

of those who continue to drive to work. As OPMI works to identify more advanced performance measures that can target the cause of commute times (e.g. reliability, congestion), MassDOT will have additional information about how to make investments that will effectively improve these outcomes and the experience of our customers.

### Average commute time - peer state comparison

Among the group of peer states, Massachusetts currently ranks fifth out of seven peer states for longest average commute time; New Hampshire and New Jersey both have longer average commutes. While all seven states have experienced an increase in average commute from the CY06-CY10 period, Massachusetts has increased 3.66%.

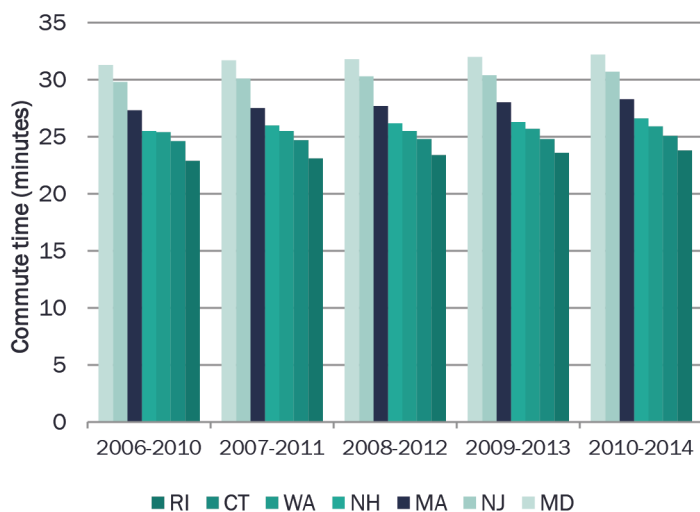


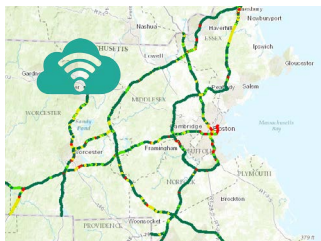
Figure 4. Average commute time estimate per calendar year, peer state comparison (Source: ACS)

# System Condition

## ► PSI (Non-interstate and interstate pavement condition)

A pavement condition measure is required by both MAP-21 and MA 2009 legislation, although the categories of roadway type for reporting requirements vary. Here, we are reporting Pavement Serviceability Index (PSI) on interstate and non-interstate (MassDOT-owned) pavement conditions. PSI is measured on the FFY calendar. The proposed targets are based on current conditions, apply to state-owned roadways, and consider both the percentage of roadway in “good” or “excellent” condition and the percentage of roadway in “poor” condition.

Over the past five federal fiscal years (FFY) the percentage of interstate pavement in “good” or “excellent” condition has increased from 77% in FFY11 to nearly 82% in FFY15. In that same time period, the percentage of interstate



PSI interactive map



### About the measure PSI

Pavement Serviceability Index (PSI) is a composite pavement condition index that considers the severity and extent of cracking, rutting, and raveling on surfaces as well as ride quality. It measures the conditions of the pavement from impassable to perfectly smooth. The PSI thresholds “excellent,” “good,” “fair,” and “poor” are different for interstate highways vs other state highways and are fully developed within MassDOT’s Pavement Management System. The condition thresholds for interstate highways are more stringent to support the higher speeds and volumes present on those facilities. Interstate pavement inspections are conducted annually and the remaining NHS inspection data is collected on a biennial basis.

### Interstate (lane miles) pavement condition

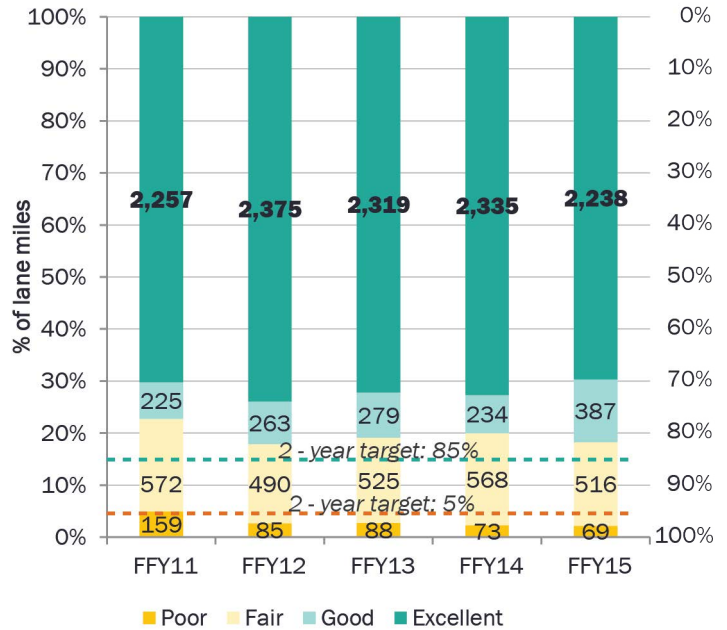


Figure 5. Interstate pavement condition

### Non-interstate (lane miles) pavement condition

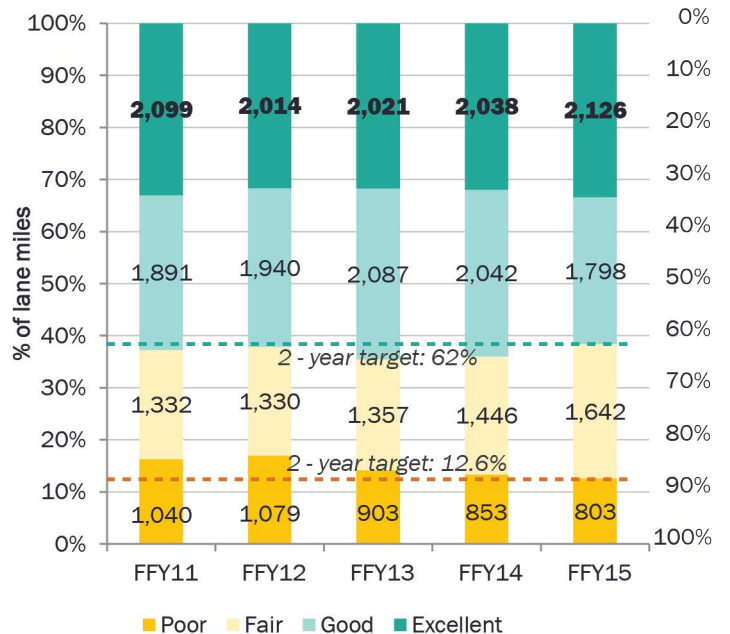


Figure 6. Non-interstate pavement condition

pavement in “poor” condition has dropped from 4.9% to 2.2%, well below the FHWA threshold of no more than 5%.

The percentage of MassDOT-owned non-interstate pavement in “good” or “excellent” condition has declined slightly from 63% in FFY11 to 62% in FFY15. The percentage of pavement in “poor” condition has continually declined for non-interstate pavements, and reached 12.6% in FFY15. The 2017-2021 CIP process, finalized in June 2016, considered the impacts of funding across program areas using the Planning for Performance tool. Given current funding levels approved by the MassDOT Board, the condition of MassDOT-owned non-interstate pavements will deteriorate over the next 10 years from the current condition of 62% “good/excellent,” to 32% “good/excellent” and 66% “poor.” As a result, MassDOT has set a target to maintain current pavement condition levels over both the near and long-term.

The Highway Division will be exploring strategies to improve our performance while keeping the investment level consistent with the CIP. We will be joining the Every Day Counts 4 initiative related to pavement preservation. Through this effort we will exchange information with

FHWA and other states on best practices to improve pavement condition such as pavement preservation. This strategy uses cost effective treatments that extend pavement life. With an average cost of preservation treatments at \$25,000-50,000 per lane mile, treatments range from chip seals, microsurfacing, ultrathin bonded overlays, crack sealing and fog seals to high performance thin overlays such as asphalt rubber modified pavements. In comparison, conventional resurfacing projects average approximately \$200,000 per lane mile and reconstruction activities routinely exceed \$1M per lane mile. Research has shown that for every dollar spent on preservation, six to ten dollars are saved that would have to be spent on rehabilitation or reconstruction if the conditions are left to degrade. MassDOT’s Pavement Management System (PMS) utilizes a balanced approach to distribute funding between preservation projects and the “worst first” projects (i.e. those with pavements in “poor” condition). Using this approach, the PMS is able to optimize the system by maximizing the number of roads in “good” condition while addressing the backlog in “poor” condition.

Another consideration in pavement condition maintenance is the traffic volumes. Figure 7 displays the relationship between these two elements.

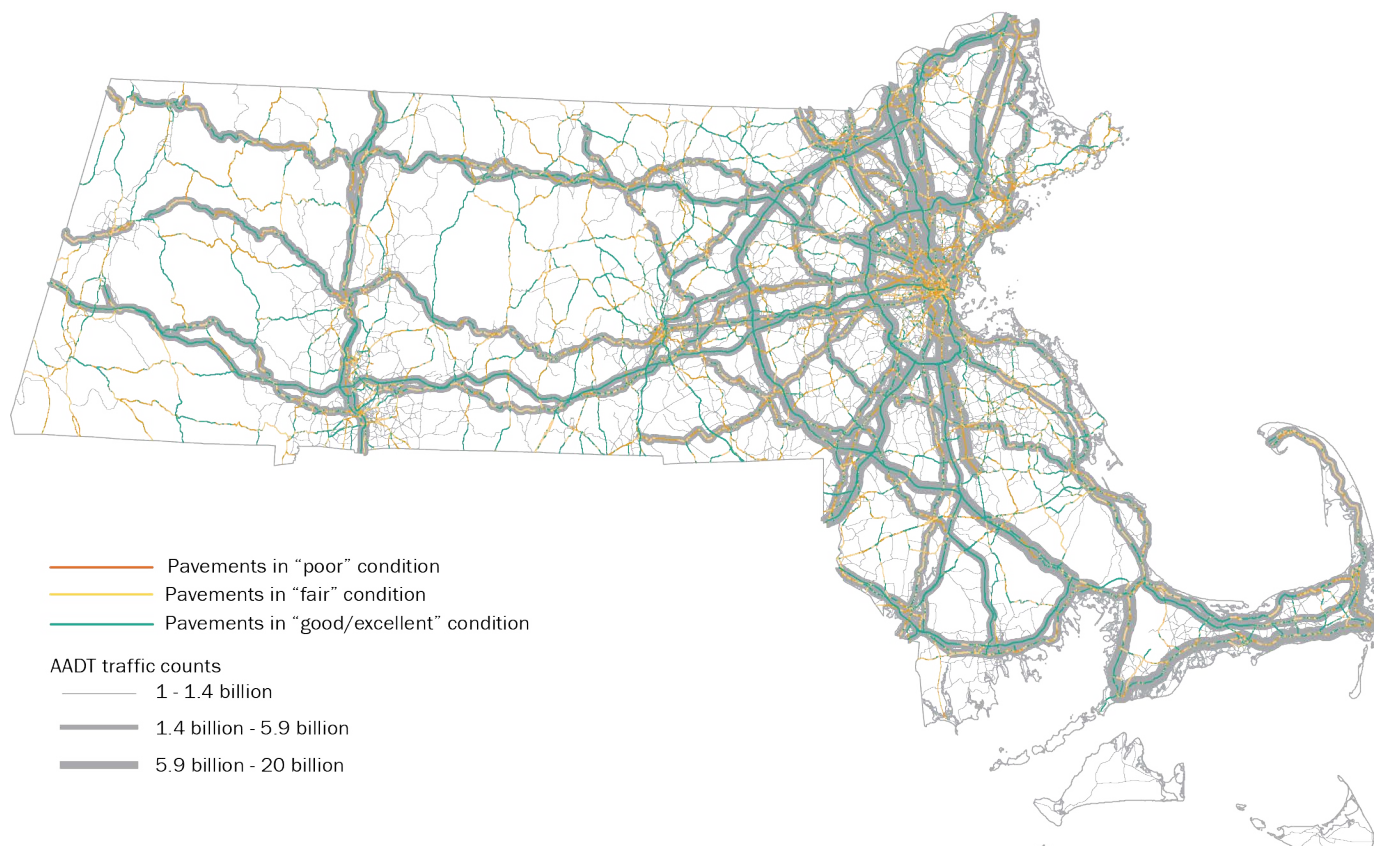


Figure 7. Map of PSI (FFY14 and FFY15, depending on latest inspection year) and annual average daily traffic (AADT) counts, 2015.



| PERFORMANCE MEASURE                                   | FFY16 PERFORMANCE | 2-YEAR TARGET   | 4-YEAR TARGET   | LONG-TERM TARGET |
|---|-------------------|-----------------|-----------------|------------------|
| PSI - Interstate (% good and excellent condition)     | 82% (FFY15)       | 85%             | 88%             | 90%              |
| PSI - Non-interstate (% good and excellent condition) | 62% (FFY15)       | 62%             | 62%             | 62%              |
| PSI - Interstate (% poor)                             | 2.2% (FFY15)      | No more than 5% | No more than 5% | Less than 5%     |
| PSI - Non-interstate (% poor)                         | 12.6% (FFY15)     | 12.6%           | 12.6%           | 12.6%            |

### ➤ Pavement repair backlog

The pavement repair backlog articulates the need for pavement repairs as defined by lane miles which are not in “good” or “excellent” condition. There are currently 3,030 lane miles of pavement in “fair” and “poor” condition (considering state-owned interstate and non-interstate roadways).

The backlog has remained relatively consistent over the past 5 years, but has varied across the 6 districts. For example, while District 1, District 3, and District 6 have steadily decreased their backlogs over the past 5 years, District 2, District 4, and District 5 have experienced an increase in backlog.

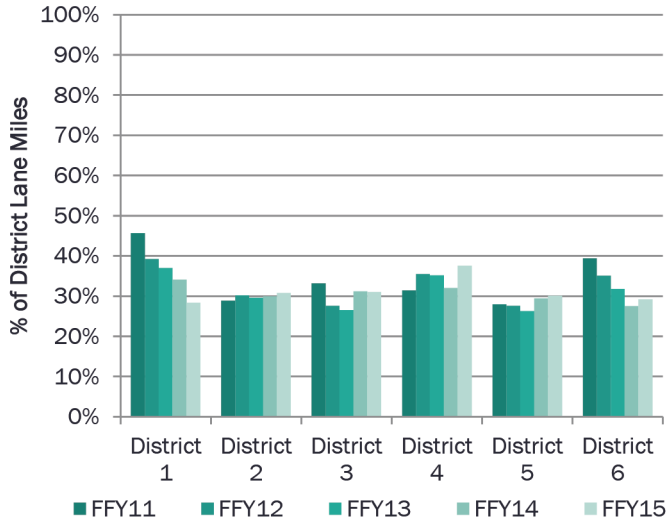


Figure 8. Pavement repair backlog 5-year trend (% of district lane miles)

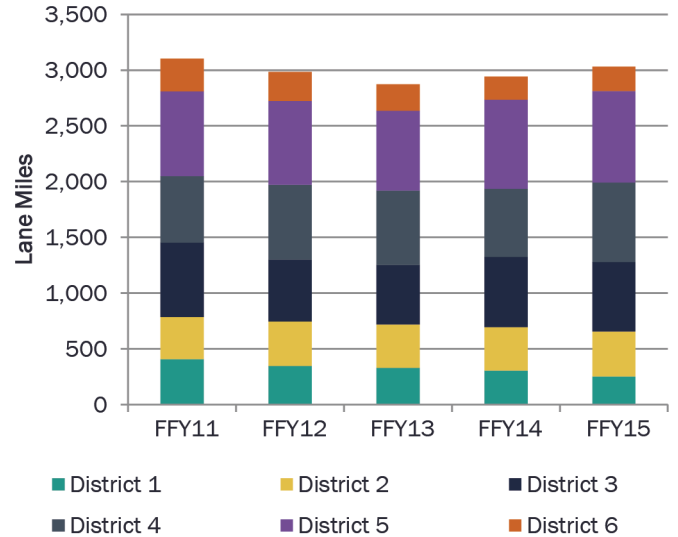


Figure 9. Pavement repair backlog 5-year trend (total lane miles by year)

## ➤ Structurally deficient bridges

MassDOT is now reporting bridge condition using three different measures. Historically, the primary Highway Division measure for bridge performance has been the number of structurally deficient bridges (SD) within the State. Bridge Health Index (see following page) has been presented as an additional, more relatable, measure for the public. MAP-21 requires that states now report the condition of National Highway System (NHS) bridges by the percentage of deck area on structurally deficient structures compared with 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. The Highway Division understands the value of considering size in the forecasting of bridge performance, specifically due to the proportion of the Accelerated Bridge Program dedicated to large bridges. To inform the investment plan required to achieve the target, the Highway Division is developing a model to predict performance by deck area. The new model will replace previous analysis, and improve reporting accuracy of bridge condition. Until this revised analysis is complete, the number of structurally deficient bridges is provided for context only.

The average number of structurally deficient bridges has declined since FY12, yet increased slightly since last fiscal year.

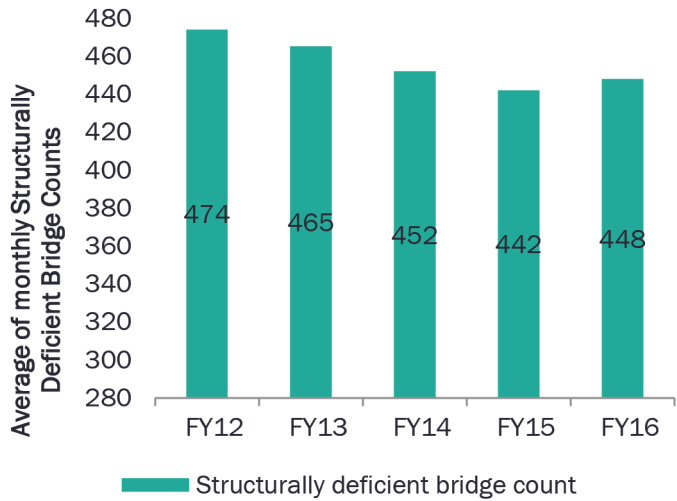


Figure 10. Average of monthly structurally deficient bridge counts for each fiscal year

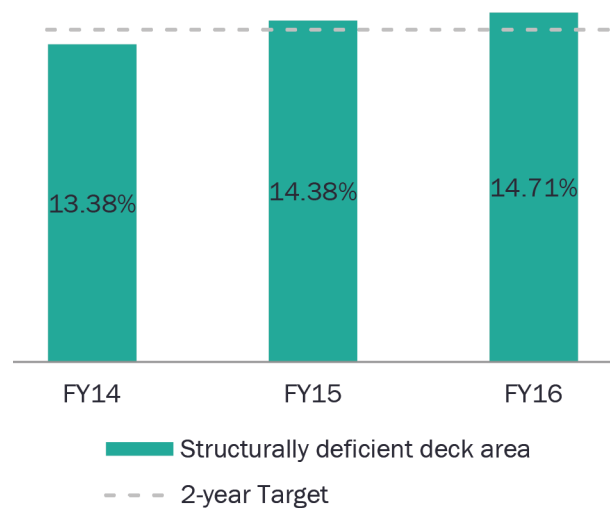


Figure 11. Average structurally deficient deck area on the NHS



### About the measure Structurally deficient bridges

A bridge is rated as structurally deficient (SD) when the deck (driving surface), the superstructure (supports immediately beneath the surface), or the substructure (foundation and supporting posts and piers) are rated at condition 4 or less on a scale of 0-9. Structural deficiency does not necessarily imply that a bridge is unsafe. It does, however, mean that a structure is deteriorated to the point of needing repairs immediately to prevent restrictions on the bridge.



### About the measure Structurally deficient deck area

This provides a different SD bridge measure by taking into consideration the size of the bridge spans. This measure is calculated by comparing the amount of deck area that is associated with a structurally deficient bridge to the total area of bridge deck in the Commonwealth. For example, using the old approach, the Longfellow Bridge would have the same significance as any other bridge. In reality, the bridge is 15 times greater than an average NHS bridge in the Commonwealth.

### ➤ Structurally deficient deck area (NHS only)

All DOTs are required to report this measure, per the National Performance Program outlined in the MAP-21 federal transportation legislation. States reporting more than 10% of bridge deck area associated with a structurally deficient NHS bridge will be required to allocate a certain percentage of funds to the Highway Bridge Program until the standard is met. The targets proposed for this measure are based upon this threshold.

Structurally deficient deck area has not changed significantly over the past three fiscal years (approximately a 1% increase). The 2-year target seeks to maintain the performance achieved in past years (14%).

### ➤ Bridge Health Index

Bridge Health Index (BHI) provides an additional measure of the condition of our bridge assets. BHI has increased slightly from 81 to 85, over the past five fiscal years. The 2-year target seeks to increase this rate by an additional 3 points.

OPMI has worked with Highway Division staff to produce targets that will lead MassDOT toward bridges in better condition, with the understanding that some elements will always be in need of repair (and therefore the BHI will never reach 100).

### ➤ Failed or missing curb ramps

To meet the obligation of the development of an ADA Transition Plan, MassDOT has implemented a program to reconstruct substandard curb ramps statewide. In 2012 an inventory was created to look at all 26,000 curb ramps throughout the Commonwealth. Almost 6,300

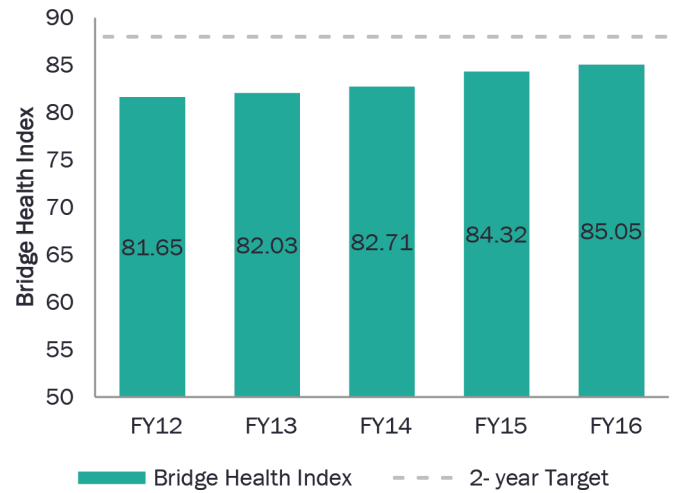


Figure 12. Bridge Health Index



## About the measure

### Bridge Health Index

The Bridge Health Index (BHI) provides a comprehensive overview of the condition of all bridge elements across the network. This measure, reported on a scale of 0 to 100, reflects element inspection data in relation to the asset value of a bridge or network of bridges. A value of zero indicates all of a bridge's elements to be in the worst condition.

were found to be failing or missing. The targets for this measure are based upon that planned scope of work. These targets will be revisited after two years and will incorporate the more sophisticated inventory that the Highway Division is working on through the asset management effort.

| PERFORMANCE MEASURE                         | FY16 (ANNUAL) PERFORMANCE | 2-YEAR TARGET                    | 4-YEAR TARGET                    | LONG-TERM TARGET                               |
|---|---------------------------|----------------------------------|----------------------------------|--|
| Structurally deficient bridges              | 448                       | Context only - no targets        |                                  |  |
| Structurally deficient deck area (NHS only) | 14.71%                    | 14%                              | 13%                              | less than 10%                                  |
| Bridge Health Index (BHI)                   | 85.05                     | 88                               | 92                               | 95   |
| Number of failed or missing curb ramps      | 6,700 (FFY16)             | 40% reduction from 2012 baseline | 60% reduction from 2012 baseline | Move towards 100% reduction from 2012 baseline |



# Budget & Capital Performance

## > Construction contracts completed on or under budget and contracts completed on time

The percent of construction contracts completed on time declined to 41% in FY16. In the same time period, the percent of construction contracts completed on budget increased to 74%. These measures illustrate the number of construction contracts completed within a year that were within the planned time and budget. Construction contracts are considered complete when they have reached full beneficial use. The Highway Division is committed to improving this performance, and has set a target of 75% within four years, and a long-term target of 80%.

The Highway Division has made adjustments to how these measures are reported, resulting in a decline in the on-time measure. Under the revised metrics for 2016, only construction contracts are included, since maintenance contracts are usually open-ended and used at various locations. This revised reporting method provides a more accurate picture of the decline in performance trends of traditional construction contracts.

The Highway Division has several initiatives underway to improve on-time performance. These include gathering lessons from post-construction conferences and moving to a paperless construction process called “e-construction” to further improve efficiencies.



### About the measure Contracts on time/on budget

These measures compare the number of construction contracts completed on-time and on-budget against the universe of completed contracts for the fiscal year to gauge the effectiveness of project management and internal controls. They are counted as complete once they have reached full beneficial use. This is achieved when the asset(s) have been opened for full multi-modal transportation use, and remaining work does not materially impair or hinder the intended public use of the facility.

