



MASSACHUSETTS STATE RAIL PLAN

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Massachusetts Rail Plan

Executive Summary

State Rail Plan Purpose

The purpose of the State Rail Plan is to guide the future of the rail system and rail services in the State. Specifically, it is intended to:

- Set forth Commonwealth policy involving freight and passenger rail transportation
- Establish policies, priorities and strategies to enhance rail services in the Commonwealth that provide benefits to the public
- Serve as the basis for federal and state rail investments within Massachusetts
- Establish the means and mechanism to coordinate with adjoining states, private parties and the federal government in projects of regional and national significance, including corridor planning and investment strategies
- Meet the planning requirement established by the Federal Railroad Administration

The State Rail Plan includes both a near-term 5-year plan, where funding has already been identified or will be identified for the upcoming annual state transportation budget process, as well as a 20 year, long-term strategy for state investment in rail. Because of parallel planning processes addressing the future of Commuter Rail (Focus40 and the MBTA Rail Vision), the State Rail Plan is not a planning or policy document for MBTA Commuter Rail.

Rail Plan Approach

The history of comprehensive rail planning in Massachusetts has led to positive results for the state's transportation network. This success has relied on utilizing a statewide and regional system approach when envisioning future programs. With this context in mind, the State Rail Plan follows the six-chapter structure recommended by the Federal Railroad Administration (FRA) for state rail plans:

- Chapter 1 provides an overview of the role of rail in the state's multimodal transportation system, and the state organization to support rail development;
- Chapter 2 describes the state's existing rail system, including future trends, forecasts, needs, and opportunities;
- Chapters 3 and 4 outline proposed passenger and freight rail improvements and investments;
- Chapter 5 describes the state's rail service and investment program; and
- Chapter 6 documents the coordination with other plans and stakeholder outreach conducted as a part of this effort.

The Massachusetts State Rail Plan outlines the Commonwealth's 20-year plan for the statewide rail system. The plan describes the policies and planning goals for the state rail network, the existing rail system, future trends, proposed improvements, and the state investment program. It also highlights changes that have been made since the Massachusetts State Rail Plan was developed in 2010. Coordination conducted with stakeholders and the general public is also documented in the plan.

Long-term Vision

Over the past few decades, MassDOT has acquired significant segments of track and right-of-way to leverage investments for freight and passenger rail. MassDOT intends to strategically look for opportunities to leverage these investments to better serve the Commonwealth over the next 20 years. The Commonwealth's vision for rail investment can be summarized as follows:

- **Long-Term Reliability & Resiliency:** Maintain and improve the rail system in Massachusetts to enable efficient and dependable passenger and freight rail operations.
- **Modernize:** Improve existing systems to meet industry standards and federal regulations to ensure proper operations for both freight and passenger rail services.
- **Optimize:** Pursue opportunities to leverage prior investment to improve service
 - Maximize return on prior investments
 - Leverage partnership opportunities
- **Regional Balance:** Pursue strategies that balance the costs and benefits of rail throughout the Commonwealth.

Context of Massachusetts Rail System

A well utilized rail network of passenger and freight rail can have many benefits for the Commonwealth and its residents — improved connectivity, Greenhouse Gas (GhG) reduction, vehicle congestion reduction, travel time savings, reduced wear and tear on the roadways, individual or firm cost savings, and economic development. The Commonwealth recognizes these benefits and has been working to maximize the public benefit from rail investment in the Commonwealth. The MassDOT owned Rail System is a subset of the larger Massachusetts Rail System and represents 25% of the statewide active route miles for freight, excluding the MBTA commuter rail portions of the rail network (shown in Figure ES-3). MassDOT has acquired rail to maintain essential transportation services, facilitate current or future passenger service and/or to be preserved for other transportation uses. MassDOT also provides funding to support certain operations and/or the maintenance of rail lines it does not own, such as through the Industrial Rail Access Program (IRAP).

The following section provides an overview of the rail system in the Commonwealth.

Passenger Rail

The rail system in Massachusetts is a critical part of the transportation network for moving residents and visitors throughout the Commonwealth. Intercity travel in the State and across the Northeastern United States is provided by Amtrak, which serves nearly three million riders in Massachusetts each year. Amtrak's Northeast Corridor provides an important travel alternative to Logan Airport. The Massachusetts Bay Transportation Authority (MBTA) provides commuter rail service to approximately forty million riders annually. Passenger rail also includes seasonal or tourist rail operations. Currently, the MBTA provides seasonal service to Cape Cod via the Cape Flyer train. While this plan is not focusing on the future of MBTA's transit services and commuter rail, the context of commuter rail is important for the Rail Plan due to lines shared by commuter rail, intercity rail, tourist service, and freight.

Figure ES-1 on the following page presents all passenger rail operations in the Commonwealth.