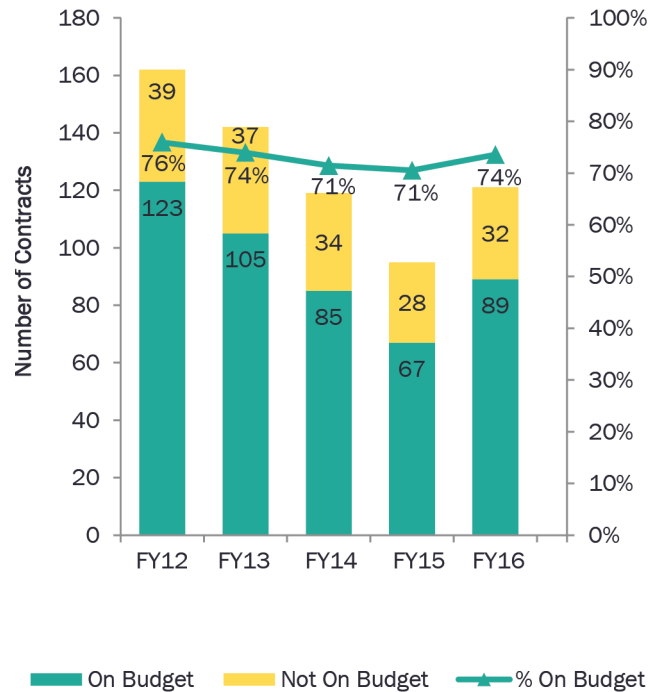


Figure 13. Construction contracts completed on or under budget



Figure 14. Construction contracts completed on time



**> Number of contracts in construction phase, planned for next year, and construction contracts completed annually**

These measures are required by Massachusetts legislation and are considered context measures important for understanding the scope of work handled by the Highway Division across each fiscal year. The number of contracts considered full beneficial use in FY16 was 191. This is a slight increase (13) from the prior fiscal year. However, the number of contracts have been declining over the past five years.

At the start of FY17, the Highway Division had 320 active contracts. An additional 50 projects are expected to become active during FY17.

**> Percent of STIP projects advertised in year**

The State Transportation Improvement Program (STIP) outlines all projects funded with federal funds in a federal fiscal year. Tracking the percentage of projects listed on the STIP that were advertised is a useful lens into the execution of the work that was planned. The percentage of planned projects advertised increased by 5% since FFY15.

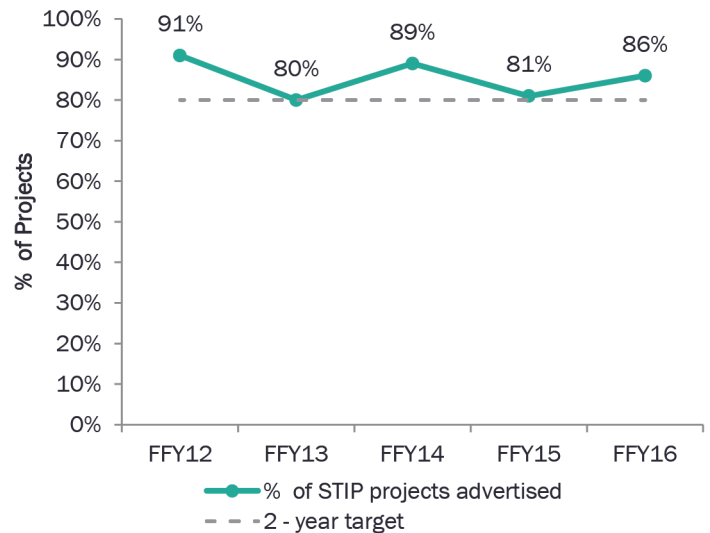


Figure 15. Percentage of STIP projects advertised in each federal fiscal year



**About the measure**  
*Percent of STIP projects advertised in year*

This measure tracks the percentage of projects actually advertised on the STIP against the plan. It is an indicator of how well the Highway Division and Office of Transportation Planning is working with regional partners in the MPOs (Metropolitan Planning Organizations) to plan and prioritize projects using federal dollars.

| PERFORMANCE MEASURE                               | FY16 (ANNUAL) PERFORMANCE | 2-YEAR TARGET    | 4-YEAR TARGET | LONG-TERM TARGET |
|---|---------------------------|------------------|---------------|------------------|
| Percent of STIP projects advertised in year       | 86% (FFY16)               | 80%              | 90%           | 95%              |
| Percent of contracts completed on or under budget | 74%                       | n/a <sup>1</sup> | 75%           | 80%              |
| Percent of contracts completed on time            | 41%                       | n/a <sup>1</sup> | 75%           | 80%              |

1. Due to the multi-year process associated with construction contracts, a 2-year target was not set.



# Safety

The safety measures reported in 2016 *Tracker* mirror those that are required under the MAP-21 legislation. Safety data is tracked by the Registry of Motor Vehicles, reported to them from state and local law enforcement agencies.



*Map 21 Highway Safety fact sheet*

## ➤ Number and rate of fatalities

The rate of fatalities (calculated using the rolling five-year average and controlling for VMT fluctuations) decreased in the time period between CY07 and CY14, despite a small increase in the number of fatalities. (The data for this measure lag due to the reporting and collection process and therefore more recent numbers are not available). Massachusetts continues to have a lower fatality rate than the nation, which had a fatality rate of 1.08 in 2014. The long-term target - Toward Zero Deaths (TZD) - has been established through adoption of the federal program with that name. The Highway Division will be setting targets in the coming months as proscribed through the MAP-21 and FAST Act process. In the meantime, initial targets of 2% and 4% reduction in fatalities have been set for the two year and four year target horizon.



### About the measures Number and rate of fatalities

The number and rate of fatalities is measured in a five year rolling average to eliminate outliers and provide a more accurate picture of trends over time. The rate is calculated per 100 million VMT.

The number and rate of fatalities are critical performance measures to illustrate the safety of our roadway network. The rate provides the context to show how the change in number of fatalities is partially a factor of an increase or decrease in the aggregate number of miles being driven during that time frame.

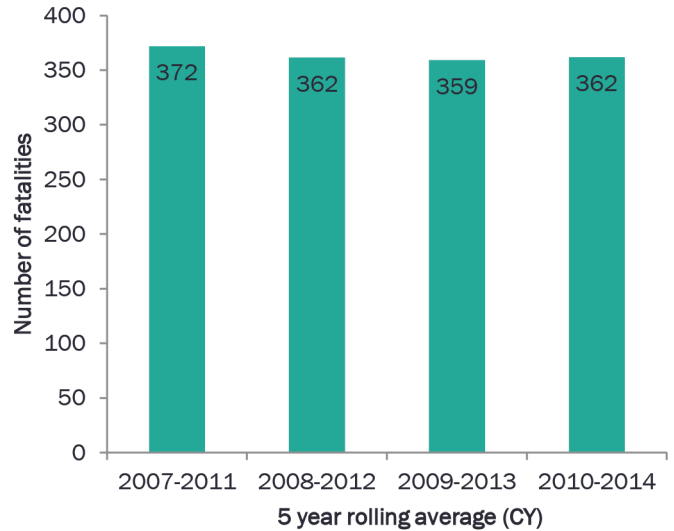


Figure 16. Number of fatalities; Source: Fatalities Analysis Reporting System (FARS)

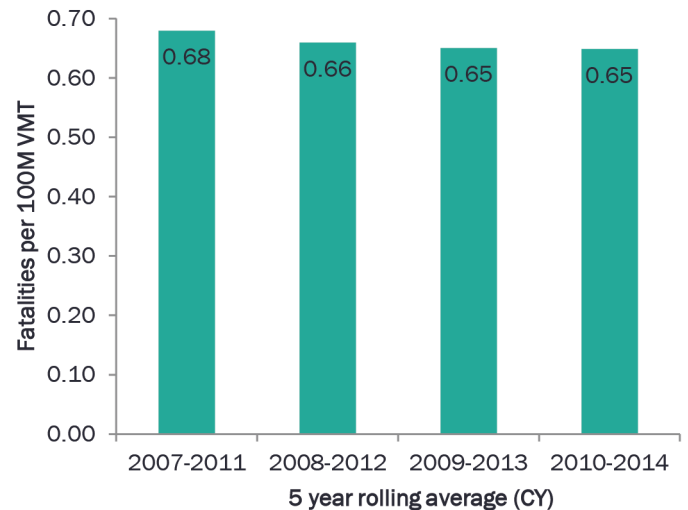


Figure 17. Rate of fatalities per 100 million VMT; Source: FARS

### ➤ Rate of fatalities peer state comparison

For six out of seven peer states and on the national level, the rate of fatalities dropped between CY13 and CY14. Among these peer states, Massachusetts had the highest reduction of the rate of fatalities from CY13 to CY14; moreover, it had the lowest fatalities in comparison to the seven peer states.

### ➤ Number of motorcycle fatalities

When motorcycles crash, riders lack the protection of an enclosed vehicle. Therefore, they're more likely to be injured or killed. The federal government estimates that per mile traveled in CY14, the number of deaths on motorcycles was over 27 times the number in cars (IIHS Fatalities Facts). Motorcycle fatalities have been trending down on average in Massachusetts since the CY07 to CY11 rolling average year.

### ➤ Motorcycle fatalities peer state comparison

Massachusetts had a total of 326 motor vehicle crash deaths in CY13, of which 12% (36) were motorcycle fatalities. In CY14 motorcycle fatalities were again 12% of the 328 total motor vehicle fatalities. Among the states analyzed, Massachusetts had the second lowest in percentage of motorcycle fatalities on the state's roadways.

### ➤ Number of bicyclist fatalities

The number of bicyclist fatalities has remained consistent since CY07. Though reliable data are not available, the number of bicycle VMT is believed to have increased during the past decade and therefore the rate of bicyclist fatalities is likely trending downward.

### ➤ Bicyclist fatalities peer states comparison

Massachusetts had a total of 326 motor vehicle crash deaths in CY13, of which 2% (6) were bicyclist fatalities. There was a slight increase in CY14 with 8 (2%) bicyclist

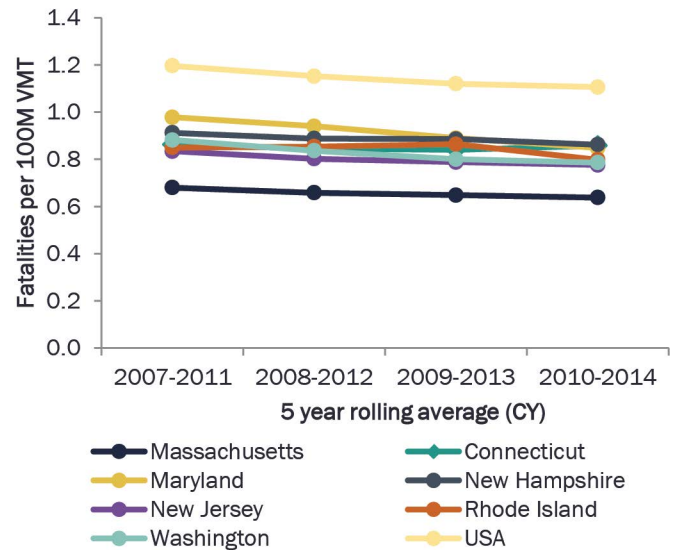


Figure 18. Rate of fatalities peer comparison; Source: FARS

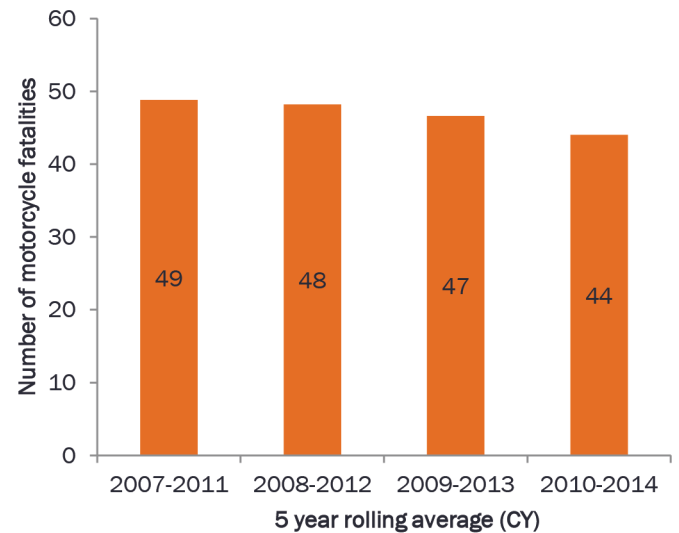


Figure 19. Number of motorcycle facilities; Source: Insurance

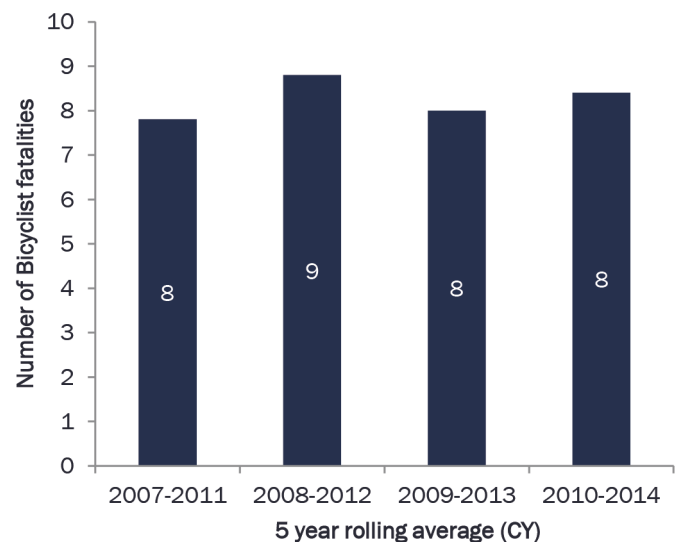


Figure 20. Number of bicyclist fatalities; Source: IIHS

fatalities of the 328 total motor vehicle fatalities. Among the states analyzed, Massachusetts had the third lowest percentage of bicyclist fatalities in CY13. In CY14, Massachusetts was equal to or higher than only one other peer state in this measure.

### > Number of pedestrian fatalities

The number of pedestrian fatalities has been trending upwards since the CY07 to CY11 rolling average year.

### > Pedestrian fatalities peer comparison

Massachusetts had a total of 326 motor vehicle crash deaths in CY13, of which 21% (68) were pedestrian fatalities. This percentage remained constant in Massachusetts in CY14. Among the states analyzed, Massachusetts had the second lowest number of pedestrian fatalities in CY13 and third lowest in CY14.

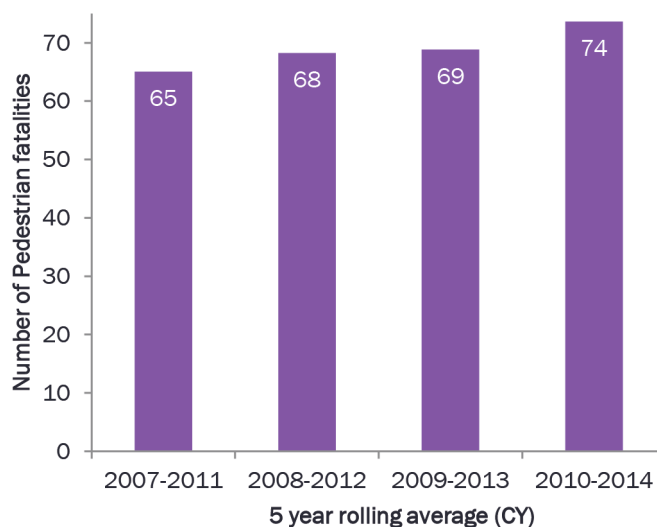


Figure 21. Number of pedestrian fatalities; Source: IIHS

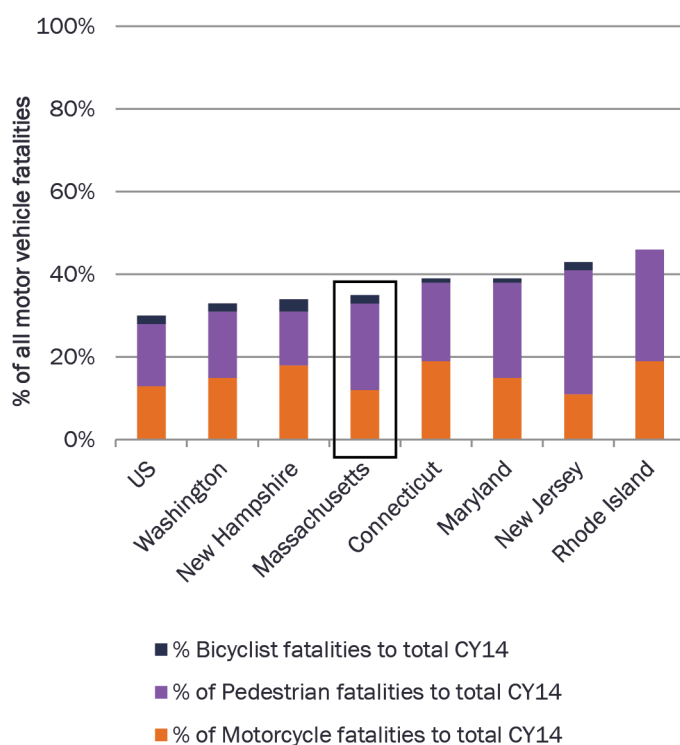


Figure 22. Peer state comparison: percentage of all motor vehicle fatalities pedestrian, motorcycle, and bicycle fatalities; Source: National Highway Traffic Safety Administration and IIHS.



## About the measures

### Number and rate of non-motorized fatalities and injuries

This is the count of Non-motorized transportation (e.g. biking, walking, equestrian) fatalities and injuries.

This measure is a composite of the pedestrian and bicycle measures. Reporting this way is required per MAP-21.



### ➤ Number and rate of serious injuries

Serious injuries have been trending down since the CY07-CY11 rolling average year.

Massachusetts was one of five of the seven peer states that had a decrease in serious injuries between CY13 and CY14, although “serious injuries” are considered and reported differently in each of the states.

### ➤ Non-motorized fatalities and non-motorized serious injuries

The number of non-motorized serious injuries and fatalities has been trending down since the CY07-CY11 rolling average year.

### ➤ Fatalities in roadway work zones

The number of driver fatalities occurring in highway work zones decreased from five to one in the past year. Historically this number of fatalities has varied year to year. MassDOT continues to explore opportunities to improve work zone safety elements with the goal of having zero deaths.

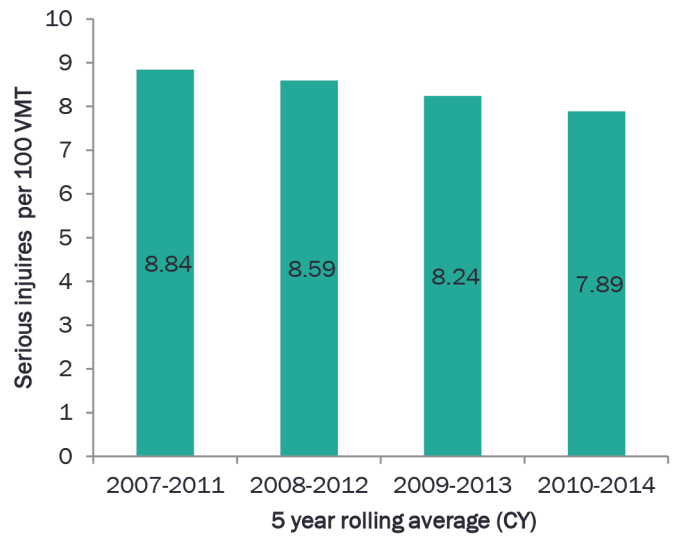


Figure 24. Rate of serious injuries

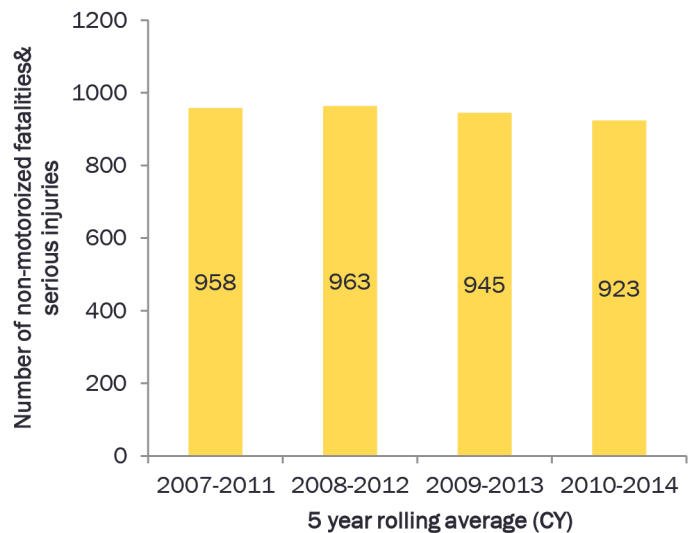


Figure 25. Number of non-motorized fatalities and serious injuries

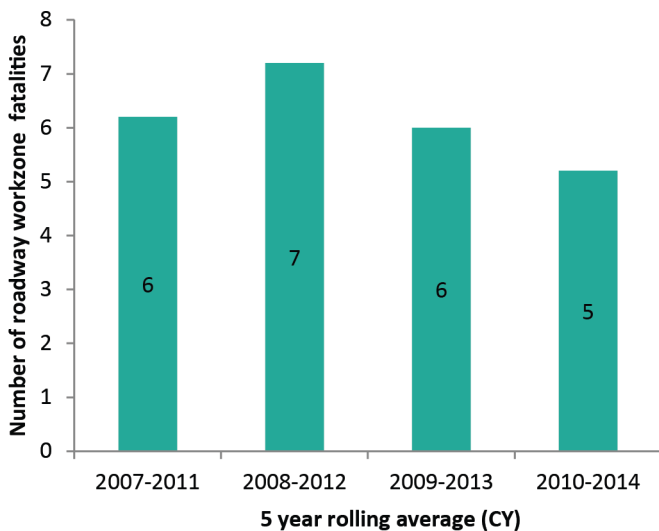


Figure 23. Fatalities in roadway work zones; Source: FARS

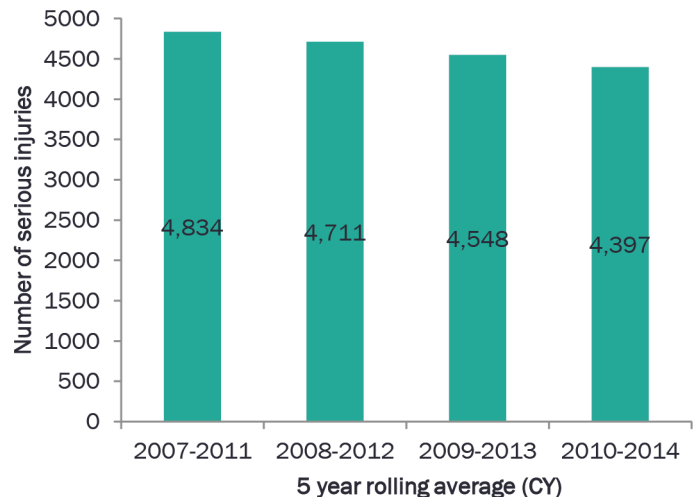


Figure 26. Number of serious injuries





# Healthy & Sustainable Transportation

On September 16, 2016 Governor Baker signed a climate change strategy executive order with the intention of taking a comprehensive approach to reduce greenhouse gas emissions (GHGs), prepare for climate change impacts, and increase resilience. Transportation is one of the leading contributing sectors to GHGs. As such, MassDOT is committed to help reduce GHGs in this sector in an effort to support the statewide effort. Furthermore, MassDOT aims to provide healthy and sustainable transportation to all people in the Commonwealth, through improved fuel efficiency, access to multi-modal and connected transportation options, and decreased emissions.

Since CY09, passenger vehicles in Massachusetts have become more fuel efficient, going from 19 effective miles per gallon to 21 effective miles per gallon in CY14.

## ➤ Fuel efficiency of MA vehicles

The fuel efficiency of all vehicles within the Commonwealth is an important indicator of transportation-based emissions levels. The Massachusetts Area Planning Council (MAPC) has conducted an analysis of vehicles in the Commonwealth using data from the RMV. This measure is supported by this analysis. While MassDOT cannot directly control the amount of miles that people in the Commonwealth drive, we aim to provide more reliable and comfortable transportation options - public transportation, carpooling, ride sharing, car sharing, bicycling, walking - to reduce the amount of VMT, and transportation emission with them. As more information becomes available regarding MassDOT and MBTA fleet fuel efficiency, targets may be revisited.

## ➤ Daily vehicle miles traveled (VMT)

Massachusetts ranks fourth among its peer states for lowest daily VMTs per capita statewide. While annual VMTs are increasing, so is population in the state (US Census Bureau, CY10-CY14 ACS 5-year estimates). Since the Global Warming Solutions Act of 2008, daily VMT per capita has increased by 2% (approximately 0.5 daily VMT per capita), and total annual VMT has increased by 5% (approximately 2 billion VMT). While MassDOT cannot directly control the amount of miles that people in the Commonwealth drive, we aim to provide public transportation options and promote carpooling and car sharing options that can reduce the amount of VMT, and transportation emissions with them.



### About the measure Fuel efficiency

Fuel efficiency was measured quarterly. Fuel efficiency is considered the average fuel economy for passenger vehicles from valid mileage estimates reported by the RMV. Fuel efficiency was calculated as the total estimated fuel consumption (gallons per day) considering the mileage and fuel economy ratings. These estimates were weighted by average daily mileage for the same vehicles and vehicle age.



Figure 27. Effective Miles per Gallon, Massachusetts Passenger Vehicle Fleet, 2009-2014; Source: MAPC Massachusetts Vehicle Census



## About the measure

### Vehicle Miles Traveled (VMT)

Vehicle Miles Traveled (VMT) is the number of miles traveled by motor vehicles in the Commonwealth, calculated per capita, on an average daily basis. This measure is to give context to other measures and therefore will not be given targets. The data is obtained from the Office of Transportation Planning (OTP), which derives the information from the FHWA Annual Highway Statistics Reports (part of the federal Highway Performance Monitoring System - HPMS), various HPMS state reports, and U.S. Census Bureau population estimates. Projected figures are based on modeled traffic growth, state population projections, and state and national VMT growth trends.

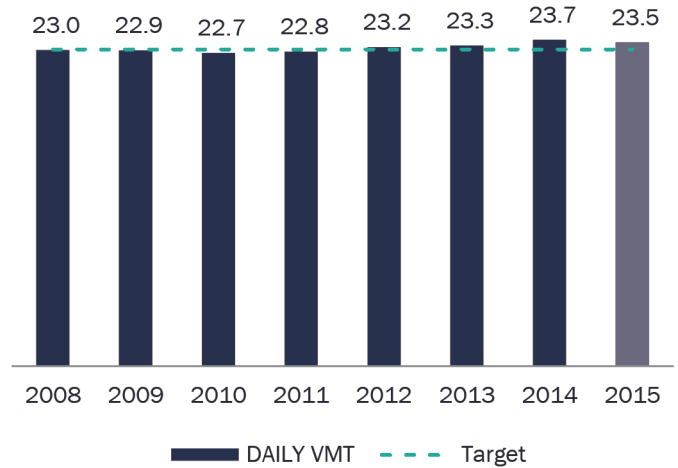


Figure 28. Daily VMT per capita per CY

| Year | Change (%) | Change (%) |
|------|------------|------------|
| 2008 | -1.03%     | -1.55%     |
| 2009 | 0.56%      | -0.09%     |
| 2010 | -0.82%     | -0.85%     |
| 2011 | 0.79%      | 0.39%      |
| 2012 | 2.10%      | 1.41%      |
| 2013 | 0.66%      | 0.54%      |
| 2014 | 2.20%      | 1.80%      |
| 2015 | -0.43%     | -0.82%     |

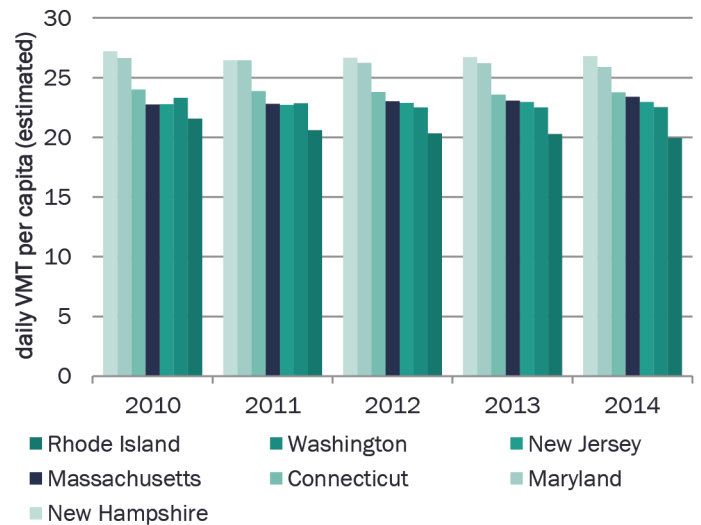


Figure 29. Daily VMT per capita per CY, peer state comparison

| PERFORMANCE MEASURE                     | FY16 (ANNUAL) PERFORMANCE | 2-YEAR TARGET | 4-YEAR TARGET      | LONG-TERM TARGET |
|---|---------------------------|---------------|--------------------|------------------|
| Daily vehicle miles traveled per capita | 23.7 (CY14)               |               | 23.0 (2008 levels) |                  |

## ➤ Pedestrian facilities

There are more than 18,000 miles of pedestrian facilities in the Commonwealth of which more than 900 (around 5%) are owned by MassDOT. The Planning for Performance tool (PfP) projects that given current funding levels, an additional 249 miles of new or rebuilt pedestrian facilities statewide (including non-state-owned) are possible by FY19 and 415 miles of new or rebuilt pedestrian facilities is possible by FY21 (from FY16). To align with the CIP, these numbers are proposed as targets. Multi-use paths are considered both pedestrian facilities and bicycle facilities because they are used for both purposes of sustainable transportation.

## ➤ Bicycle facilities

Bicycling is an important mode of healthy and sustainable travel for both commuting and recreation. MassDOT aims to increase coverage and connectivity of its on and off-road network to encourage increased bicycle ridership. Statewide there are approximately 934 lane miles of on-road bicycle facilities (existing or under construction) with an additional 2,226 lane miles of on-road facilities in design. There are 927 lane miles of off-road multi-use paths existing or under construction, with an additional 821 lane miles in design. The bicycle facility inventory is continually being updated to give improved insight into the state of the Commonwealth's bicycle network



### About the measure Pedestrian facilities

MassDOT-owned pedestrian facilities are currently measured by linear miles of sidewalk and multi-use paths. Currently, the Office of Transportation Planning, is updating MassDOT's 1998 Statewide Pedestrian Transportation Plan. As part of this plan major gaps in the walking network - physical, modal, and temporal - will be identified. These measures and their associated targets will be highlighted upon the completion of the Pedestrian Plan.

Data on pedestrian facilities includes a GIS inventory of sidewalk lengths and widths throughout the Commonwealth (provided by the Office of Transportation Planning at MassDOT). The GIS inventory is updated periodically to reflect ongoing construction or reconstruction efforts in respect to new or upgraded pedestrian facilities.

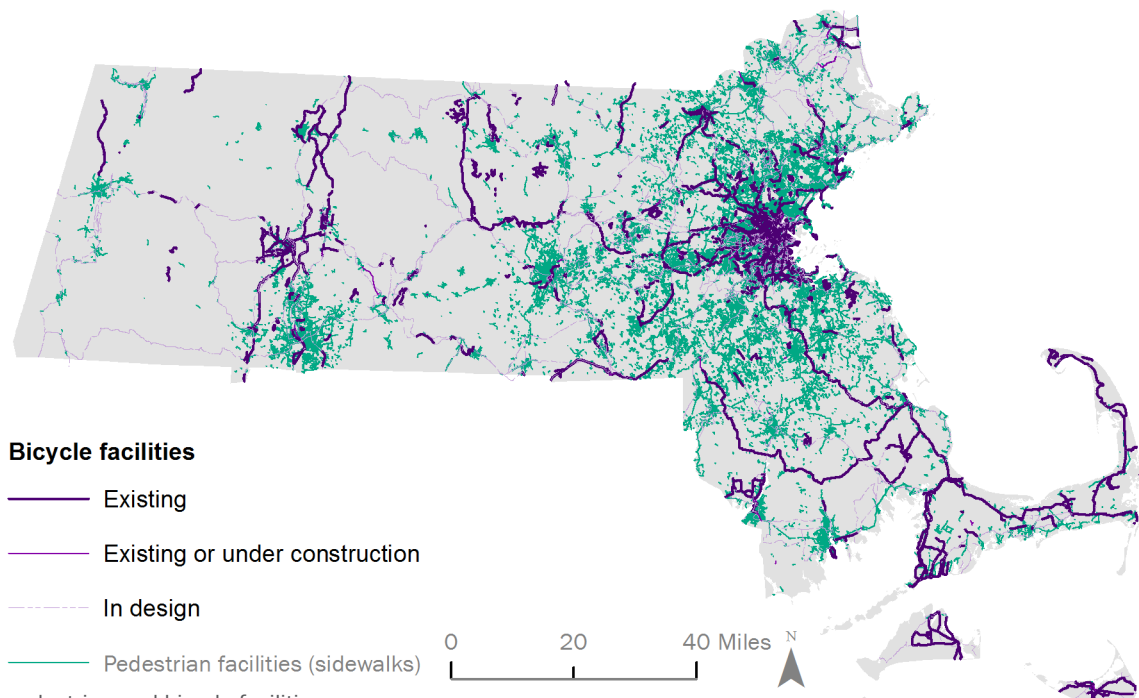


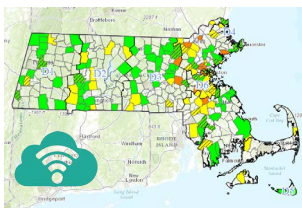
Figure 30. Map of pedestrian and bicycle facilities

in upcoming years (including increased visibility into facility type, ownership, and condition). The PfP tool suggests that by FY19 (given current funding levels), 50 miles of new multi-use paths could be constructed and in FY21, 85 miles of new multi-use paths could be constructed (statewide). Targets for the bicycle facilities measure will be determined by the updated Statewide Bicycle Transportation Plan, currently in development.

### ➤ Number of Complete Street policies registered/passed

MassDOT has launched a Complete Streets program (authorized by the 2014 Transportation Bond Bill), the intent of which is to encourage municipalities to create and rebuild roads that provide safe and accessible options for all travel modes – walking, biking, transit and motorized vehicles – and, for people of all ages and abilities. In addition to funding, the program provides planning and design resources, a training program in best practices, benefits, requirements, and implementation, as well as other resources for municipalities.

In Tier 1 of this program, municipalities must create and submit a Complete Streets Policy. At this point in the implementation process, the number of policies passed is the best measure of success. By the end of FY16, 105 communities throughout the Commonwealth have registered policies, and 51 of those have been passed.



Complete Streets portal



## About the measure

### Bicycle facilities

Similar to pedestrian facilities, bicycle facilities are measured through a GIS inventory that, with our partners at MAPC, is updated periodically to reflect changes in the network. The inventory includes both on-road bicycle facilities and multi-use paths (off-road facilities), their ownership, length and location. MassDOT’s Office of Transportation Planning is also currently updating its 2008 Statewide Bicycle Transportation Plan.



## About the measure

### Complete Streets policies

This measure tracks the progress in implementing Complete Streets across the Commonwealth. There are several steps towards implementing the program, the first of which is to enable and encourage municipalities to adopt Complete Streets policies. As the program becomes more mature, OPMI will work with Highway Division staff to consider other measures to track the success of this initiative (e.g. number of Complete Streets projects approved, under construction, built, etc.).

| PERFORMANCE MEASURE  | FY16 (ANNUAL) PERFORMANCE                  | 2-YEAR TARGET            | 4-YEAR TARGET            | LONG-TERM TARGET                 |
|--|--|--------------------------|--------------------------|----------------------------------|
| Multi-use paths existing or under construction                                   | 927 lane miles (including non-state-owned) | TBD                      | TBD                      | Bicycle plan network complete    |
| On-road bicycle facilities existing or under construction                        | 934 lane miles (including non-state-owned) | TBD                      | TBD                      | Bicycle plan network complete    |
| Pedestrian facilities (including existing or under construction multi-use paths) | 18,017 miles (including non-state-owned)   | 250 miles new or rebuilt | 425 miles new or rebuilt | Pedestrian plan network complete |
| Number of Complete Street policies registered/passed                             | 105/51                                     | 200/100                  | 300/150                  | 351 passed                       |

# Measures in Development

Chapter 46 of the Acts of 2013 indicate specific goals and targets to be tracked and measured by OPMI. This report presents almost all of those measures. In addition, MAP-21 and the FAST Act establish performance measures (some of which are not yet finalized), and target-setting processes. OPMI continues to work with each Division on improving the reporting of performance measures to meet these requirements, and to provide better insight for decision-makers, partners and stakeholders. While recognized as important, the following measures are currently under development with the intent to be included in upcoming reports.

## ➤ *Administrative and maintenance disbursement rates per mile*

These measures are listed in Massachusetts legislation, and are also a reporting requirement by the Federal Highway Administration (FHWA). The Highway Division is in the process of working with the MassDOT Fiscal Department and FHWA to resume regular reporting of these measures. OPMI will include them in future performance reports.

## ➤ *Number of incidents that have caused delays or closures*

The MassDOT Highway Operations Center (HOC) is the Commonwealth's 24/7/365 traffic management center. It is responsible for detecting and receiving reports about roadway incidents, responding to facility alarms, managing security systems, and coordinating traffic operations,

maintenance and emergency response activities. Currently, the HOC incident data are not linked to the reporting of delays and closures; therefore, this measure is not available. MassDOT has recently embarked upon a pilot program with WAZE to enhance incident reporting and improve response. OPMI will be working with the Highway Division to explore possible use of these data for incident reporting. In addition, the Highway Division is currently implementing an Integrated Traffic Management System, which will coordinate these data, improve service, and allow this measure to be tracked.

## ➤ *Congestion*

MassDOT is mandated to provide a system congestion measure to the federal government, per MAP-21. The federal measure is not yet finalized (and is expected in 2016), but OPMI and the Highway Division staff have been working to explore the available data and possible methodologies.

For example, through its GoTime Bluetooth system, MassDOT has been collecting anonymized travel and speed data along roadways in the Commonwealth since 2012. The system infrastructure is still being implemented to span the entire state, and will be live by the end of December, 2016.

MassDOT has recently partnered with WAZE to share data and alerts. The Highway Operations Center (HOC) is currently conducting a pilot effort to utilize the WAZE alerts to manage incident response. If deemed effective, the pilot program could become a permanent program for

the HOC. In addition, MassDOT is storing all WAZE data, and starting to analyze it for use in historical analysis and forecasting contexts.

MassDOT was also recently awarded funding through the Strategic Highway Research Program 2 to consider methodologies to report reliability (one element of congestion) on the highway network.



# Aeronautics Division

## Overview





The mission of the Aeronautics Division is to promote aviation throughout the Commonwealth while establishing an efficient integrated airport system that will enhance airport safety, economic development, and environmental stewardship.

The Aeronautics Division has jurisdiction over the Commonwealth's public use airports and heliports, private restricted landing areas and seaplane bases. It certifies airports and heliports, licenses airport managers, conducts annual airport inspections, and enforces safety and security regulations.

In addition, its responsibilities include:

- Overseeing the statewide Airport Capital Projects Program;
- Developing statewide aviation safety programs;
- Overseeing state-owned navigational aids;
- Conducting statewide aviation planning studies;
- Implementing statewide airport security initiatives; and
- Promoting statewide aviation education.

### AERONAUTICS DIVISION - 2016 SCORECARD

| PURPOSE   | PERFORMANCE MEASURE  | CURRENT (FY16)                 | CHANGE FROM FY15 | 2-YEAR TARGET | 4-YEAR TARGET | LONG-TERM TARGET |
|---|--|--------------------------------|------------------|---------------|---------------|------------------|
|  | Percent of aircraft registrations collected                      | <b>82%</b><br>(1,918 of 2,348) | no data          | 85%           | 87%           | 90%              |
|  | Pavement condition (PCI)   | <b>70</b> (FY12)               | n/a              | 72            | 74            | 75               |
|  | Capital budget disbursement                                      | <b>91%</b>                     | +8%              | 90%           | 92%           | 94%              |
|   | Contracts completed on budget                                    | <b>82%</b>                     | no data          | 85%           | 90%           | 95%              |
|   | Contracts completed on time                                      | <b>73%</b>                     | no data          | 90%           | 95%           | 95%              |
|  | Airport safety and emergency management training attendance rate | <b>77%</b>                     | no data          | 75%           | 75%           | 75%              |
|   | Airport safety inspections completed                             | <b>25</b> (CY16)               | +10 (CY15)       | 12            | 12            | 12               |

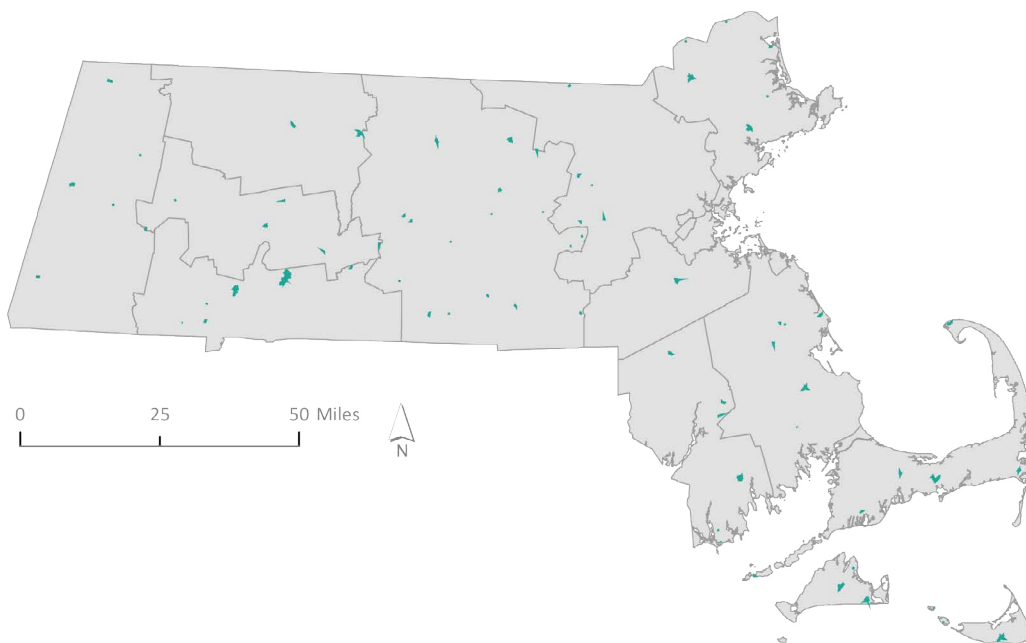


Figure 31. Locations of airports regulated by MassDOT Aeronautics Division



# Customer Experience

## > Number of aircraft registrations

The Aeronautics Division serves a range of customers; aircraft owners are the group served most directly. The aircraft registration program provides the Division with the data about this customer group. All airport managers in Massachusetts are required under statute (702 CMR 5.00) to forward to the division, on March 1st and September 1st of each year, a listing of all aircraft based at their airports. This provides the Aeronautics Division with an inventory of aircraft in the Commonwealth.

All airworthy aircraft based in Massachusetts or temporarily located in Massachusetts for 60 or more days (per calendar year), must be registered with the Aeronautics Division and the airport at which they are based. Annual fees are variable and are based on the maximum certified takeoff weight of the aircraft. These range from \$100 to \$300 annually.

In FY16, airport managers reported 2,348 aircraft on their based aircraft lists. During FY16 the MassDOT Aeronautics Division registered 1,918 of those aircraft (82%) which generated approximately \$320,000 in revenue.



## About the measure

### Aircraft registrations

This is the total number of aircraft registered with the Aeronautics Division. This metric impacts the customer experience as the Division communicates with the aircraft owners on the airworthiness of their aircraft. It also provides insight into the economic impact that the airports are having on the surrounding communities.



# System Condition

## > Pavement condition (PCI)

Pavements represent one of the largest capital investments in the Massachusetts aviation system, and the condition of these pavements is important both from a cost-effectiveness and safety standpoint. Airport pavement weaknesses, such as cracks and loose debris, pose a significant safety risk to aircraft. Timely airport pavement maintenance and rehabilitation are essential because repairs are much more costly once the condition deteriorates to a critical level.

Recognizing a need to protect this significant investment, the Aeronautics Division established a statewide airport pavement management system (APMS) in 2012 to monitor the condition of the Massachusetts airport infrastructure and to proactively plan for its preservation. The APMS system provides the airports, MassDOT Aeronautics, and the Federal Aviation Administration (FAA) with the pavement information and analytical tools that help them to identify pavement-related needs, optimize the selection of projects and treatments over a multi-year period, and evaluate the long-term impacts of project priorities.

In FY12, the average Pavement Condition Index (PCI) was measured at 70, meaning that 70% of the Commonwealth's airport pavements have a PCI of 65 or higher which is considered "good." This measurement will be taken again in FY17, at which time the new condition index will be reported.



## About the measure

### PCI

Runway pavement condition is monitored using a statewide airport pavement management system.

The condition of these pavements is important from both cost-effectiveness and safety standpoints. Airport pavement weaknesses, such as cracks and loose debris, pose a significant safety risk. Pavement rehabilitation costs increase as conditions deteriorate.

# Budget & Capital Performance

## ➤ Capital budget disbursement

The Aeronautics Division sets a goal to spend 90% of the funds budgeted for airport capital improvements each year. In FY16 the Aeronautics Division disbursed \$15,255,533 of its \$16,823,481 capital allocated budget, 91% of the budget allocation.

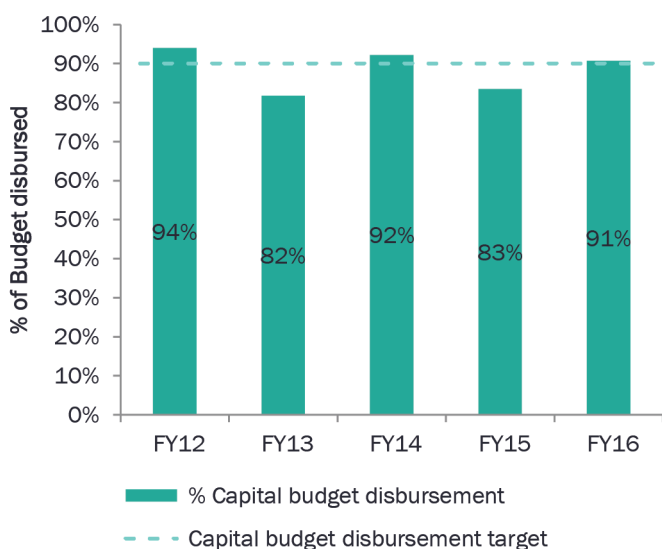


Figure 32. Capital budget disbursement

## ➤ Number of contracts completed on or under budget

The Aeronautics Division is currently developing Airport Information Resource Portal (AIR-PORT) software, which will provide staff with a tool to measure and track activities related to the planning and prioritizing this goal area.

In FY16 82% of all contracts were completed on budget. Aeronautics Division had a total of 44 contracts, of which 36 contracts were trending to be completed on time. The Aeronautics Division has set a goal to complete 85% of its projects on or under budget.



### About the measure

#### Capital budget disbursement

This is the percentage of total allocated capital budget that is dispersed to contractors, vendors, etc. by the end of the fiscal year.

This measure is an indicator of how well the Aeronautics Division is executing its planned expenditures.



### About the measure

#### Contracts completed on or under budget

These measures compare the number of projects completed on or under budget against all projects.

The Aeronautics Division manages projects through extensive project and internal controls. These metrics, along with other factors, provide an indication of the effectiveness of those strategies.



### ➤ Number of contracts completed on time

In FY16 73% of all projects were completed on time. In FY16 the Aeronautics Division had 44 total projects, of which 32 contracts were trending to be completed on time. The Aeronautics Division has set a goal to complete 90% of its projects on time.

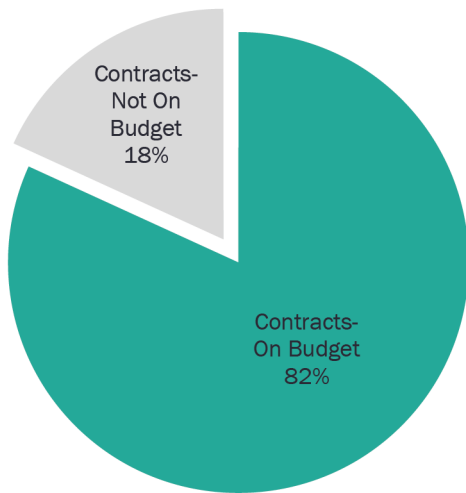


Figure 33. Contracts completed on budget

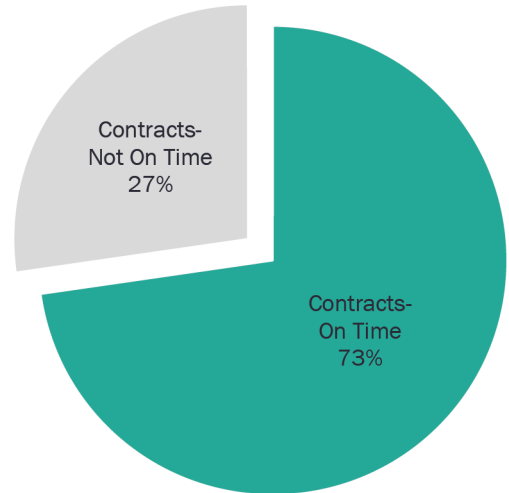


Figure 34. Contracts completed on time

| PERFORMANCE MEASURE         | FY16 (ANNUAL) PERFORMANCE | 2-YEAR TARGET | 4-YEAR TARGET | LONG-TERM TARGET |
|-----------------------------|---------------------------|---------------|---------------|------------------|
| Capital budget disbursement | 91%                       | 90%           | 92%           | 94%              |
| Contracts on budget         | 82%                       | 85%           | 90%           | 95%              |
| Contracts on time           | 73%                       | 90%           | 95%           | 95%              |





# Safety

## > Airport safety and emergency management training

The Aeronautics Division is the air operations lead coordinating agency for the Massachusetts Emergency Management Agency, a partner in the MassDOT Emergency Management Committee, and participates in various emergency planning exercises across the Commonwealth (e.g. with municipal airports, local first responders, Civil Air Patrol, State Police, and other state and federal agencies such as Massport and Joint Base Cape Cod). During these events, exercises are conducted to validate plans, policies, and procedures, test equipment, identify gaps in training, and establish best practices. A tabletop exercise uses a hypothetical, simulated emergency to validate plans and procedures, rehearse concepts, and/or assess the level of preparedness through an interactive discussion.

The Aeronautics Division has set a target to attend 75% of the emergency trainings they are invited to participate in. In FY16, personnel attended 10 out of 13 (77%) emergency management training or exercises.

## > Airport safety inspections completed

The Aeronautics Division performs all airport inspections by calendar year as directed in the FAA contract, and is on schedule to complete all inspections by the end of CY16. A comprehensive airport inspection includes the following areas: paved and unpaved aprons, runways, taxiways, safety areas, markings and lighting, navigable airspace, navigational aids, traffic and weather indicators, fueling operations, construction safety, wildlife hazard management, airport operations, and compliance with MassDOT Aeronautics Regulations. MassDOT oversees 36 airports, and is required to complete a minimum of 12 inspections per calendar year (set as a target). In the past 5 years, the Aeronautics Division has exceeded this goal.

“77% emergency management training attendance in FY16”



### About the measure Airport safety and emergency management training

The percentage of training events attended by Aeronautics Division personnel, out of the total number to which they were invited. The emergency trainings provide personnel with fundamental elements of emergency management knowledge and protocols, while bringing together and strengthening the community of providers and emergency responders.



### About the measure Airport safety inspections

This measure reflects the number of airports inspected by the Aeronautics Department in a one year period.

Airport safety inspections are required by the FAA, and are a key element of maintaining safe airports for users.



Figure 35. Airport safety inspections completed each year

# Registry of Motor Vehicles

## Overview


The mission of the Registry of Motor Vehicles (RMV) is to provide a safe transportation environment for the Commonwealth that is customer-centric and transformative. The RMV has made a strong commitment to personalize the customer experience and enable customer mobility and consumer safety across the Commonwealth.

The RMV credentials and delivers driver, non-driver, and vehicle services through multiple service channels for customer convenience. In FY16 the RMV:

- Issued 155,000 new licenses and converted 77,000 out of state licenses to ensure that only qualified individuals operate motor vehicles in the Commonwealth. An estimated 5.1 million drivers are currently licensed by the Commonwealth;
- Registered and titled over 1.3 million vehicles, protecting drivers and providing a database of motor vehicle assets;
- Issued nearly 172,000 license suspension notices, helping to keep the Commonwealth's roadways safe;
- Inspected more than 27,000 school buses to protect the safety of student riders;
- Oversaw more than 1,700 commercial, non-commercial, and fleet inspection stations;
- Oversaw annual safety and emission checks on vehicles to ensure the safety of vehicles traveling on Massachusetts roadways and to protect air quality and the environment for the public benefit;
- Maintained, through the Merit Rating Board (MRB), operator driving records consisting of traffic law violations, at-fault and comprehensive insurance claim records, and out-of-state driving records;
- Certified nearly 500 driving schools and more than 2,500 driving instructors to ensure that Massachusetts motorists receive proper education and training;
- Maintained and operated 29 service center locations throughout the Commonwealth to provide these services.

The following indicators of RMV performance inform RMV leaders and staff to ensure that processes are effective, efficient, and secure and continuously improve the RMV customers' experience.

### RMV - 2016 SCORECARD

| PERFORMANCE GOAL  | PERFORMANCE MEASURE   | CURRENT (FY16) | CHANGE FROM FY15 | 2-YEAR TARGET                      | 4-YEAR TARGET                      | LONG-TERM TARGET                   |
|---|---|----------------|------------------|------------------------------------|------------------------------------|------------------------------------|
|  | Service Center customer wait time (systemwide): Percent of total customers waiting less than 30 minutes | 65.9%          | +6.0%            | 80%                                | 80%                                | 80%                                |
|   | Service Center customer wait time (systemwide): Percent of total customers waiting one hour or more     | 11.7%          | -5.0%            | 10%                                | 4%                                 | 0%                                 |
|   | Contact Center wait time after virtual hold   | 3:34           | n/a              | 3:30                               | 2:50                               | 1:00                               |
|   | % of license renewals conducted online (as a percentage of eligible transaction volume)                 | 50.1%          | -3.4%            | 80% of eligible transaction volume | 85% of eligible transaction volume | 95% of eligible transaction volume |
|   | % of registration renewals conducted online (as a percentage of eligible transaction volume)            | 58.3%          | +2.4%            | 92% of eligible transaction volume | 95% of eligible transaction volume | 97% of eligible transaction volume |
|   | % of systemwide transactions conducted outside of service center  | 61.5%          | +1.1%            | 65%                                | 70%                                | 75%                                |
|   | % of systemwide transactions conducted online   | 28.6%          | +0.7%            | 35%                                | 40%                                | 50%                                |
|   | % of registration renewals eligible to be done online   | 89.9%          | +0.2%            | For context only - no targets      |                                    |                                    |
|   | % of license renewals eligible to be done online  | 61.5%          | -1.5%            | For context only - no targets      |                                    |                                    |

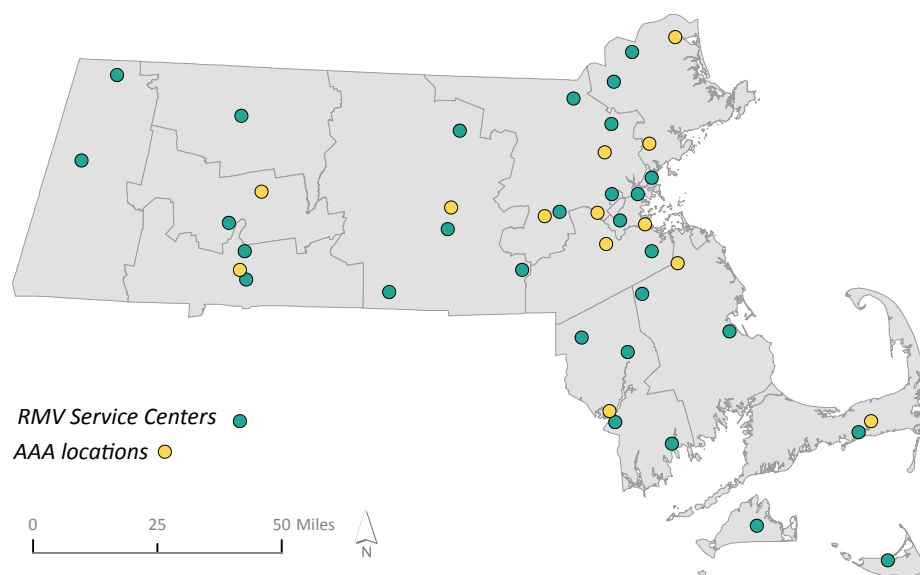


Figure 36. Locations of RMV Service Centers and AAA locations

# Customer Experience

## ➤ Service Center customer wait time

Service Centers conducted 39% of all RMV transactions in FY16. The 29 Service Centers throughout the Commonwealth vary in services offered and the number of customers they serve. For example, individual Service Centers assist between 10 and 1,200 customers on a daily basis, depending on the time of year and Service Center location.

In FY16, the Service Centers began a conversion process (i.e. the War on Wait Times) to improve the way customers are served when they enter the facility. The objective was to reduce customer wait time, and eliminate hidden wait times. Hidden wait time is the amount of time a customer waits before receiving a ticket to assign them a position in line. With no feasible way to measure the time a customer waited before receiving a ticket, these hidden wait times led to an under-representation in the data of total customer wait times. Therefore, pre-War on Wait Times data suggest that wait times were lower than they actually were. Figure 37 depicts the improvement achieved through the War on Wait Times program. Conversion was rolled out at Service Centers over the course of FY16, so the full year of data (in the top graph) under-reports the impact of the change. The bottom graph compares the fourth quarter of FY15 (pre-conversion in all Service Centers), with the fourth quarter of FY16 (post-conversion in all Service Centers) to show the full impact.

Other factors that impact customer wait times continue to be relevant to interpreting this measure, such as:

- seasonal fluctuations in customer volume and transaction type;
- staffing trends, including vacations and intern availability;
- differences among Service Centers in demand and demographics served; and
- differences among Service Centers in services offered, size, and configuration/technology.

Wait time performance varies by Service Center and throughout the year. However, systemwide, the 80%/0% aspirational target was met an estimated 43% of the days in FY16 (the equivalent of 107 business days). The 80%/10% 2- year target was met an estimated 44% of the days in FY16 (the equivalent of 110 business days). Systemwide performance peaked in December, with 66%

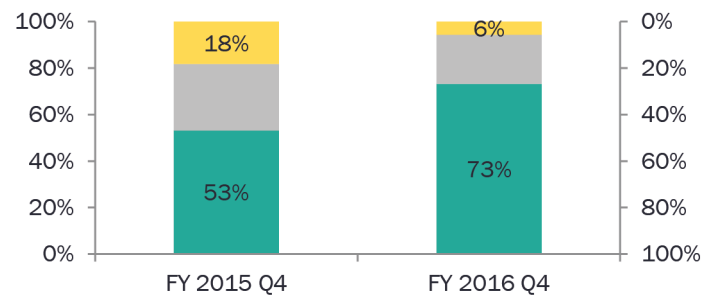
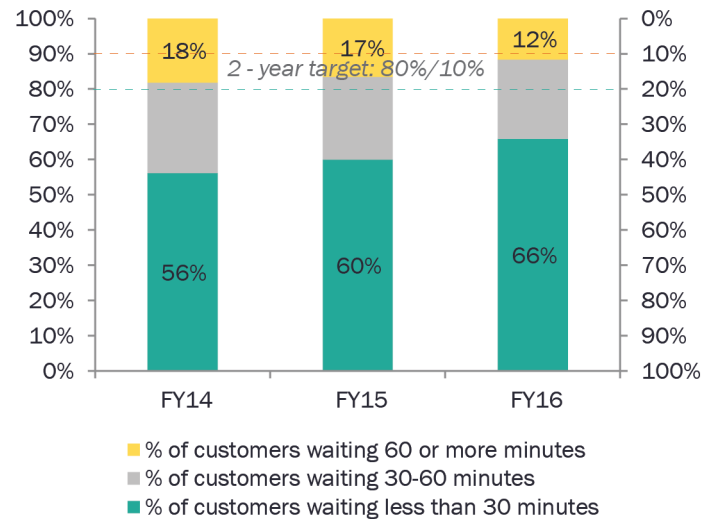


Figure 37. Service Center Customer Wait Times - annual performance and 4th quarter performance comparison



## About the measure

### Service Center customer wait time

Customer wait time at Service Centers is defined as the elapsed time between when a customer receives a queue ticket and when a Customer Service Representative (CSR) calls their ticket. The wait times are extracted from the Qmatic database (a product of the queuing vendor). By grouping customers together, for example by Service Center or by month, we calculate the percent of customers who wait less than 30 minutes or more than 1 hour. Detailed information on this measure is provided daily on an interactive online dashboard for RMV staff and leadership.

of the month meeting its service level target (equivalent of 15 business days). Individual Service Centers met the 2-year target between 11% and 99% of working days in FY16, illustrating the range of performance among different Service Centers.

| PERFORMANCE MEASURE   | FY16 (ANNUAL) PERFORMANCE | 2-YEAR TARGET | 4-YEAR TARGET | LONG-TERM TARGET |
|---|---------------------------|---------------|---------------|------------------|
| Service center customer wait time (systemwide): Percent of total customers waiting less than 30 minutes | 65.9%                     | 80%           | 80%           | 80%              |
| Service center customer wait time (systemwide): Percent of total customers waiting one hour or more     | 11.7%                     | 10%           | 4%            | 0%               |

Customer volumes by Service Center FY16

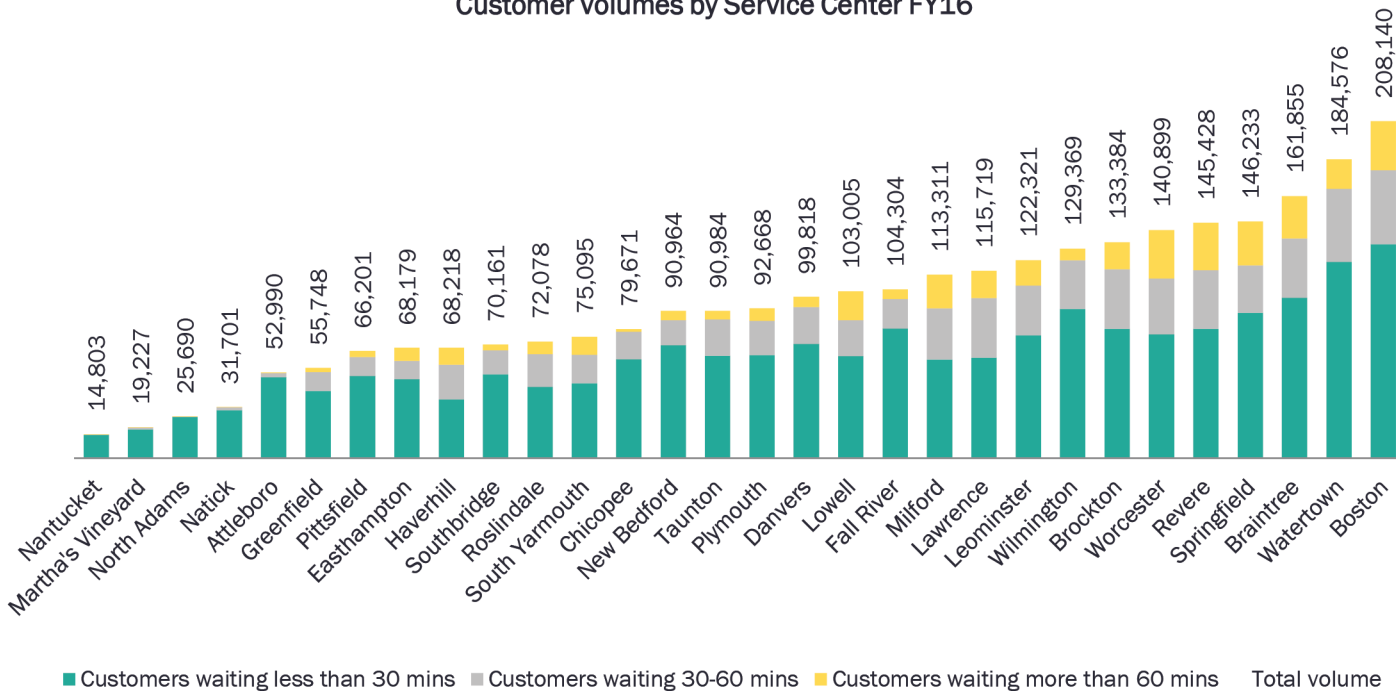


Figure 38. Service Center Customer volumes by location (and how long customers waited to be served) in FY16; The Danvers Service Center was closed in June 2016.





## About the measure

**Percentage of systemwide transactions conducted outside of Service Centers, online, and percentage of renewals conducted online**

The RMV “system” includes a number of different service channels where customers can complete transactions (see Figure 42). Service channel volume is measured through the ALARS database, which tracks transaction-level and customer-level information. *Percentage of systemwide transactions conducted outside of Service Centers, online, and percentage of renewals conducted online* are calculated based on a count of “core” ALARS transactions. In FY16 an interdepartmental group met to review the types of transactions represented in ALARS compared to customer counts in other databases at the RMV. In order to compare volumes across databases, a list of “core” transactions that most closely represent customer goals (such as getting a new license, renewing a registration, etc.) was compiled and is used as a sample of ALARS data to represent customer volume across all service channels at the RMV.

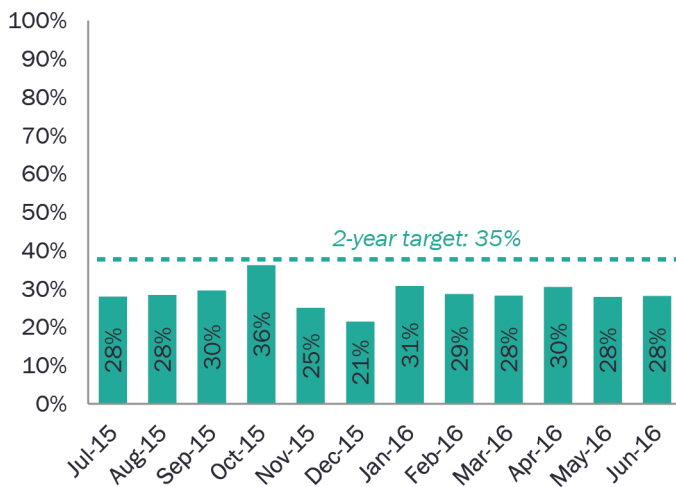


Figure 40. % of systemwide transactions conducted online by month

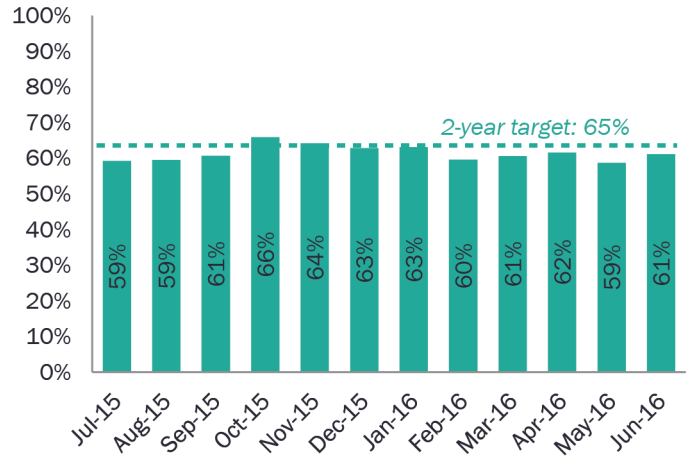


Figure 39. % of systemwide transactions conducted outside of Service Centers, monthly

### > Percentage of systemwide transactions conducted outside of Service Centers

The percentage of systemwide transactions conducted outside of Service Centers indicates two important aspects of the customer experience: 1) Access to the RMV through a variety of service channels, and 2) efficiency of the RMV in reaching customers by distributing customer demand across multiple channels.

In FY16 more than half (62%) of all RMV transactions occurred outside of Service Centers. This represents an increase of 1% since FY15, trending towards the 2-year target of 65%.

### > Percentage of systemwide transactions conducted online

Monthly, the percentage of systemwide transactions conducted online has ranged between 21% and 36% since January 2014, with an average of 28%. The percentage of systemwide transactions conducted online in FY16 was 29%, an increase of nearly 1% since FY15.

| PERFORMANCE MEASURE  | FY16 (ANNUAL) PERFORMANCE | 2-YEAR TARGET | 4-YEAR TARGET | LONG-TERM TARGET |
|--|---------------------------|---------------|---------------|------------------|
| % of systemwide transactions conducted out of Service Center | 61.5%                     | 65%           | 70%           | 75%              |
| % of systemwide transactions conducted online                | 28.6%                     | 35%           | 40%           | 50%              |

As business rules change and upgrades are made to the website, the number and type of transactions which can be conducted online by customers may increase, allowing a greater percentage of systemwide transaction to be conducted online (although there will remain an upper limit to this percentage).

### > Percentage of license and registration renewals eligible to be done online

Some transactions must be done in person in a Service Center due to certain regulations and restrictions, therefore this is an important context measure for the percentage of out-of-service-center transactions. There are currently 27 types of work items that are available for customers to perform online, which include transactions and requests for information. The percentage of customers eligible to renew their licenses online varied monthly between 60% and 62% (an average of 62% for FY16), while the percentage of customers eligible to renew their registration online varied monthly between 74% and 94% (an average of 90% for FY16 with no significant change in eligibility from FY15). The percentage of customers eligible to renew their licenses online has dropped by nearly 2% from FY15.

Monthly, the primary reason customers are ineligible to complete license renewals online is due to the need to retake their license or ID photo. The primary reason



### About the measure % of license and registration renewals eligible to be done online

There are several regulatory factors that prevent customers from renewing their license or registration online. In order to calculate the percentage of renewals that are eligible for online renewal, customer records are sorted based on the due date of their renewal and any limiting factors that apply to their record at that point in time. These limiting factors are described in Figure 41. This data is reported by IT staff on a monthly basis. It is important to note that the percentage of renewals eligible to be done online does not describe the percentage of customers who actually choose to conduct their business online, nor does it reflect restrictions in payment types/preferences.

#### LIMITING FACTORS FOR LICENSE RENEWALS

- The customer is a commercial license holder
- The customer's social security status is not in good order
- Last photo was taken before turning 21
- The customer is 75 or older
- Last photo was taken more than 9 years ago
- Last renewal was done online
- Customer has "non-renewal" status: this means that at the time of the report, the customer had outstanding obligations that need to be addressed, before the renewal can be processed through any channel (for example, unpaid parking tickets).

- The owner's license number is an "X" license number
- If the registration has an insurance stamp required (these customers can process their renewals through the Back Office by mailing in their form)
- Numerous plate restrictions
- Numerous weight restrictions
- Customer has "non-renewal" status: this means that at the time of the report, the customer had outstanding obligations that need to be addressed, before the renewal can be processed through any channel (for example, unpaid parking tickets).

Figure 41. Limiting factors for renewals

|                                   |  |
|-----------------------------------|--|
| Service Centers                   | 29 RMV branch locations  |
| Contact Center                    | Also known as the call center  |
| Back Office                       | Mail-in services, Merit Rating Board (MRB), Medical Affairs Bureau, Road Testing, DCU, and other operations out of the Quincy Headquarters or Registrar's Office |
| Internet                          | www.massrmv.com  |
| Kiosks                            | Self-service kiosks located in Service Centers   |
| Public Private Partnerships (PPP) | Partnering agencies that offer RMV services such as AAA and car dealerships  |

Figure 42. Service Channels

customers are ineligible to complete registration renewals online is due to the need to have an insurance stamp placed on their registration form. These customers can, however, mail-in their form and do not need to come to a Service Center.

### > Percentage of license renewals conducted online

As a percentage of eligible transaction volume, the percentage of license renewals conducted online varied monthly over FY16, ranging between 39% and 59%.

As a percentage of all license renewal transactions conducted systemwide, online license renewals represented 31% in FY16 compared to the 62% eligible to renew online.

### > Percentage of registration renewals conducted online

As a percentage of eligible transaction volume, the percentage of registration renewals conducted online varied monthly over FY16, ranging between 43% and 66%.

As a percentage of all registration renewal transactions conducted systemwide, online registration renewals represented 52% in FY16 compared to the 90% eligible to renew online.



## About the measure

### % of license and registration renewals conducted online

Percentage of renewals conducted online is shown in two ways: 1) as a percentage of systemwide renewals conducted and 2) as a percentage of eligible transaction volume. The first representation uses ALARS core transaction volumes to compare online renewals to all renewals conducted in the fiscal year. The second representation, by which the targets are set for this measure, adjusts the total volume of all renewals by the online eligibility percentage (this adjustment is applied monthly, and then aggregated for the fiscal year).

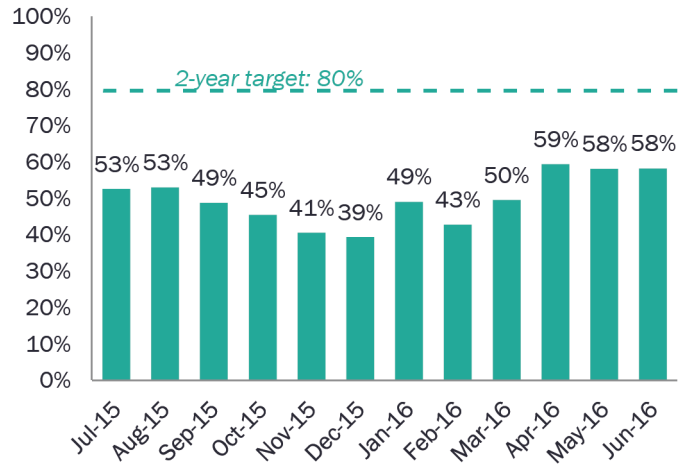


Figure 43. % of license renewals conducted online monthly (as a percent of eligible renewal volume)

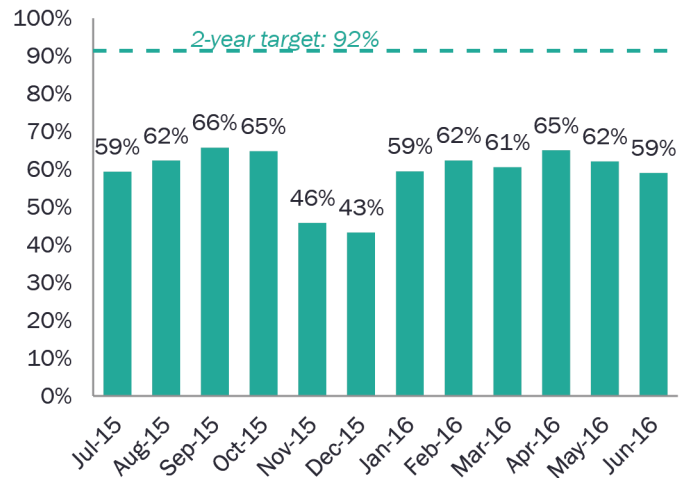


Figure 44. % of registration renewals conducted online monthly (as a percent of eligible renewal volume)

|   |                                      |                                    |                                    |                                    |
|---|--------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| % of license renewals conducted online      | 50.1% of eligible transaction volume | 80% of eligible transaction volume | 85% of eligible transaction volume | 95% of eligible transaction volume |
| % of registration renewals conducted online | 58.3% of eligible transaction volume | 92% of eligible transaction volume | 95% of eligible transaction volume | 97% of eligible transaction volume |

### ➤ Contact Center wait time (after virtual hold)

The Contact Center processed 2.15% (147,000) of RMV transactions in FY16 and handled over 500,000 calls. In FY16 the average wait time after virtual hold was 3 minutes and 34 seconds. Monthly wait times after virtual hold ranged from 1:39 to nearly 5 minutes in FY16.

The virtual hold technology provides estimated wait times to callers to help them decide whether to wait on hold or call back later. In addition, when call volumes and wait times are too high, the technology gives customers the option to schedule a same day call back or an appointment call up to 5 days in advance. In July 2016, the virtual hold system was turned off to assess the performance of the Contact Center without the technology and to address some customer complaints linked to the features of virtual queuing.

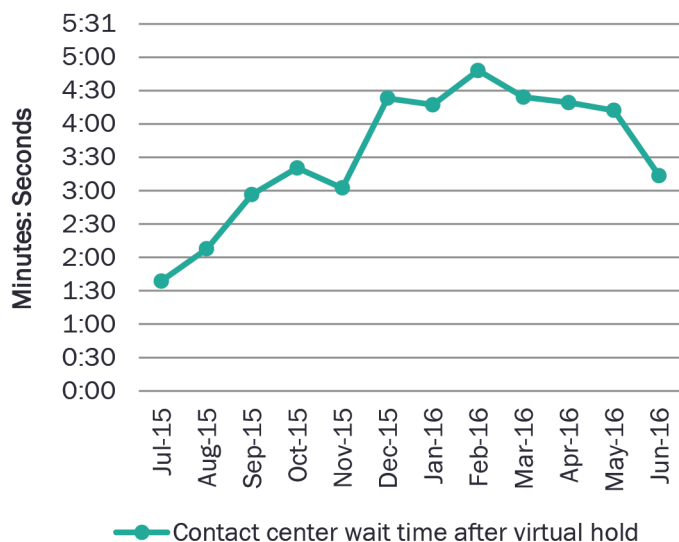


Figure 45. Monthly Contact Center wait time after virtual hold



## About the measure

### Contact Center wait time

In FY16 the Contact Center directed most calls through the virtual hold system, meaning that callers scheduled a callback time before being connected to an agent. After the system reconnected to the caller, there was an additional wait time while waiting for an agent to finish their previous call. The wait time after virtual hold measures the elapsed time from the point where the caller confirms that they are ready to be connected to an agent, to when an agent answers the call.

# Measures in Development

These measures have been proposed either by OPMI or division teams to track performance in additional ways. For some measures, data is available and OPMI is working on creating the methods and analysis needed to report these measures. In other cases, data is not available and must first be collected and analyzed before a final measure is proposed. In these cases, OPMI is working with the division teams to ensure that data is collected and reported in a way that is conducive to the proposed measure. OPMI anticipates that these measures will be reported in FY17 *Tracker*.

## ➤ *Road test availability*

Road test availability will measure 1) the demand for road tests, 2) the supply of road test appointments, and 3) any gap between the supply and demand. This will help the road test program assess its level of resources to meet the current demand, as well as assess how the current (and any planned) scheduling systems can help distribute the demand across the supply of appointments.

## ➤ *MAB cycle request time*

OPMI is also working with the Medical Affairs Bureau (MAB) team to capture and report data that can help us to report cycle request time, or in other words, the wait time for customers to have requests that require MAB approval and processing, (for example, a placard) completed.

## ➤ *Total number of customers connecting with an agent*

This measure will reflect the success that customers experience in reaching an agent in the Contact Center when they need one. It will measure the combined performance of the Contact Center, the virtual hold system, and other related technologies.





# Rail & Transit Division

## Overview

The Rail and Transit Division provides oversight and funding for all 15 Regional Transit Authorities (RTAs), owns 358 miles of track (294 miles of which is active) and 163 bridges, and works cooperatively with Amtrak and private railroad companies to provide intercity rail and freight rail service to residents and business.

This section is organized into two distinct categories: transit and rail. The transit section provides data on the 15 RTAs, and the CapeFLYER (a seasonal rail service sponsored by MassDOT). The 15 RTAs are:






- Berkshire Regional Transit Authority (BRTA)
- Brockton Area Transit Authority (BAT)
- Cape Ann Transportation Authority (CATA)
- Cape Cod Regional Transit Authority (CCRTA)
- Franklin Regional Transit Authority (FRTA)
- Greater Attleboro-Taunton Regional Transit Authority (GATRA)
- Lowell Regional Transit Authority (LRTA)
- Martha's Vineyard Transit Authority (VTA)
- Merrimack Valley Regional Transit Authority (MVRTA)
- MetroWest Regional Transit Authority (MWRTA)
- Montachusett Regional Transit Authority (MART)
- Nantucket Regional Transit Authority/THE WAVE (NRTA)
- Pioneer Valley Transit Authority (PVTA)
- Southeastern Regional Transit Authority (SRTA)
- Worcester Regional Transit Authority (WRTA)

RTAs in Massachusetts operate two main types of service. Bus service includes regularly scheduled local routes and commuter routes which operate on fixed schedules. Demand response service includes federally mandated paratransit service and other dial-a-ride services, whether using dedicated vehicles or taxi vouchers. Measures relating to RTA operations are separated into bus and demand response in order to reflect differences in their costs and operational characteristics.

The rail section provides measures that relate to safety and condition of the railroad infrastructure assets throughout the Commonwealth. Neither of these sub-sections contain targets this year. MassDOT oversees operations of the RTAs, but does not set performance targets for them. As rail data collection and quality matures, relevant targets will be set and published in future versions of *Tracker*. In some cases (and as noted), the available rail data is not exclusive to MassDOT-owned assets.

In previous versions of *Tracker*, the Rail and Transit Division section included the Massachusetts Bay Transit Authority (MBTA). As part of an effort to highlight and expand the performance reporting of rail and transit throughout the Commonwealth, OPMI has created a section specifically for the MBTA (see page 63).




## RAIL &amp; TRANSIT DIVISION- 2016 TRANSIT SCORECARD

| PURPOSE   | PERFORMANCE MEASURE   | CURRENT (FY16)                                  | CHANGE FROM FY15                     | SERVICE TYPE    |
|---|---|---|--------------------------------------|-----------------|
|    | % of scheduled trips operated   | <b>98.7%-100%</b>                               | 13 +   2 -                           | Fixed-route bus |
|    | Fleet age   | <b>2.2 – 8.3 years</b>                          | n/a                                  | Fixed-route bus |
|   |   | <b>1.0 – 5.7 years</b>                          | n/a                                  | Demand response |
|   | Revenue vehicle condition <sup>1</sup>                                | <b>2.8 – 4.7</b>                                | n/a                                  | Fixed-route bus |
|   |   | <b>2.0 – 5.0</b>                                | n/a                                  | Demand response |
|   | Facility condition <sup>1</sup>                                       | <b>1.0 - 5.0</b>                                | n/a                                  | Fixed-route bus |
|    | % of capital dollars spent by year's end                              | <b>70% - 100%</b>                               | 4+   2 -   9 no change               | All             |
|   | Operating expense per vehicle revenue mile                            | <b>\$3.61 - \$9.57</b><br>(FY15)                | 12+   3 -                            | Fixed-route bus |
|   |   | <b>\$3.08 - \$15.70</b><br>(FY15)               | 10 +   5 -                           | Demand response |
|   | Farebox recovery ratio  | <b>7.8% - 35.2%</b><br>(FY15)                   | 3 +   12 -                           | Fixed-route bus |
| <b>2.8% - 56.0%</b><br>(FY15)   |   | 8 +   7 -                                       | Demand response                      |                 |
|  | All injuries as a result of transit accidents (injuries per 100k UPT) | <b>0-0.95</b> (FY12-16 rolling avg)             | 5 +   7 -   1 no change              | Fixed-route bus |
|   |   | <b>0-2.51</b> (FY12-16 rolling avg)             | 3 +   4 -   4 no change              | Demand response |
|   | Preventable accidents (per 100k UPT)                                  | <b>0-4.43</b> (FY12-16 rolling avg)             | 7 +   8 -                            | Fixed-route bus |
|   |   | <b>0-37.0</b> (FY12-16 rolling avg)             | 5 +   6 -   4 no change              | Demand response |
|  | Annual ridership <sup>2</sup>   | <b>0.136M - 12.155M</b><br>(Statewide: 30.988M) | 11 +   4 -<br>(from average FY10-15) | Fixed-route bus |
|   |   | <b>7k - 585k</b><br>(Statewide: 2.457M)         | 8 +   7 -<br>(from average FY10-15)  | Demand response |
|   | % of MA residents with access to transit                              | <b>51.5%</b>                                    | n/a                                  | Fixed-route bus |
|   | Ridership in CapeFLYER  | <b>13,663</b> (CY16)                            | +2.9%                                | Rail            |

Note: Current (FY16 unless otherwise noted) is listed as a range where applicable (minimum and maximum value per RTA). Change from FY15 (or the most recent year prior as noted) is listed as the number of RTAs showing an increase followed by the number of RTAs showing a decrease, followed by the number of RTAs which had no change in performance. (# + | # - | # no change). Otherwise the absolute increase or decrease is indicated in this column.

1. Ranges on a scale from 1 to 5.
2. Total trips

## RAIL &amp; TRANSIT DIVISION- 2016 RAIL SCORECARD

| PURPOSE   | PERFORMANCE MEASURE                       | CURRENT (FY16)                                       | CHANGE FROM FY15 |
|---|---|--|------------------|
|  | Percentage of bridges inspected           | <b>100%</b> (CY2015)                                 | No change        |
|   | Number of railroad ties repaired per year | <b>25,000</b>  | no data          |
|  | Capital budget spent to date vs. planned  | <b>153%</b>  | +71%             |
|  | Number of derailments                     | <b>5.04 / 1000 track miles</b> (FY12-16 rolling avg) | +2.2%            |
|   | Number of reported hazmat incidents       | <b>1.39 / 1000 track miles</b>                       | +18.2%           |
|   | Number of highway-rail incidents          | <b>3.15 / 1000 grade crossings</b>                   | +5.8%            |

Note: Current includes FY16 unless otherwise noted; Change from FY15 includes the amount of change from FY15 to FY16 or change from the most recent year prior as noted.



# Customer Experience

## Transit

### > Percent of scheduled trips operated

The percent of scheduled trips operated directly impacts the perceived and real reliability of a system. In FY16, each Massachusetts RTA operated between 98.7% and 100% of regularly scheduled bus trips. Of the 15 RTAs, 13 operated a higher percentage of scheduled trips in FY16 than FY15.

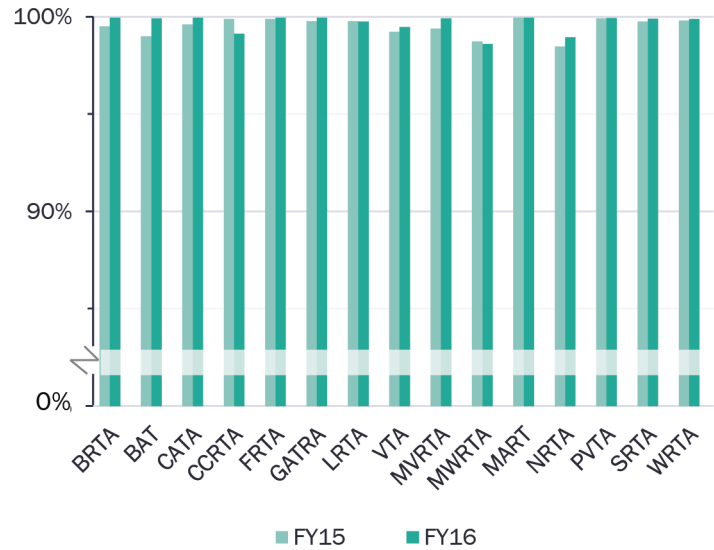


Figure 46. Percent of scheduled trips operated, All RTAs, FY 2015-16



## About the measure

### Percent of scheduled trips operated

The percent of scheduled trips operated refers to how reliably the buses in each RTA complete their scheduled routes. For example, if out of 100 scheduled fixed-route bus trips, one did not run at all, the percent of scheduled trips operated measure would be 99%.



# System Condition

## Transit

Modern and well-functioning equipment allows an RTA to provide efficient, comfortable, and safe transit services to its users. The measures in this section describe the age and condition of vehicles that RTAs use to provide revenue service to transit customers, and the facilities used for maintenance and administrative purposes.

### > Fleet age

The RTAs had average fleet ages of between 2.2 and 8.3 years old for fixed-route buses and 1.0 to 5.7 years old for demand-response vehicles. The average useful life of a single fixed-route bus in a fleet is 10-12 years. The average useful life of a single demand-response van in a fleet is 7 years.

### > Revenue vehicle condition

Vehicle condition is rated on a scale from 1.0 to 5.0. The RTAs had condition ratings between 2.8 and 4.7 for fixed-route buses and between 2.0 and 5.0 for demand response vehicles. Most fixed-route bus fleets were rated close to 3.0 or “fair,” with MVRTA, CCRTA, and three others rated closer to “excellent” or “good.” Four demand-response fleets were rated “good” or above, but three were also rated below “good.”

### > Facility condition

The RTAs had facility condition ratings between 1.0 and 5.0. Figure 49 shows the condition rating for each facility per RTA.



## About the measure

### Vehicle and facility condition

Vehicle and facility conditions are assessed using a standardized scale ranging from 1 (poor) to 5 (excellent) which reflects the age of the vehicle or facility, its current operating condition, and the quality of maintenance it received.

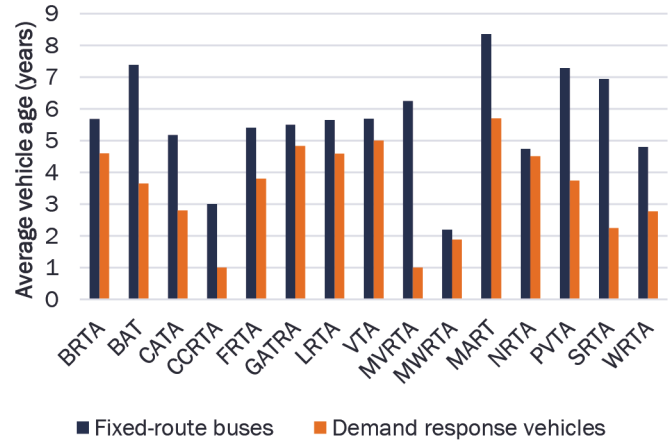


Figure 47. Fleet age

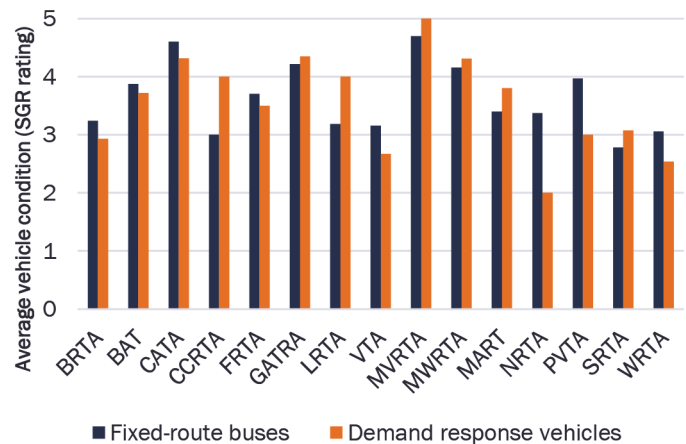


Figure 48. Revenue vehicle condition

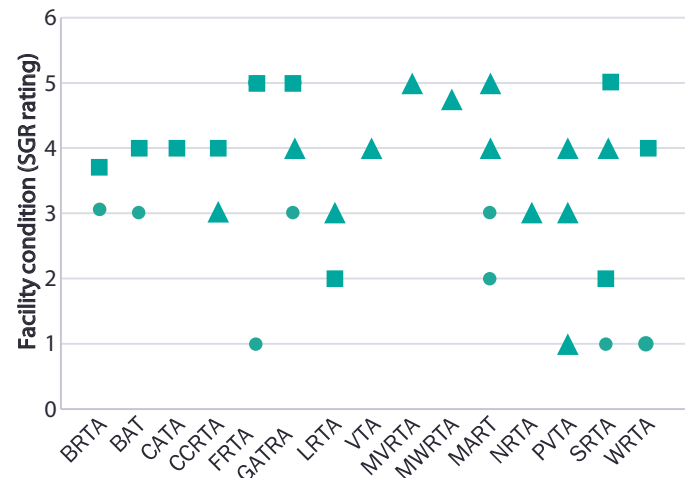


Figure 49. Facility condition; squares represent operations facilities, circles represent maintenance facilities, and triangles represents both types of facilities where this rating occurs.

## Rail

### > Percentage of bridges inspected

The FRA requires that MassDOT inspect all 163 bridges on MassDOT owned track each year, on a calendar year schedule. By the close of FY2016, 87% of them were inspected. All bridges will be inspected before the end of the calendar year (2016), within the one year time period mandated per FRA. This process, once complete, will result in a full inventory of track class assignment (e.g. miles of Class I track, etc.), which will be reported in future *Tracker* reports.

### > Number of rail ties repaired

Track condition relies on rail tie maintenance. The number of rail ties replaced or repaired provides an indication of the extent of the work needed to maintain the track at current class level. In FY16 the Rail and Transit Division replaced or repaired 25,000 rail ties.



# Budget & Capital Performance

## Transit

### > Operating expense per vehicle revenue mile

In FY15, Massachusetts RTAs spent between \$3.61 and \$9.57 per mile to operate a vehicle in fixed-route bus service. Three RTAs - LRTA, MWRTA, and PVTA - spent less per mile than they did in FY14.

In FY15, Massachusetts RTAs spent between \$3.08 and \$15.70 per mile to operate a vehicle in demand-response service. Five RTAs - MART, NRTA, PVTA, SRTA, and WRTA - spent less per mile than they did in FY14.

### > Farebox recovery ratio

In FY15, fare revenue from Massachusetts RTAs covered between 7.8% and 35.2% of operating expenses for fixed-route bus service. Three RTAs - BRTA, LRTA, and VTA - had a higher farebox recovery ratio in FY15 than in FY14.

In FY15, fare revenue from Massachusetts RTAs covered between 2.8% and 56.0% of operating expenses for demand-response service. Eight RTAs - CATA, CCRTA, FRTA, VTA, MART, NRTA, PVTA, and SRTA - had a higher farebox recovery ratio in FY15 than in FY14.

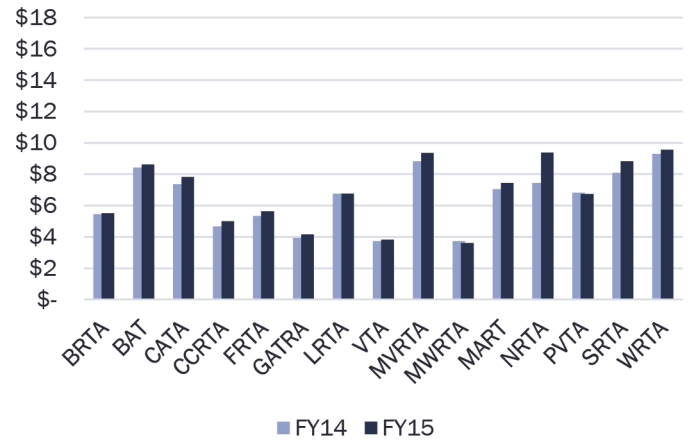


Figure 51. Operating expense per vehicle revenue mile – bus service, by RTA, FY14-15; Source: NTD

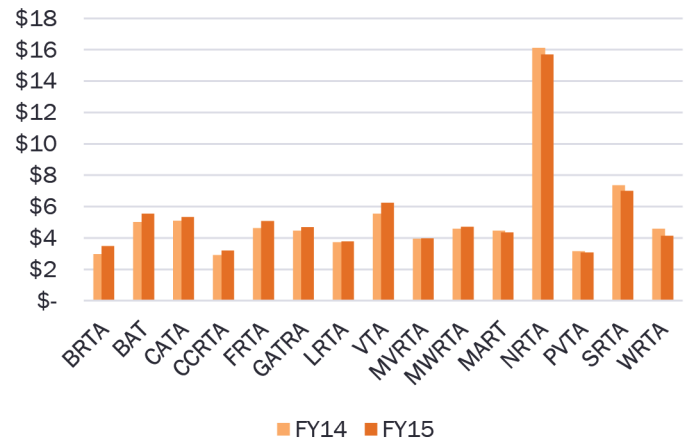


Figure 52. Operating expense per vehicle revenue mile for Demand Response service, by RTA, FY14-15; Source: NTD

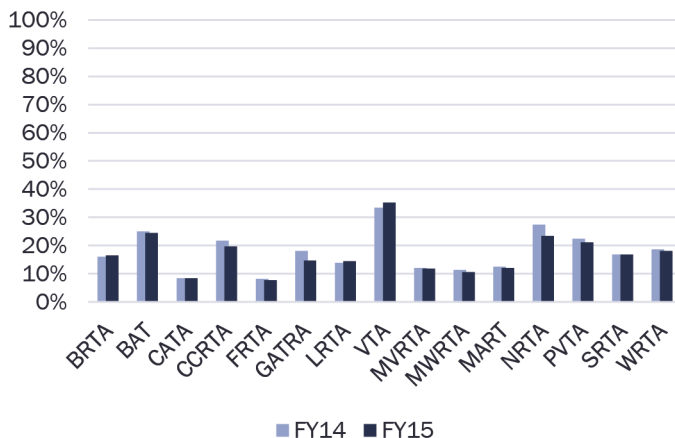


Figure 50. Farebox recovery ratio – bus service, by RTA, FY14-15; Source: NTD

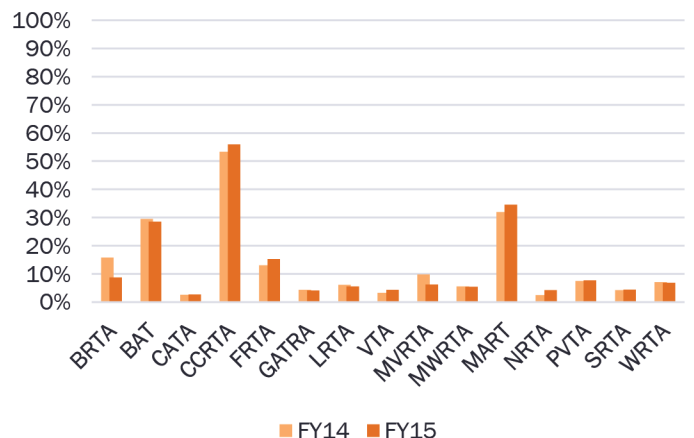


Figure 53. Farebox recovery ratio – demand response service, by RTA, FY14-15; Source: NTD

## > Percent of capital dollars spent by year's end

This measure indicates the ability of the RTAs to spend the state capital funds that they have budgeted. An annual percentage close to 100 indicates that an RTA is able to anticipate need accurately and execute programs effectively. In FY16, all RTAs spent 100% of their state-funded capital budget with the exception of GATRA and MVRTA (99%), FRTA (98%), and NRTA (70%). All of the RTAs spent more of their budget in FY16 than they did on average in FY15.



Figure 54. Percent of state capital dollars spent by year's end, All RTAs, FY15-16



## About the measure

### Percent of dollars spent by year's end

The percent of capital dollars spent by the year's end refers to the portion of the capital budget that was utilized within the fiscal year. For example, if an agency only spent \$10,000,000 of its \$20,000,000 budget, it would have spent 50% of its budget by year's end.

## Rail

### > Budget spent to date vs. planned

In FY16 the rail programs, combined, spent \$32,830,631 for capital expenditures. This is 153% of the original amount budgeted in the CIP. Mid-year MassDOT allocated supplemental bond cap (available due to underspending by other divisions) to the Rail and Transit Division, to cover the additional needs.



## About the measures

### Operating expense per vehicle revenue mile and farebox recovery ratio

These measures describe the efficiency with which RTAs commit operating expenses to serve their transit routes, geographies, and populations. Operating expenses are the ongoing annual costs of operating a transit agency, including staff time, maintenance, and fuel.

Bus service includes regularly scheduled local routes and commuter routes which operate on fixed schedules. Demand response service includes federally mandated paratransit service and other dial-a-ride services, whether using dedicated vehicles or taxi vouchers. Data was obtained from the National Transit Database (NTD) which includes federally audited data through FY14.

Operating expense per vehicle revenue mile describes how expensive it is for an RTA to operate a bus or van for one mile of revenue service. Revenue service includes trips that accept passengers and excludes for example moving a vehicle back to the garage after the last trip of the day. Smaller values indicate more efficient performance.

Farebox recovery is the ratio of the revenue from fares and passes to operating expenses. Higher ratios indicate that passengers pay relatively high fares, that expenses are relatively low, or both.



# Safety

## Transit

### > All transit injuries

The rate of transit injuries per 100,000 passengers decreased or stayed the same for most RTAs over the five-year rolling averages covering FY10 to FY15. At 7 out of the 12 RTAs that report separately for bus and demand response, the injury rate for fixed-route bus service declined or stayed the same over the past two 5-year periods. At 9 out of those 12 RTAs, the injury rate for demand response service declined or stayed the same.

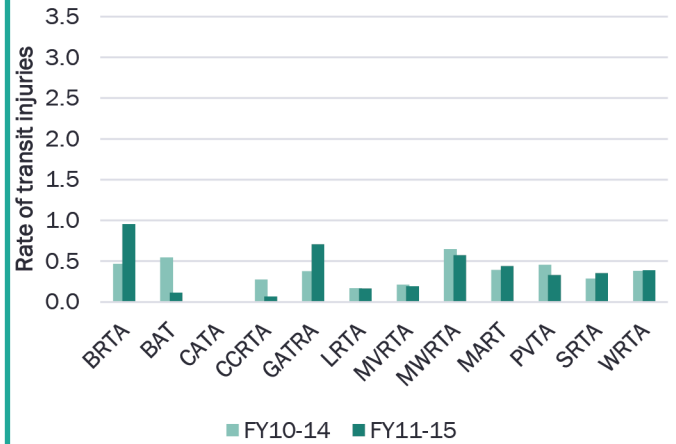


Figure 55. Transit injuries per 100,000 passengers – bus service, 12 RTAs, FY 2010-2015 (rolling averages)\*

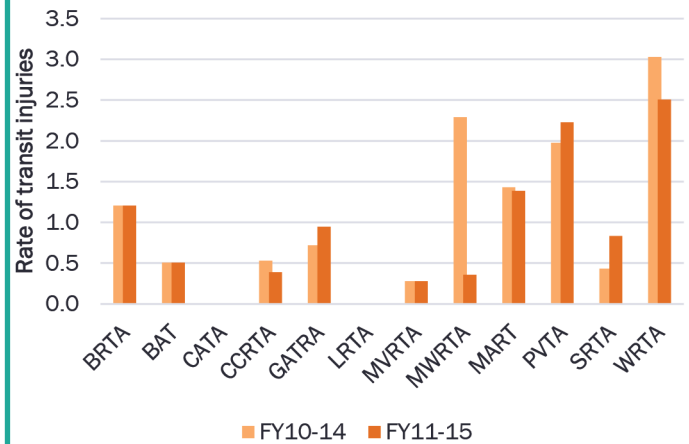


Figure 56. Transit injuries per 100,000 passengers – demand response service, 12 RTAs, FY 2010-2015 (rolling averages)\*

\*VTA, FRTA, and NRTA are not included because they do not report injuries by mode.



## About the measure

### All transit injuries

All transit injuries represents the annual number of injuries that resulted from unintentional contact with transit vehicles or property. An injury is recorded for each person who received medical attention on the premises, or was transported away to receive medical care. These are reported for each RTA for each fiscal year and normalized per 100,000 unlinked passenger trips (UPT).



## ➤ Preventable accidents

The rate of preventable transit accidents per 100,000 passengers decreased for 8 RTAs between FY15 and FY16. The greatest decrease was a change of 7 fewer accidents in the rate per 100,000 passengers. The other 7 RTAs had an increase in the rate of accidents. The highest increasing rate was just over one more accident per 100,000 passengers in FY16.



### About the measure Preventable accidents

Preventable accidents are defined as those accidents in which the transit driver is normally deemed responsible or partly responsible for the occurrence of the accident. These are reported for each RTA for each fiscal year and normalized per 100,000 unlinked passenger trips (UPT). Data are shown here for FY15 and FY16. These data have not yet gone through auditing by the NTD.

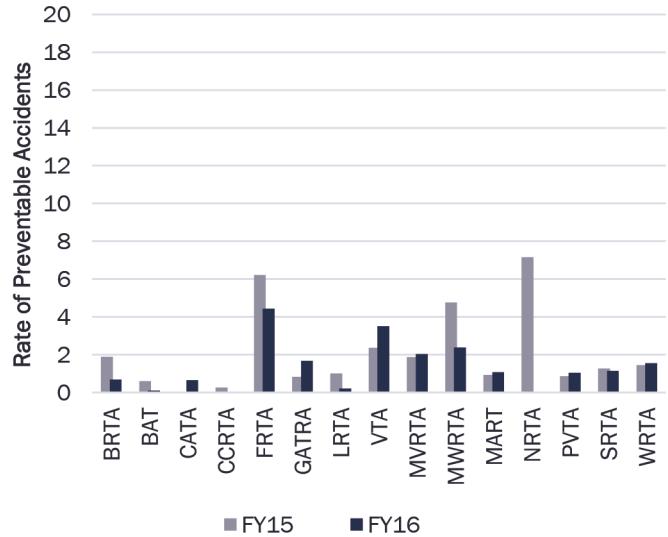


Figure 57. Preventable accidents per 100,000 passengers - bus service, FY15-16

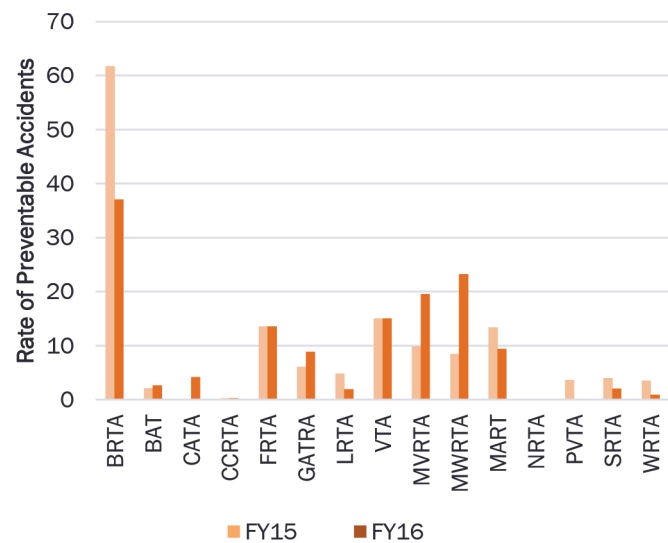


Figure 58. Preventable accidents per 100,000 passengers - demand response service, FY15-16

## Rail

### > Number of derailments

The number of rail derailments in Massachusetts have declined overall since FY12 (using the 5-year rolling average). They have, however, increased slightly in the past two years.

#### Peer state comparison

Due to the relatively small number of derailments per state, the annual numbers do fluctuate substantially among peer states, making it hard to identify a trend. The nationwide trend, however, has declined steadily over the past four years.



### About the measure Number of derailments

A derailment occurs when on-track equipment leaves the rail for a reason other than a collision, explosion, highway-rail crossing impact, etc. These can be reduced by inspection and maintenance of the rail and rolling stock and by operators following the speed limits. This measure is reported using a 5-year rolling average. For the peer comparison chart, incidents are shown per 1,000 miles of rail located within the state.

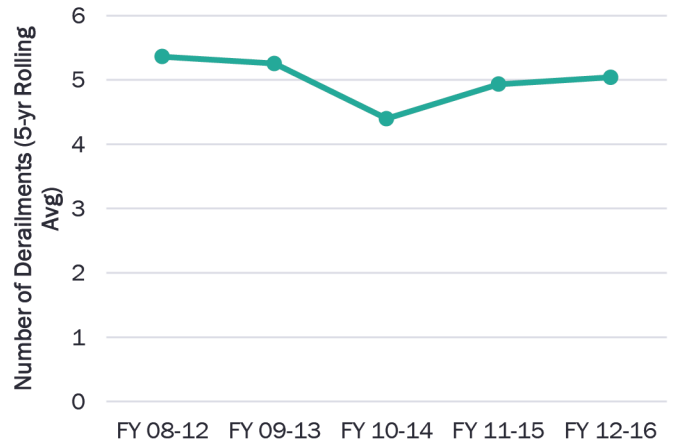


Figure 59. Number of rail derailments, 5 year rolling average FY12-16; Source: FRA; state-wide data

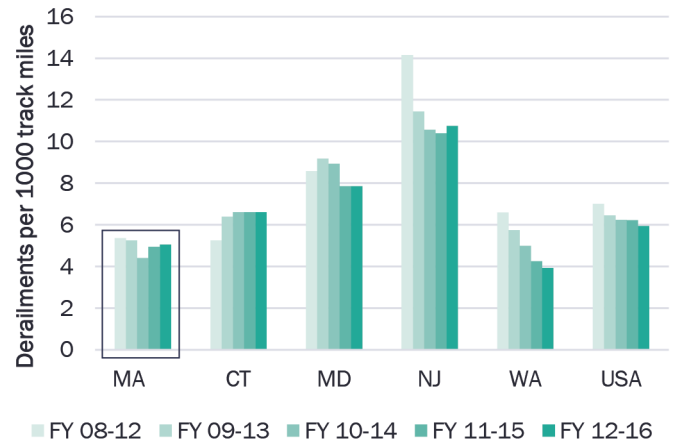


Figure 60. Number of rail derailments per 1000 track miles in peer states, 5 year rolling average FY12-16; Source: FRA; state-wide data

## > Number of reported hazmat incidents

Reported hazmat incidents have increased three out of the past four years.

### Peer state comparison

Adjusted for track miles, Massachusetts has a lower hazmat incident rate than most of its peer states.

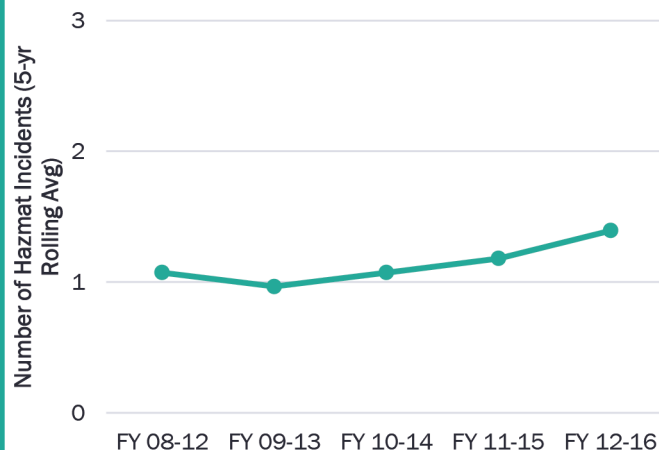


Figure 61. Number of reported hazmat incidents, 5 year rolling average FY12-16; Source: FRA; state-wide data

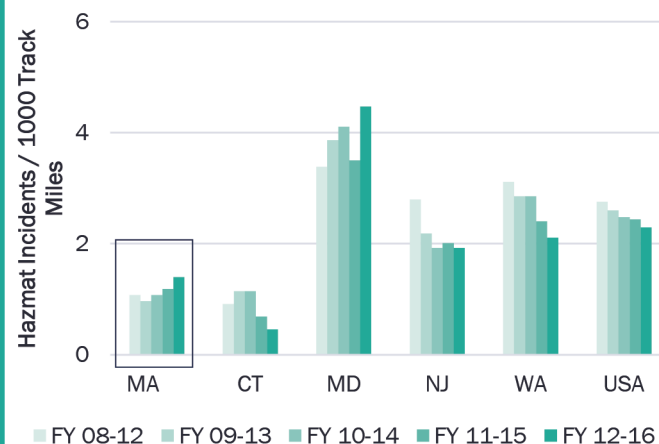


Figure 62. Number of reported hazmat incidents per 1000 track miles in peer states, 5 year rolling average FY12-16; Source: FRA; state-wide data



## About the measure

### Hazmat incidents

This measure tracks the reported incidents involving hazardous material transported via rail. For the peer comparison chart, incidents are shown per 1,000 miles of rail located within the state.

## ➤ Number of highway-rail incidents

Highway-rail crossing incidents have increased steadily over the past four years.

### Peer state comparison

Adjusted for number of crossings, Massachusetts has a lower highway-rail incident rate than most of its peer states.

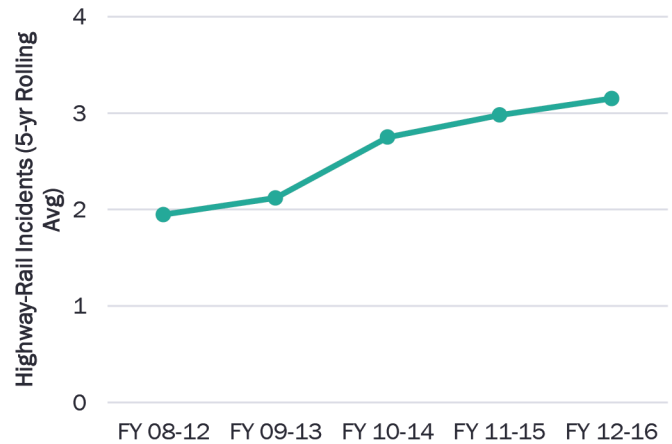


Figure 63. Number of highway-rail incidents, 5 year rolling average FY12-16; Source: FRA; state-wide data

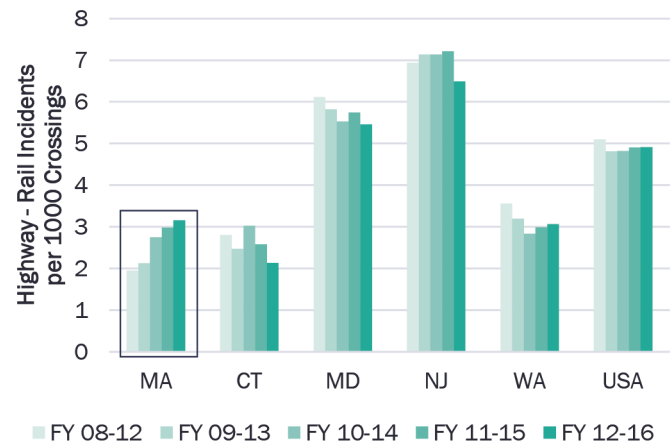


Figure 64. Number of highway-rail incidents per 1000 track miles in peer states, 5 year rolling average FY12-16; Source: FRA; state-wide data



## About the measure

### Highway-rail incidents

This measure tracks the total number of reported incidents at highway-rail grade crossings (including pedestrians, bicyclists, etc.). Highway-rail grade crossing means a location where a public highway, road, street, or private roadway, including associated sidewalks and pathways, crosses one or more railroad tracks at grade. For the peer comparison chart, incidents are shown per 1,000 highway-rail crossings located within the state.



# Healthy & Sustainable Transportation

## Transit

### > Annual ridership on fixed-route passenger service

In FY16, Massachusetts RTAs carried a total of 31 million passengers on fixed-route bus service, a statewide increase of 1.6% from FY15. Ten RTAs had an increase in bus ridership between 0.3% and 9.1%.

### > Annual ridership on demand response passenger service

In FY16, Massachusetts RTAs carried a total of 2.5 million passengers on demand-response service, a statewide increase of 1.5% from FY15. Nine RTAs had an increase in demand-response ridership between 1.7% and 24.1%.

### > Ridership on CapeFLYER

CapeFLYER is passenger rail service between Boston and Hyannis operated on weekends during the summer season. It is a cooperative effort between CCRTA, MassDOT, and the MBTA. CapeFLYER reports ridership on a calendar year basis to match its seasonal service.

In the summer 2016 season, CapeFLYER carried 13,663 one-way passengers, an increase of 2.9% from summer 2014. CapeFLYER operated service into the early fall in 2013, its first season, resulting in higher ridership. Ridership has steadily increased in the subsequent years, when its season has consistently ended at Labor Day.

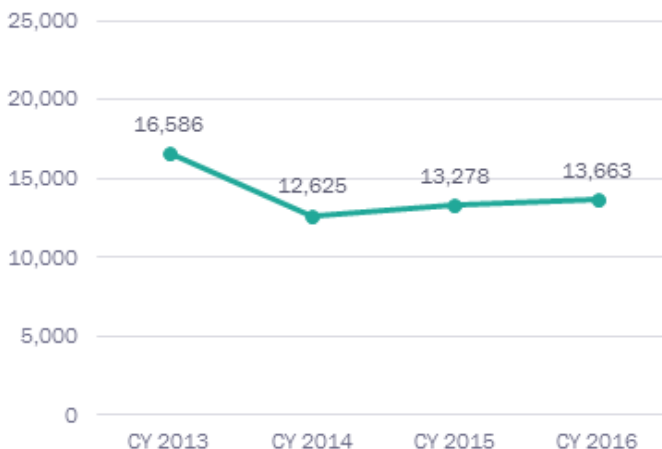


Figure 65. One-way passenger trips on CapeFLYER service, CY13-16

## About the measure

### Ridership

Annual ridership is the number of one-way passenger trips taken. Customers transferring between buses are counted once per bus that they ride. This method of counting ensures that data can be reliably compared between RTAs and across years.



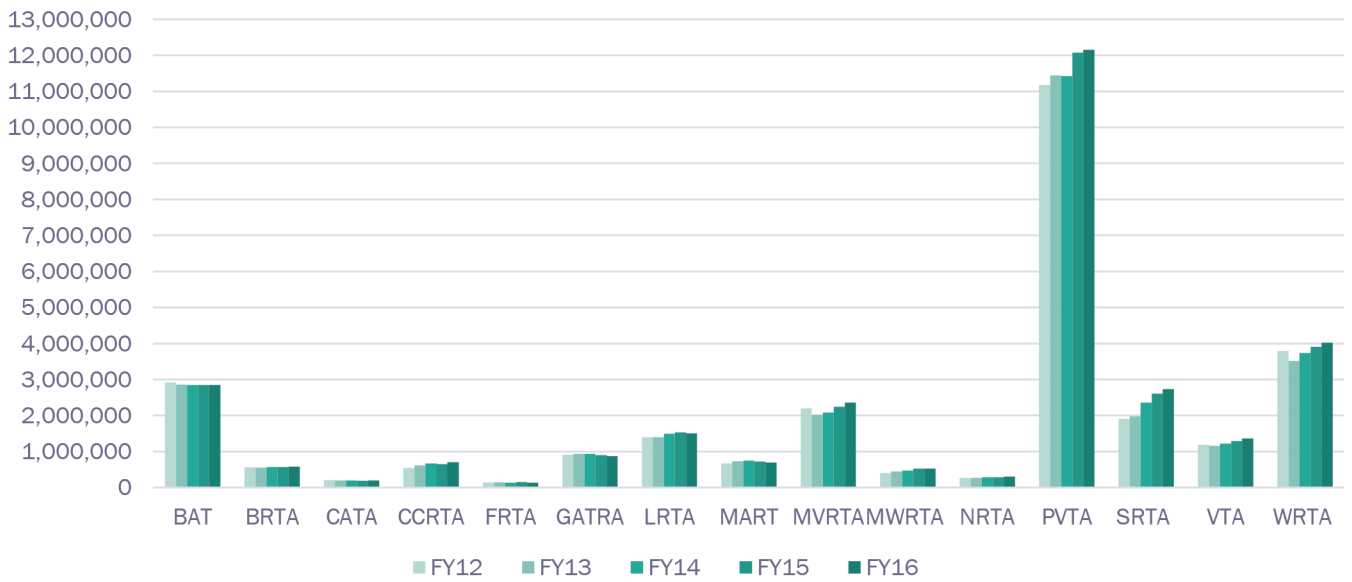


Figure 66. Ridership – bus service, FY 2012-16; Source: National Transit Database and MassDOT.

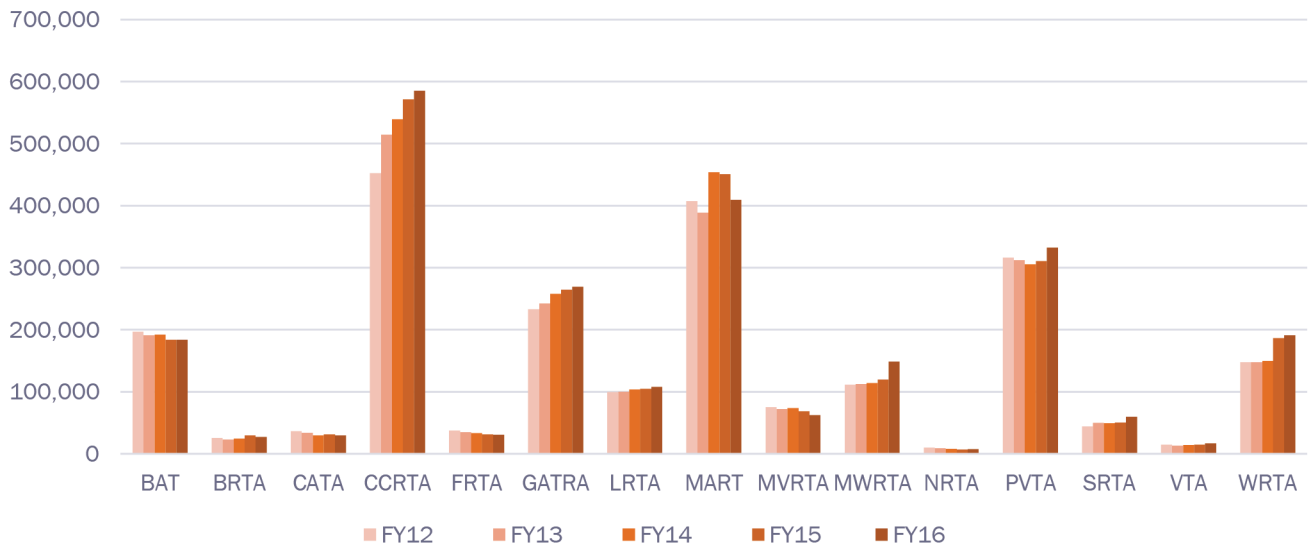


Figure 67. Ridership – demand response, FY12-16; Source: NTD and MassDOT.

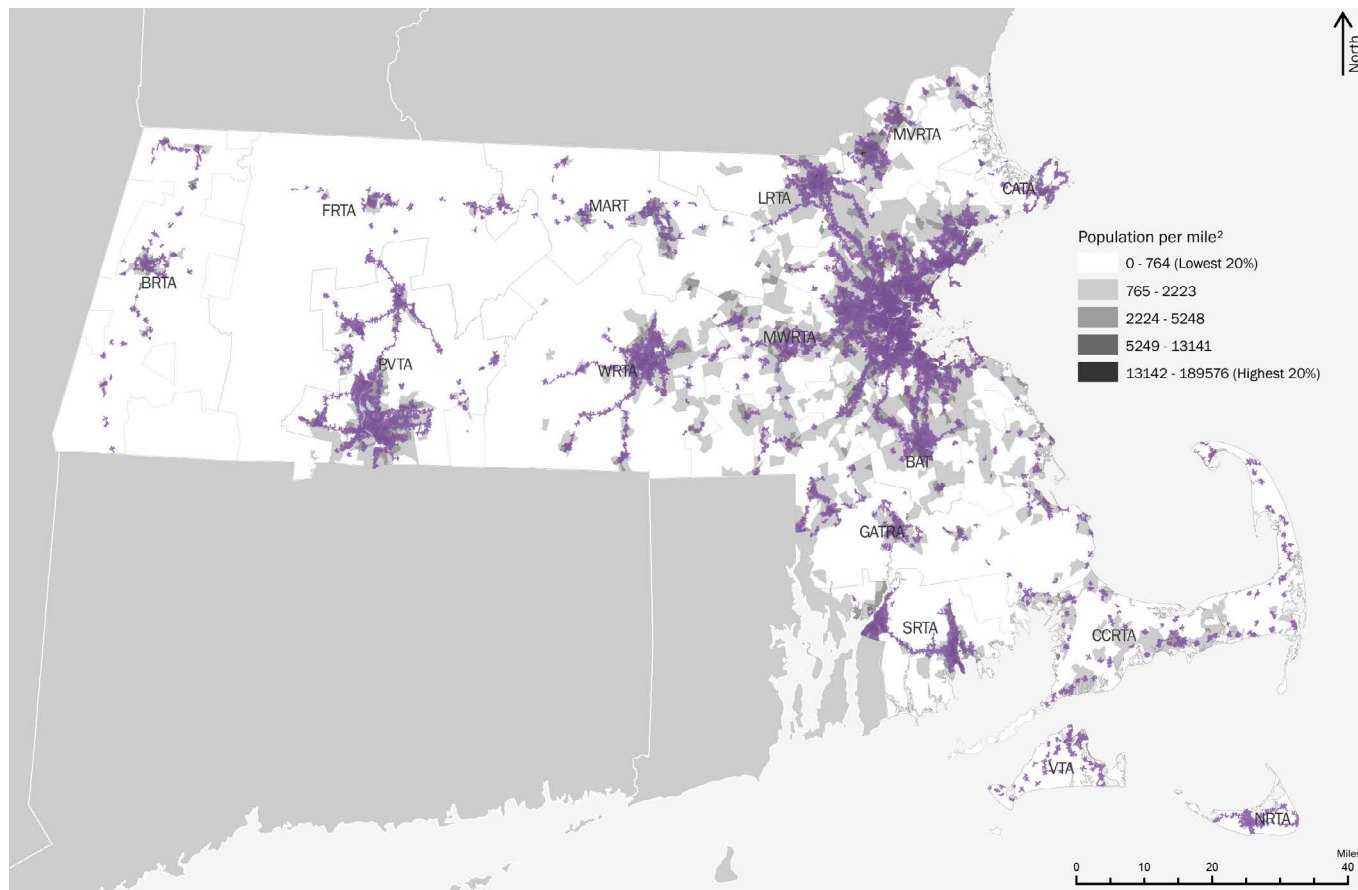


Figure 68. Massachusetts area with access to transit

## ➤ Percent of Massachusetts residents with access to transit

At the end of FY16, the 15 RTAs and all MBTA bus, train, and boat service combined to provide 51.5% of Massachusetts residents access to transit service (stops served by fixed-route bus service), or about 3.4 million out of 6.7 million residents.



### About the measure

#### Percent of Massachusetts residents with access to transit

This measure is the proportion of State population who lives within one-half mile of transit service. Thus, it represents one measure of accessibility to transit service statewide. Calculations are based on walking distances from transit stops that one or more agencies served at the end of FY16 with population data from 2010-2014 American Community Survey 5-year estimates.



# MBTA

## Overview

The MBTA owns and operates one of the oldest and largest public transportation agencies in the US, transporting more than 1.3 million passengers daily. The MBTA's services, or modes, include:

- **Bus** - The MBTA operates 172 bus routes, including 116 local routes, 19 key routes (i.e. serving corridors with higher ridership), 28 commuter or express routes, 2 community routes, and 7 supplemental routes.
- **Light rail** - The MBTA's primary light rail system, the Green Line, provides service to outlying areas and subway service through the center of the city. The MBTA also operates the Mattapan High Speed Line, which serves as an extension of the Red Line from Ashmont to Mattapan.
- **Heavy rail** - The MBTA operates three heavy rail lines, the Red Line, Blue Line, and Orange Line. Collectively, these lines provide core subway service.
- **Commuter Rail** - The MBTA's 14 Commuter Rail lines link cities and towns around the state with downtown Boston. Since July 2014, the Commuter Rail has been operated by Keolis Commuter Services.
- **Boat** - The MBTA provides ferry service between downtown Boston, the South Shore, Logan Airport, and Charlestown.
- **Paratransit** - The MBTA provides paratransit service via THE RIDE to eligible customers in 60 cities and towns in eastern Massachusetts.




## > Related Processes






The MBTA uses performance measures to track progress toward goals, provide accountability and transparency, and plan for investments and programs in the future. There are a number of current initiatives and plans under development that include goals and performance measures that match or overlap with those included in *Tracker*. To ensure alignment among these efforts, OPMI has worked closely with MBTA and MassDOT staff and MBTA Fiscal and Management Control Board (FMCB) members in the development and presentation of these performance measures. The following are related to *Tracker*.

- > MBTA Service Delivery Policy (SDP) – defines the services provided by the MBTA, and the associated service objectives. The service quality standards included in the SDP are the same as the customer service performance measures included in *Tracker*.
- > Focus40 – the 25-year investment plan focused on how to position the MBTA to meet the needs of the Greater Boston region in 2040. When finished in early 2017, this plan will include long-term goals and packages of investment strategies based on public input. The Focus40 goals will be drafted to relate to the *Tracker* performance goals.
- > MBTA Strategic Plan – The MBTA FMCB will be adopting a Strategic Plan in the spring of 2017. This plan will provide the medium (4 year) and long-term targets for the performance measures listed in *Tracker*. Once these are finalized, *Tracker* will be updated.
- > MBTA Dashboard (mbtabackontrack.com) – In March 2016 the MBTA launched its online performance dashboard. The automated website presents MBTA performance in the areas of reliability, ridership, financials, and customer satisfaction. The data is updated daily or monthly, depending on the measure. Some of these measures include targets, and these align with the targets presented in *Tracker*.

### MBTA - 2016 SCORECARD

| PURPOSE   | PERFORMANCE MEASURE                                    | CURRENT (FY16)          | CHANGE FROM FY15 | 2-YEAR TARGET  |
|---|--|-------------------------|------------------|----------------|
|  | Subway reliability - Blue Line                         | <b>93%</b>              | n/a              | 90%            |
|   | Subway reliability - Orange Line                       | <b>91%</b>              |                  |                |
|   | Subway reliability - Red Line                          | <b>87%</b>              |                  |                |
|   | Subway reliability - Green Line <sup>1</sup>           | <b>72%</b> (March-June) |                  |                |
|   | Subway passenger travel time - Blue Line               | <b>98%</b>              | no data          | Context only   |
|   | Subway passenger travel time - Orange Line             | <b>92%</b>              |                  |                |
|   | Subway passenger travel time - Red Line                | <b>96%</b>              |                  |                |
|   | Subway passenger travel time - Green Line <sup>1</sup> | <b>91%</b> (March-June) |                  |                |
|   | Bus reliability  | <b>71%</b>              | +5.6%            | 75%            |
|   | Bus service operated                                   | <b>98.5%</b>            | +0.5%            | In development |
|   | Commuter Rail reliability                              | <b>90%</b>              | +4.6%            | 90%            |
|   | Commuter Rail service operated                         | <b>99.81%</b>           | +0.2%            | In development |
|   | Boat reliability                                       | <b>98%</b>              | +2.1%            | 95%            |
|   | THE RIDE reliability                                   | <b>92%</b>              | +2.3%            | 90%            |

**MBTA - 2016 SCORECARD**

| PURPOSE   | PERFORMANCE MEASURE  | CURRENT (FY16)                         | CHANGE FROM FY15                | 2-YEAR TARGET                                      |                   |
|---|--|--|---------------------------------|--|-------------------|
|    | Platform accessibility (all rapid transit stations with elevators) | <b>99.5%</b> (April 2015 - March 2016) | +0.1% (April 2014 - March 2015) | In development                                     |                   |
|   | Vehicle accessibility (Green Line)                                 | <b>98.6%</b>                           | no data                         | In development                                     |                   |
|   | Customer satisfaction <sup>2</sup>                                 | <b>3.2</b>                             | no data                         | In development                                     |                   |
|    | Fleet age - Bus  | <b>7.8 years</b>                       | -0.33 years                     | In development; will coordinate with 2018-2022 CIP |                   |
|   | Fleet age - Rapid transit  | <b>26.3 years</b>                      | -5.7 years                      |  |                   |
|   | Fleet age - Commuter Rail  | <b>22 years</b>                        | -1 year                         |  |                   |
|   | Track condition - Rapid transit <sup>2</sup>                       | <b>2.32</b> (FY15)                     | no data                         |  |                   |
|   | Track condition - Commuter Rail <sup>2</sup>                       | <b>2.7</b> (FY15)                      |                                 |  |                   |
|   | Transit vehicle condition - Bus <sup>2</sup>                       | <b>2.83</b> (FY15)                     |                                 |  |                   |
|   | Transit vehicle condition - Rapid transit <sup>2</sup>             | <b>2.84</b> (FY15)                     |                                 |  |                   |
|   | Transit vehicle condition - Commuter Rail <sup>2</sup>             | <b>2.86</b> (FY15)                     |                                 |  |                   |
|   | Transit vehicle condition - Non-revenue <sup>2</sup>               | <b>1.46</b> (FY15)                     |                                 |  |                   |
|   | Facility condition - Bus <sup>2</sup>                              | <b>3.42</b> (FY15)                     |                                 |  |                   |
|   | Facility condition - Rapid transit <sup>2</sup>                    | <b>2.78</b> (FY15)                     |                                 |  |                   |
| Facility condition - Commuter Rail <sup>2</sup>                                     | <b>3.12</b> (FY15)   |  |                                 |  |                   |
|  | Fare recovery ratio  | <b>41.16%</b>                          |                                 | +1.22%   | 50%               |
|  | Fatalities as a result of transit incidents                        | <b>12</b>                              |                                 | -1   | Move towards zero |
|  | Base coverage (residents within one half mile of transit)          | 74.3%                                  | n/a                             | Context only                                       |                   |
|   | Ridership (unlinked passenger trips)                               | <b>390.5 million</b>                   | +6.2 million                    | Context only                                       |                   |

1.Data only available since March 2016.

2. Ranges from 1 to 5.

Note: 4-year and long term targets will be provided in the Strategic Plan.



# Customer Experience

MBTA customers are riders of public transit who share common experiences such as planning a trip, waiting at a stop or station, and riding a transit vehicle. The reliability measures describe how consistently customers can rely on published schedules, while the accessibility measures describe how consistently accessible service is available. Additional measures are under development will assess the information communicated to customers.



## About the measures

### Reliability

The reliability measures vary by mode, reflecting the differences between the types of services. Overall, the measures describe how well the MBTA adheres to its published schedules and service frequencies so that MBTA customers can rely on consistent travel times.



Subway reliability is measured as the percent of customers who wait no longer than the scheduled time between trains. The calculations for this measure do not yet account for the effects of overcrowding or bus shuttles, which significantly degrade the customer experience. Subway passenger travel time is a supplemental measure of reliability that refers to the amount of time that a passenger spends on board a train.

Subway passenger travel time is the percent of customers whose travel time is within 3 minutes of the scheduled travel time. Travel time combines with wait time to produce the passenger experience of on-time performance. Data is available since July 1, 2015.



Bus reliability is measured at each end of the route and key stops in between. For services that come every 15 minutes or less, it is the percent of buses that are no more than 3 minutes later than the scheduled interval since the last bus. For other services, it is the percent that show up within 6 minutes of the scheduled time.

Bus service operated is a supplemental measure of reliability and is the percentage of scheduled bus trips that ran their scheduled route. For example, if out of 100 scheduled bus trips, one did not run at all, the bus service operated measure would be 99%. When a frequent service bus trip does not run, it lowers both bus service operated and bus on-time performance. When a scheduled-departure trip does not run, it lowers bus service operated but does not affect bus on-time performance.



Commuter Rail reliability is measured as the percent of trains that arrive at their final stop no more than 4 minutes and 59 seconds later than scheduled.

Commuter Rail service operated is a supplemental measure of reliability and is the percentage of scheduled train trips that ran at least part of their scheduled route. For example, if out of 100 scheduled Commuter Rail trips, one did not run at all, the Commuter Rail Service Operated measure would be 99%. When a Commuter Rail trip does not run, it lowers both Commuter Rail reliability and Commuter Rail service operated.

Boat reliability is measured as the percent of ferry and commuter boat trips that arrive at their final destination no more than 5 minutes later than scheduled.

THE RIDE reliability is measured by how promptly vehicles arrive at the starting point of each completed trip. It is the percent of trips that arrived to pick up the customer within 15 minutes of the scheduled reservation start.



## > Subway reliability

In FY16, Blue Line reliability was 92.5% and Orange Line was 90.9%, both above the 90% reliability target. Red Line was under the target at 87.3%. For the four months starting in April 2016 that Green Line reliability data was available, its reliability was 71.6%.

In FY16, Orange and Red Line reliability improved by about 4 and 7 percentage points, respectively. The Blue Line did not show any obvious trends across FY16. Data for FY14-FY15 came from an earlier reporting system and cannot be directly compared to FY16.

### Subway passenger travel time

Passenger travel time was relatively consistent for the Blue Line in FY16, when 98.4% of its annual passengers experienced travel times within 3 minutes of the schedule. For the Red Line, the annual total was also relatively consistent at 95.9%. In contrast, passenger travel time on the Orange Line improved by more than 10 percentage points from the first six months of the fiscal year, to 98.6% from January to June. This improvement corresponds to the implementation of Orange Line headway control efforts.

## > Bus reliability

In FY16, bus reliability was 70.8% systemwide, with individual bus routes ranging from 62.0% to 89.6%. Bus reliability increased by 5.6 percentage points between FY15 and FY16. Comparing FY16 to earlier years, bus reliability increased by 2.1–2.7 percentage points.

### Bus service operated

In FY16, 98.5% of scheduled bus trips were operated. The highest percentage was in January (99.1%) and the lowest was in July (98.1%). Compared to FY15, 0.5% more trips were operated in FY16.

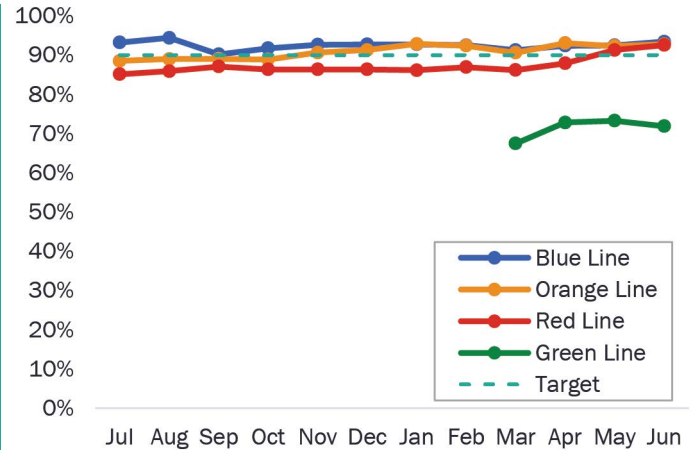


Figure 69. Subway reliability, monthly, FY16

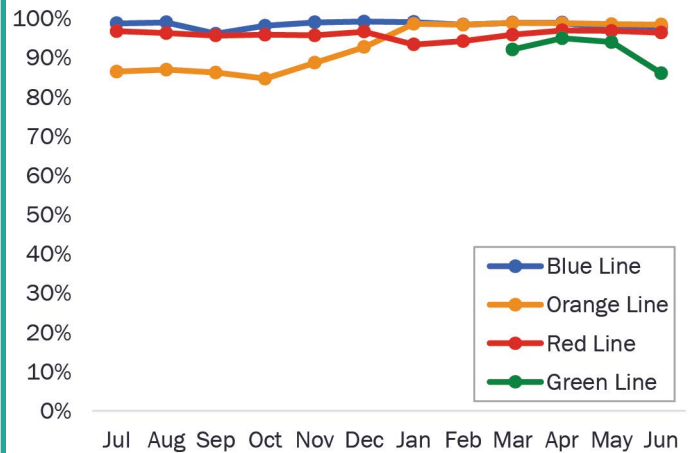


Figure 70. Subway Passenger Travel Time by Line, Monthly, FY16

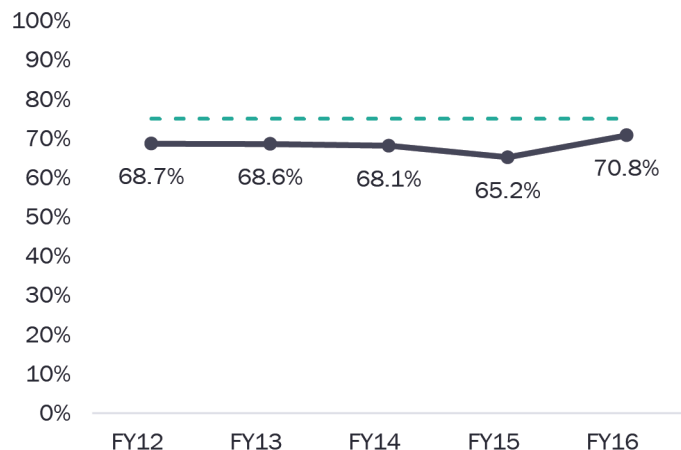


Figure 71. Bus reliability, FY12-FY16

### > Commuter Rail reliability

In FY16 Commuter Rail reliability was 90.5% systemwide. This level of reliability has been consistent since 2012 with the exception of 2015 when winter storms heavily impacted services. Commuter Rail reliability increased by 4.8 percentage points between FY15 and FY16 and by 3.0 percentage points when February and March of 2015 are excluded.

#### Commuter Rail service operated

In FY16, 99.8% of scheduled Commuter Rail trips were operated. The highest percentage of scheduled trips in FY16 were operated in May (99.9%) and the lowest in February (99.4%). Compared to FY15, 0.8% more trips were operated in FY16. Even excluding the performance in February 2015 due to extreme winter storms, other months still improved slightly from FY15 to FY16.

### > Boat reliability

In FY16, boat reliability was 98.1%, or 2.1 percentage points higher than FY15 annual performance. Excluding February due to the extraordinary effects of winter storms in 2015, FY16 boat reliability declined by 0.5 percentage points versus FY15.

### > THE RIDE reliability

In FY16, THE RIDE vehicles arrived on time 91.9% of the time, up 2.3% from FY15. Most of the performance drop in FY15 was attributable to the extraordinary effects of winter storms in 2015, as February 2015 performance was 73%, almost 20 percentage points below normal.

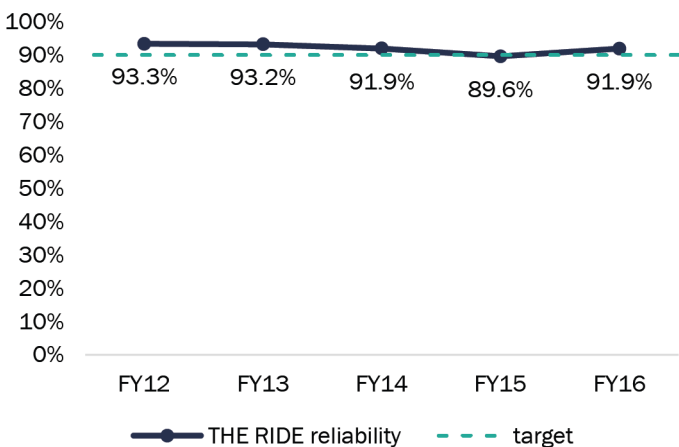


Figure 72. THE RIDE reliability, FY12-16

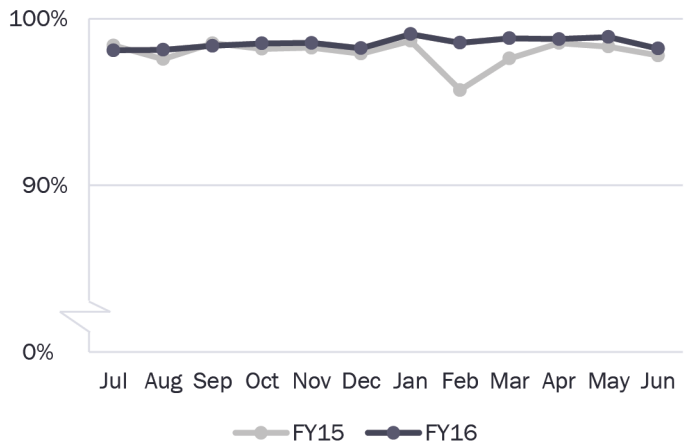


Figure 73. Bus service operated, monthly, FY15-16

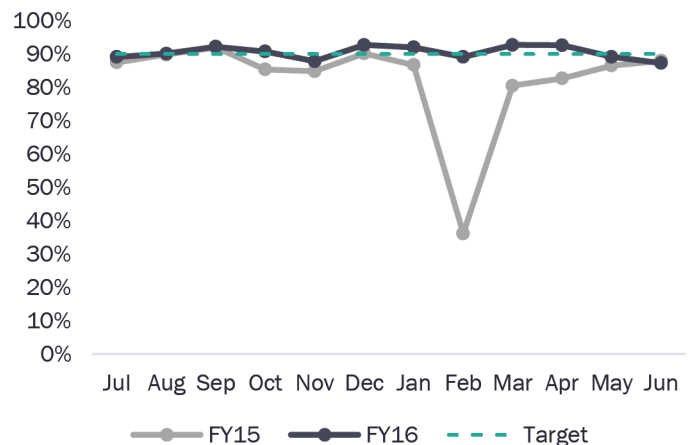


Figure 74. Commuter Rail reliability, monthly, FY15-FY16

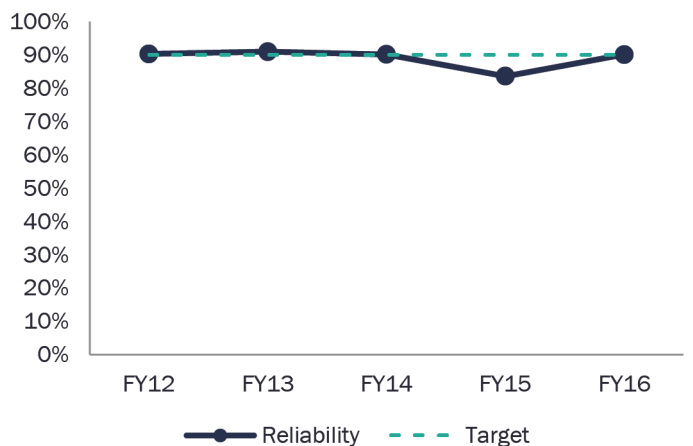


Figure 75. Commuter Rail reliability, FY12-16.

## > Platform accessibility

For most of FY16, 55 of 60 rapid transit stations (92%) with stairs had elevators installed. Platforms at the remaining five stations (Bowdoin, Boylston, Hynes, Symphony, and Wollaston) were reachable only by stairs or escalators for the entire year. At the end of March 2016, Government Center station reopened with newly installed elevators and other amenities for all travelers. Now, 56 of 61 rapid transit stations with stairs have elevators installed.

In the year ending March 31, 2015, out of those stations with elevators installed, platforms were accessible by elevator 99.5% of the time. For the remaining service hours, one or more elevator outages removed an accessible path between a platform and station exit and/or a transfer platform. Platforms on the Blue and Red Lines were accessible most consistently, at 99.7% each. Platforms in the Silver Line Waterfront tunnel were the least frequently accessible at 98.6%, although Silver Line platform accessibility improved 0.4% from the previous year.



### About the measure Accessibility

If elevators are not available to customers who need or want to use them, they may not be able to gain access to a station. The MBTA records when elevators are out of service and how many platforms are made inaccessible by each outage. Platform accessibility is the percent of the total platform-hours that are accessible. This measure is currently available for Red, Orange, Blue, Green, and Silver Line stations which require elevators or stairs to access a platform. Other stops and stations on these lines are not included.

Once they reach a platform, many customers need or want to board only ADA-compliant vehicles. Vehicle accessibility is the percent of trips that include at least one ADA-compliant vehicle that a customer can access. This measure is available with preliminary data for the Green Line and is under development for Commuter Rail. Almost all other MBTA vehicles are ADA-compliant, except for brief periods when a bus ramp or lift malfunctions. Targets will be set for these measures once a longer span of prior years' data is available for comparison.

## > Vehicle accessibility

In FY16, 98.6% of Green Line trips were accessible. The trains serving these trips had at least one low-floor Green Line vehicle that was accessible to passengers who needed or wanted to board without climbing stairs. The fewest Green Line trips were available during August and September 2015, at 97.1% and 97.4% respectively. Most other months hovered around 99%, with the most available in December and March, at 99.4% each.

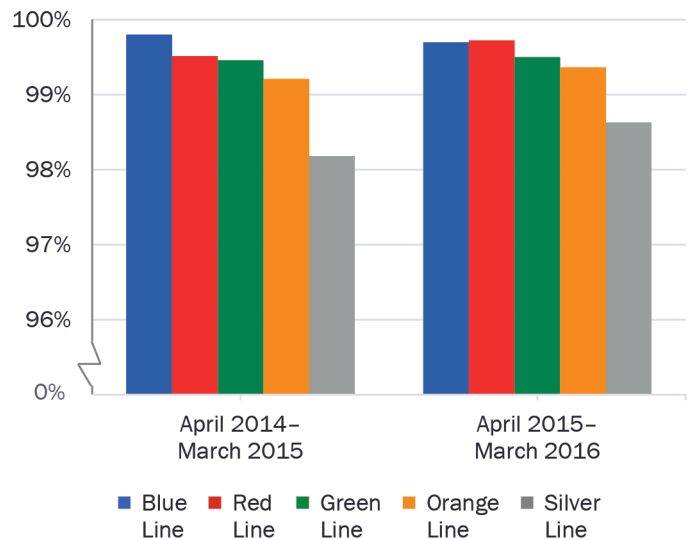


Figure 76. Platform accessibility by Rapid Transit Line, April 2014-March 2016. Preliminary data.

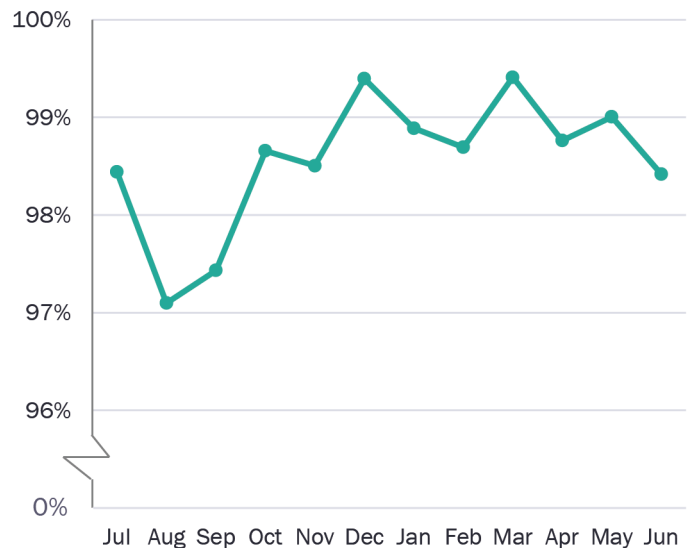


Figure 77. Vehicle accessibility of Green Line trips, FY16. Preliminary data.

## > Customer satisfaction

The MBTA surveys a panel of customers each month about their experience with the agency's service. In FY16, the average overall customer service rating was 3.2 on a scale of 1 to 5. Comparable FY15 data is not available, as the panel survey changed significantly at the beginning of FY16. More detail about this performance measure is available on the MBTA dashboard: [mbtabackontrack.com](http://mbtabackontrack.com).



### **About the measure** *Customer satisfaction*

The MBTA's monthly panel survey asks customers to rate various aspects of their most recent trip, as well as rating the MBTA overall. The panel includes riders of all modes: bus, subway, Commuter Rail, and ferry. Survey responses are recorded on a 7 point scale. Possible responses range from extremely negative (such as "Extremely Dissatisfied" or "Strongly Disagree") to extremely positive (such as "Extremely Satisfied" or "Strongly Agree.")

This measure is based on the question, "How would you rate the MBTA Overall?"

To express this on a 5 point scale, we assign a number to each response with 1 being "Extremely Dissatisfied" and 7 being "Extremely Satisfied." The responses are averaged and then multiplied by 5/7 to get a number between 1 and 5.

# System Condition

The MBTA maintains an inventory of capital assets in its State of Good Repair (SGR) database. The MBTA has done extensive work to define the condition of its major assets. As capital and maintenance projects are completed, the database is updated to reflect the new condition. The MBTA continues to work to refine this database to expand the inventory, and improve the quality of the data. The most recent condition data available was reported in August 2015. Fleet age is reported for FY16.

## > Fleet age

Fleet age is commonly used in the transit industry as a proxy measure for vehicle condition.

## > Track condition

Track condition is measured on the SGR scale of 1 to 5 (where greater than 2.5 is considered being in a state of good repair). The MBTA's subway track is just below that SGR threshold, and the commuter rail track is just above.

## > Transit vehicle condition

Transit vehicle condition is measured as a composite number from inspecting the key elements of a vehicle. In alignment with fleet age, vehicle conditions range from very high (the Blue Line) to very low (the Mattapan Line).



### About the measure Fleet age, track condition, and transit vehicle condition

The MBTA's State of Good Repair (SGR) Database contains a current inventory of capital assets. Using condition, and performance data, the database generates scores for each asset. The score ranges from 1 (low) to 5 (high). A score of 2.5 or higher is considered to be a state of good repair. The condition of transit system assets impacts service, maintenance needs today, and maintenance and capital needs in the future. The MBTA utilizes the SGR ratings to prioritize projects and plan investments.

## > Facility condition

Facility condition, which is measured and reported for stations, maintenance, and storage facilities, is also reported on the 1 to 5 SGR scale. All facility condition ratings across the transit modes are currently at a state of good repair (greater than 2.5).

| MBTA FLEET AGE |            |
|----------------|------------|
| Bus            | 7.8 years  |
| Rapid Transit  | 26.3 years |
| Blue line      | 8 years    |
| Green line     | 20 years   |
| Orange line    | 36.5 years |
| Red line       | 32.2 years |
| Mattapan line  | 70.5 years |
| Commuter Rail  | 22 years   |

| MBTA VEHICLE CONDITION |      |
|------------------------|------|
| Bus                    | 2.83 |
| Rapid Transit          | 2.84 |
| Blue line              | 4.9  |
| Green line             | 3.9  |
| Orange line            | 1.19 |
| Red line               | 2.11 |
| Mattapan line          | 1    |
| Commuter Rail          | 2.86 |
| Non-revenue            | 1.46 |

| MBTA TRACK CONDITION |      |
|----------------------|------|
| Rapid Transit        | 2.32 |
| Commuter Rail        | 2.7  |

| MBTA FACILITY CONDITION |      |
|-------------------------|------|
| Bus                     | 3.42 |
| Rapid Transit           | 2.78 |
| Commuter Rail           | 3.12 |



# Budget & Capital Performance

## > Fare recovery ratio

The MBTA showed an increase in fare recovery ratio from FY15 to FY16 of just over 1.2 percentage points. This increase is noteworthy as it came without a fare increase<sup>1</sup>. While fare revenues increased by \$16.5 million from FY15 to FY16, operating expenses decreased by \$4.5 million, countering a long-lasting trend. Fare recovery ratio does not include expenses due to debt.

1. The most recent fare increase was effective on July 1, 2016, after the close of the fiscal year.

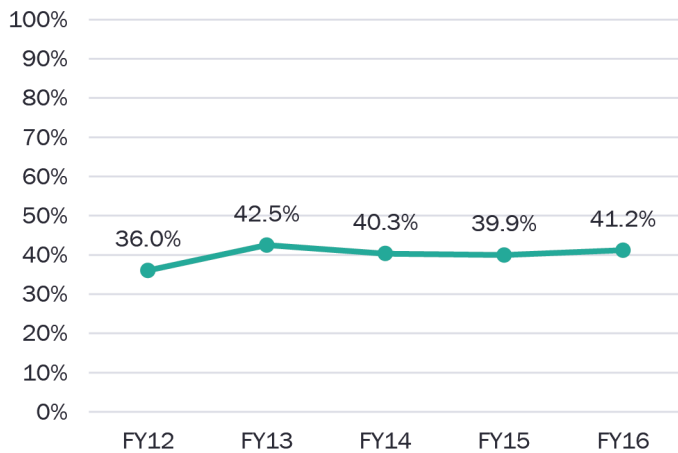


Figure 78. MBTA Fare recovery ratio, FY12-16



## About the measure


### Fare recovery ratio

Fare recovery ratio is a ratio of the revenue received from fares and passes to the total amount of operational expenses. Ratios closer to 100% indicate that passengers directly pay for more of the cost of operating service. The measure is one way of looking at the cost effectiveness of the services that are being provided.



## > Project delivery performance measures

Per the Acts of 2009 and 2013, all operating divisions at MassDOT and the MBTA are required to report on project delivery measures (specifically on time and on budget), and to provide an overview of the projects completed, projects in construction, and projects planned for the upcoming year. Previous Tracker reports have provided this information for the MBTA. Through the Governor’s Special Panel Assessment (following the winter of 2015), and a subsequent external review of the capital delivery process at the MBTA, capital delivery was identified as an area that has not been a priority at the transit agency. Specifically, the Governor’s panel report noted the following issues related to capital delivery: chronic capital underinvestment, bottlenecked project delivery and flawed contracting processes. The MBTA has focused its efforts on these areas in order to accelerate capital delivery and achieve its spend plan. With improvement in that area, the MBTA leadership is turning to the related systems (e.g. capital delivery and state of good repair efforts).

MassDOT leadership has embarked upon revamping the capital delivery procedures and practices in an effort to increase efficiency throughout the process. These changes are critical, as the MBTA commits to an increase in capital expenditures from approximately \$3 billion over the past five years to over \$6.5 billion over the next five years. This new process is being developed to support the new MassDOT Capital Investment Plan (CIP) approach. Historically the CIP has been a list of projects divorced from an understanding or analysis about how these projects are likely to impact the agency’s goals and objectives.  For the 2017-2021 CIP, MassDOT for the first time, developed the plan that is:

- > Informed by a strategic vision
- > Influenced by public and stakeholder input sought from the beginning of the process
- > Built around funding programs
- > Populated with projects selected based on an objective and comparative evaluation.

The organization for the CIP is detailed in Figure 79.

Using the 2017-2021 CIP, the MBTA has developed a strategic universe of programs and projects that drive service improvement. Future versions of Tracker will measure the MBTA on how well they get projects through the pipeline (project development) and how efficiently they spend capital dollars (project delivery).

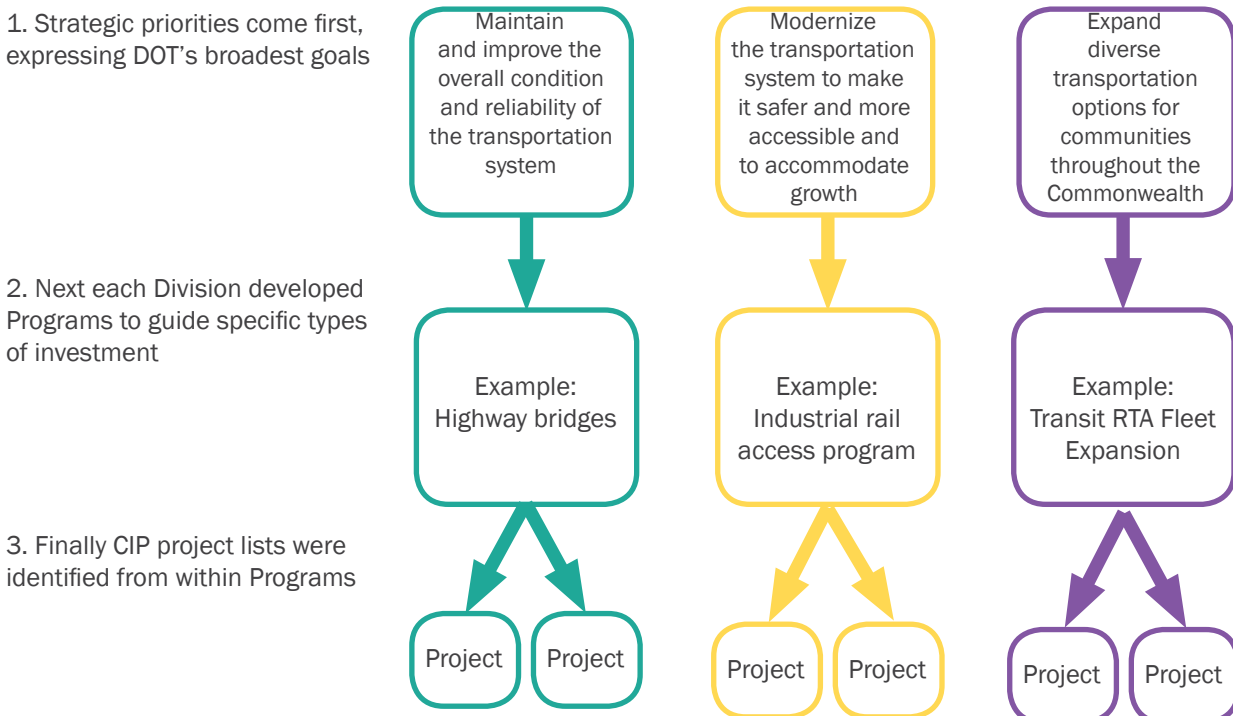


Figure 79. CIP framework

Not shown in Figure 79 is the fact that most projects are made up by a number of contracts, since most large projects require a diverse set of expertise and resources, and it is often desirable to award them to more than one contractor. Tracking, reporting, and improving performance in capital delivery for the MBTA will be done at the project level, since this level is most relatable by the public.

To illustrate this situation, Figure 80 provides an overview of the many parts that comprise the Red Line/Orange Line Infrastructure Improvement Program. Within this program are many projects – which are distinct but also necessarily inter-related.

| RED LINE ORANGE LINE<br>INFRASTRUCTURE IMPROVEMENT<br>PROJECTS | CURRENT STATUS (AS OF<br>SEPTEMBER 2016) | COST (MILLIONS) |
|--|--|-----------------|
| Orange Line Test Track at Wellington Yard                      | Design: 15%                              | \$6.4           |
| Wellington Yard Expansion-Tracks 33 to 38                      | Design: PSE                              | \$26.0          |
| Wellington Maintenance Facility                                | Design: 90%                              | \$104.1         |
| Wellington Yard-Zones A-B                                      | Design: NTP 10/2016                      | \$50.2          |
| Red Line Test Track at Cabot Yard                              | Design: 15%                              | \$21.1          |
| Cabot Maintenance Facility                                     | Design: NTP 12/2016                      | \$90.0          |
| Cabot Yard Rebuild-Zones A-C                                   | Design: NTP 12/2016                      | \$55.3          |
| Signal Systems RL & OL Enhancements                            | Design: 15%                              | \$3.7           |
| RL/OL Program Level (PM/CM, OR &<br>Project Admin.)            | Ongoing                                  | \$70.9          |
| Unallocated Contingency  |  | \$70.9          |
|  | <b>Total:</b>                            | <b>\$498.6</b>  |

Figure 80. MBTA infrastructure improvement projects

Each one of these projects will be one data point in the on-time and on-budget performance measures calculation, and will be counted individually in the number of projects completed, planned, and in progress measures. For 2017 Tracker, the MBTA will have completed the capital delivery process revamp, and will report refined performance measures.



# Safety

## > Fatalities as a result of transit incidents

In FY15, the Commuter Rail had 9 fatalities, the Red Line had 3, and the Orange, Blue, and Green Lines and the Bus service all experienced no fatalities. This is one less than the previous fiscal year and 2 less than the average between FY11 and FY14.

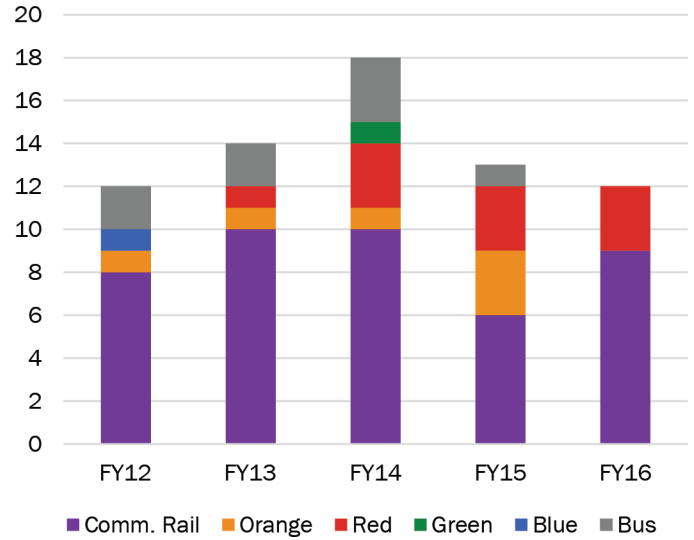


Figure 81. Fatalities as a result of transit incidents by line



# Healthy & Sustainable Transportation

## > Ridership

After decreasing in FY15, largely due to the impacts of multiple winter storms, MBTA ridership on all modes increased by 1.6% to a total of just over 390.5 million unlinked passenger trips. Ridership increased on all individual modes. Ridership on an average weekday increased from 1.26 million unlinked trips to 1.28 million.

Unlinked passenger trips avg. weekday - MBTA System

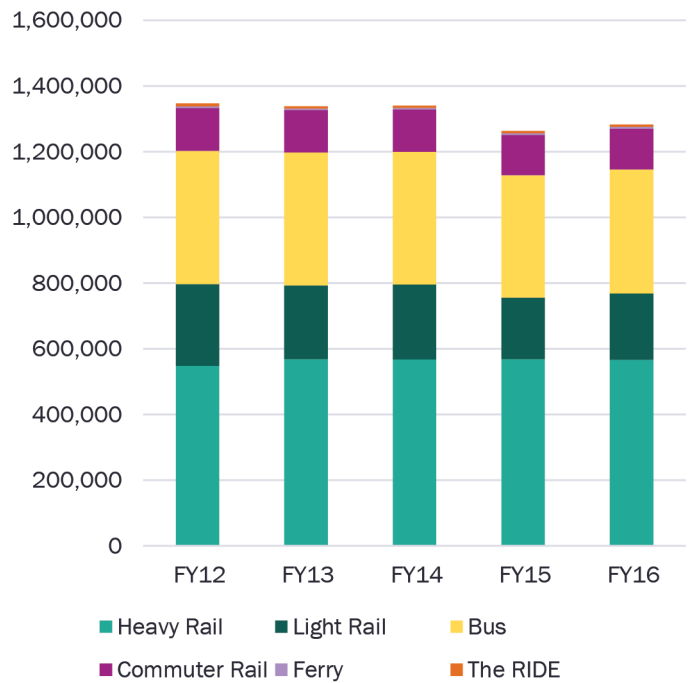


Figure 83. Weekday ridership

Total unlinked passenger trips - MBTA System

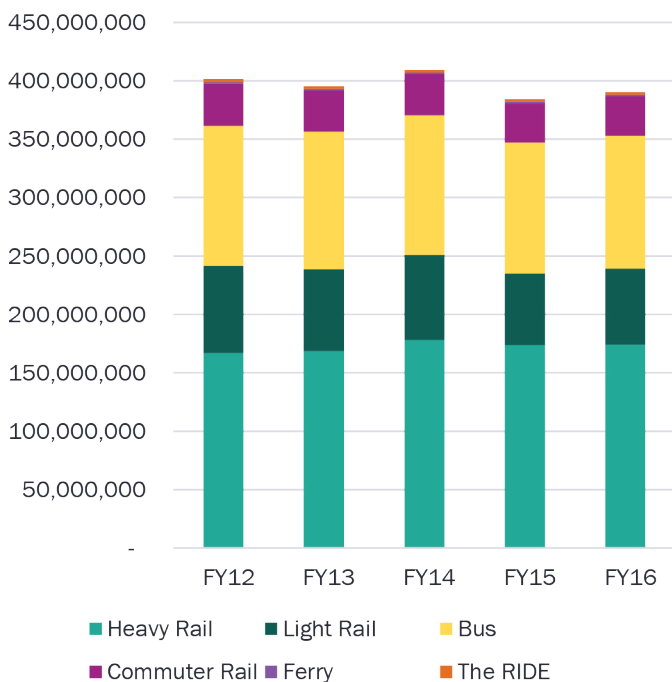


Figure 82. Ridership



## About the measure

### Ridership

Ridership tells us the number of rides the MBTA system provides per year. Unlinked passenger trips are shown here in accordance with industry standard. This means that each time a vehicle or train is boarded, it counts as one unlinked trip. Where possible (on Heavy Rail, Light Rail and MBTA buses), data is automatically collected from the MBTA's CharlieCard system.

Data for FY15 and FY16 is preliminary and may be adjusted in the future.

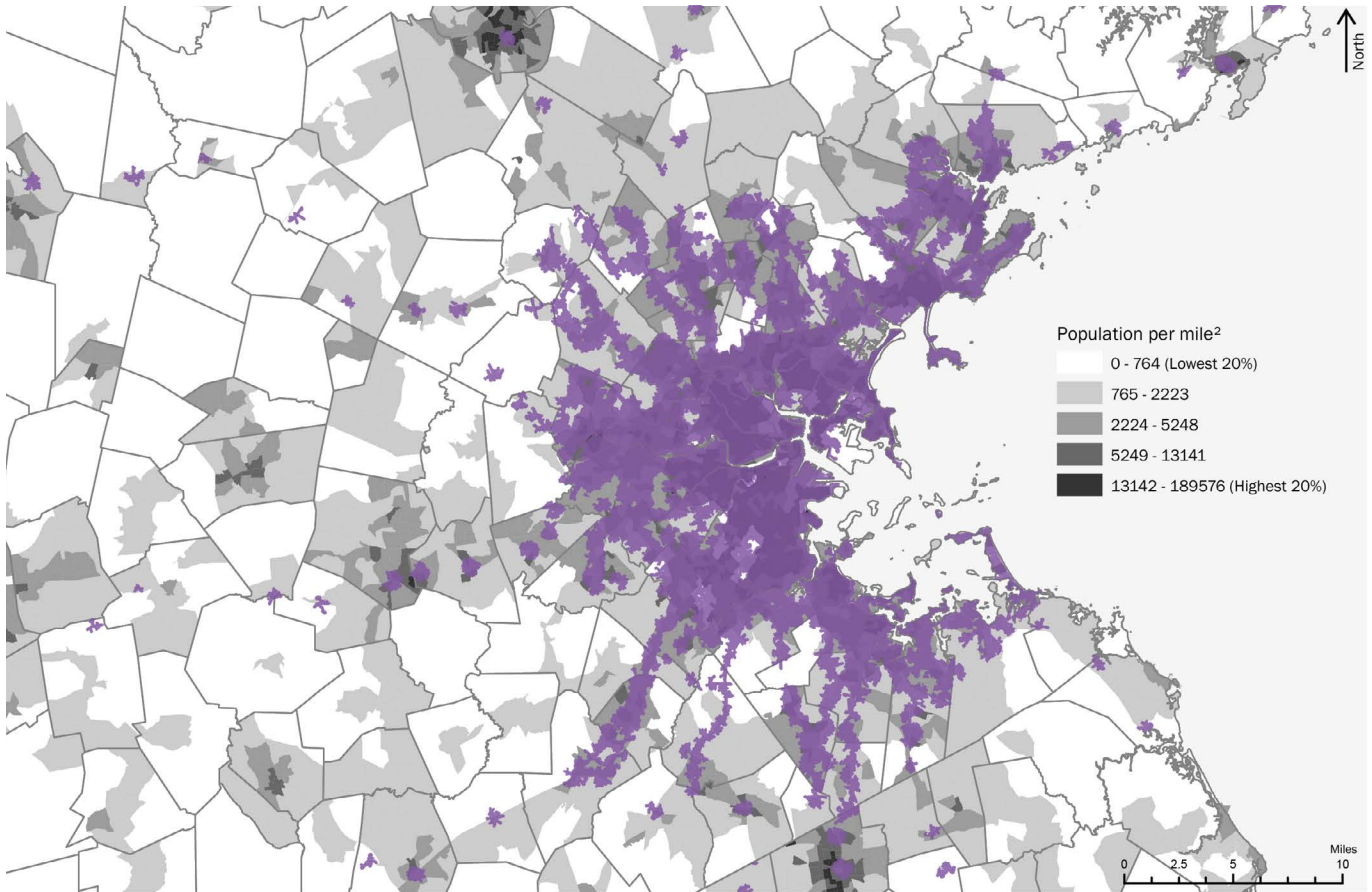


Figure 84. Massachusetts area with access to MBTA service.

➤ **Base coverage**

At the end of FY16, the MBTA provided service within one-half mile walking distance of 74.3% of residents in its core service area. This area covers 59 municipalities close to Boston.



**About the measure**

**Base coverage**

People expect the MBTA to provide a basic level of coverage throughout its service area. Base coverage reflects the percentage of the population that lives no more than 0.5 miles from a bus stop, rapid transit station, commuter rail station, or boat dock. It is calculated for municipalities in the MBTA's core service area, excluding municipalities that are member of a regional transit authority.

# Measures in Development

## > Customer experience-communication

The MBTA strives to provide its customers with relevant, timely, and accurate information about the services they use. The MBTA has defined targets for the quality of in-vehicle stop/station announcements and elevator status alerts, and is developing data sources to provide high-quality measurements in these areas.

## > Bus passenger comfort

To experience a comfortable ride, passengers on a given bus must have enough personal space. The MBTA tracks the number of passengers on board each bus in order to plan service changes, and also to understand whether passengers would have been uncomfortable. The MBTA has recently begun calculating bus passenger comfort in terms of the number of passengers experiencing crowded conditions, and the total length of time that they have experienced crowding. After further refinement, this data will be used to rank routes and set targets for bus passenger comfort.

## > Passenger comfort (other modes)

The MBTA strives to provide all passengers with a comfortable ride. For other modes like subway and Commuter Rail, it is more difficult to calculate the exact passenger load per car, so the MBTA is pursuing ways to estimate passenger comfort for these modes. Figure 86 presents visual description of the crowding data.

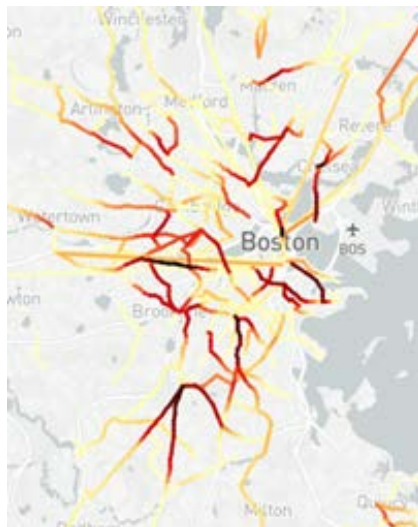


Figure 86. Uncomfortable inbound bus passengers on an average weekday. Preliminary data.





Contact:

Office of Performance Management  
and Innovation  
MassDOT  
10 Park Plaza, Suite 6720  
Boston, MA 02116

Email: [innovate@state.ma.us](mailto:innovate@state.ma.us)

<http://www.massdot.state.ma.us/InformationCenter/PerformanceManagementAccountability.aspx>