Amtrak provides intercity services at 14 stations in the State. From 2010 to 2016, there has been an overall 17.5 percent increase in Amtrak ridership at these stations. Amtrak routes include:

- Northeast Regional/Acela: Boston to Washington, DC
- Downeaster: Boston to Brunswick, ME
- Lake Shore Limited: Boston to Chicago, IL
- New Haven-Springfield Shuttle: Springfield to New Haven, Connecticut
- Vermonter: St. Albans, VT to Washington, DC - via Springfield, Massachusetts

Figure ES-1: Passenger Rail Operations in Massachusetts

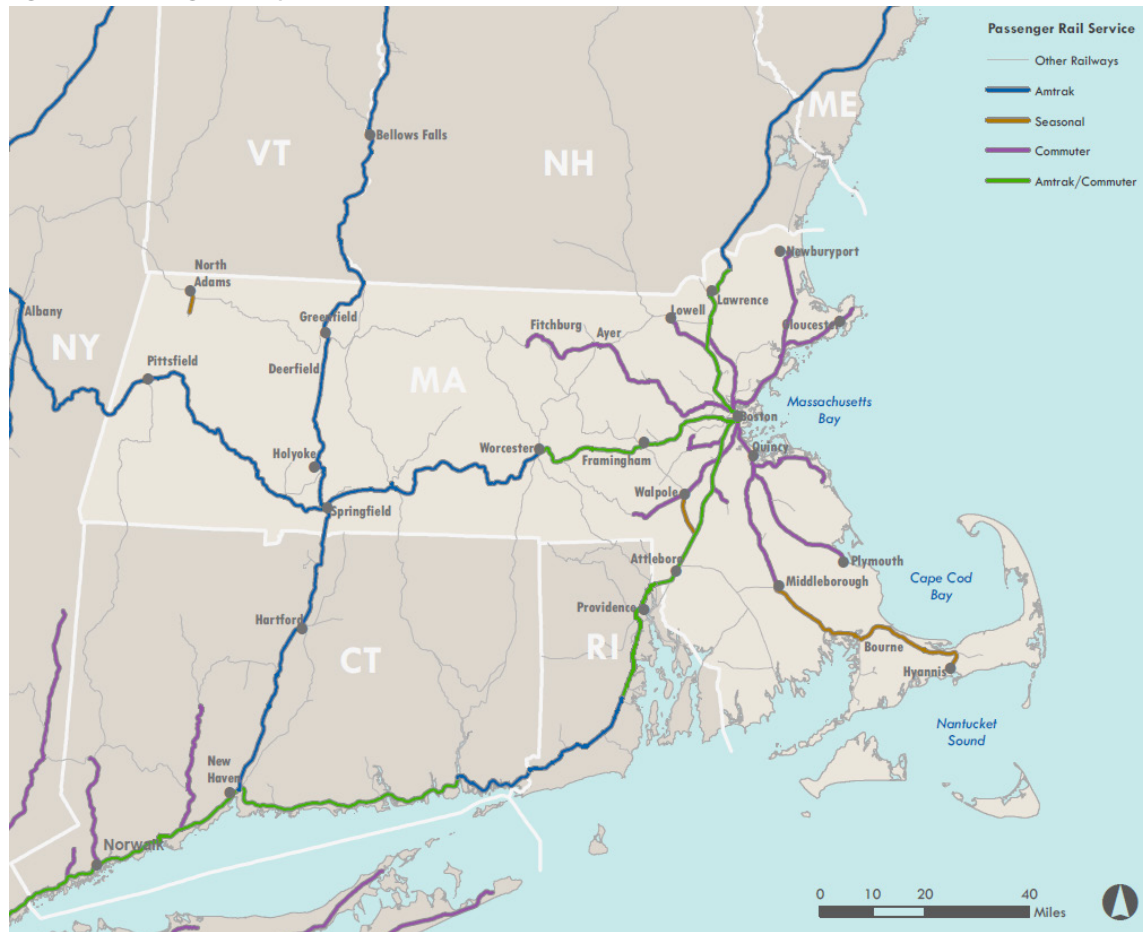
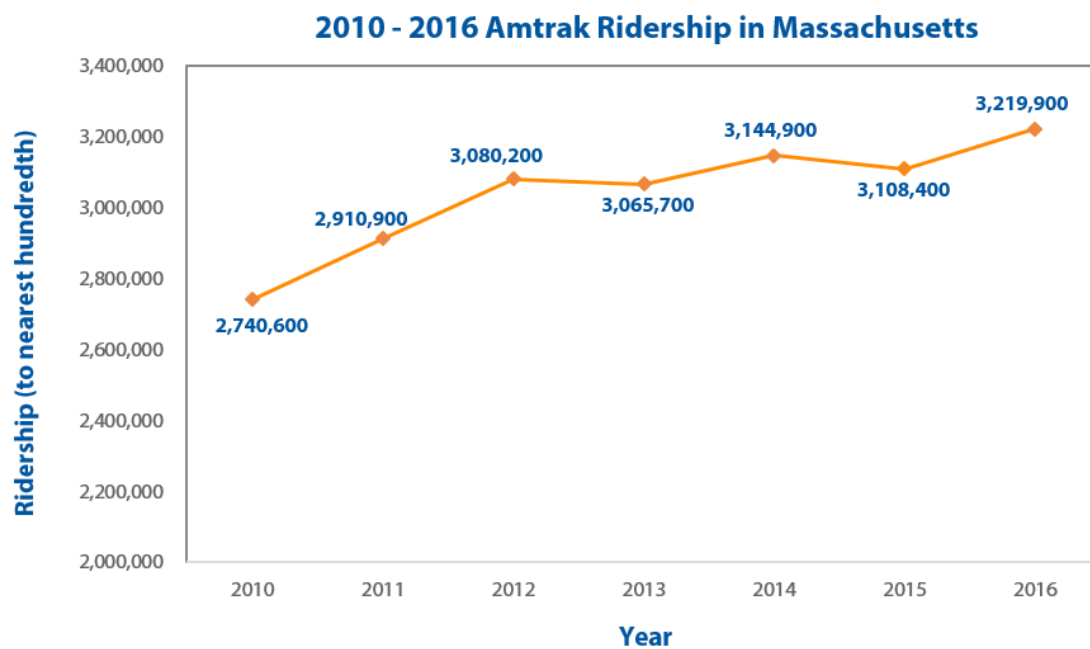
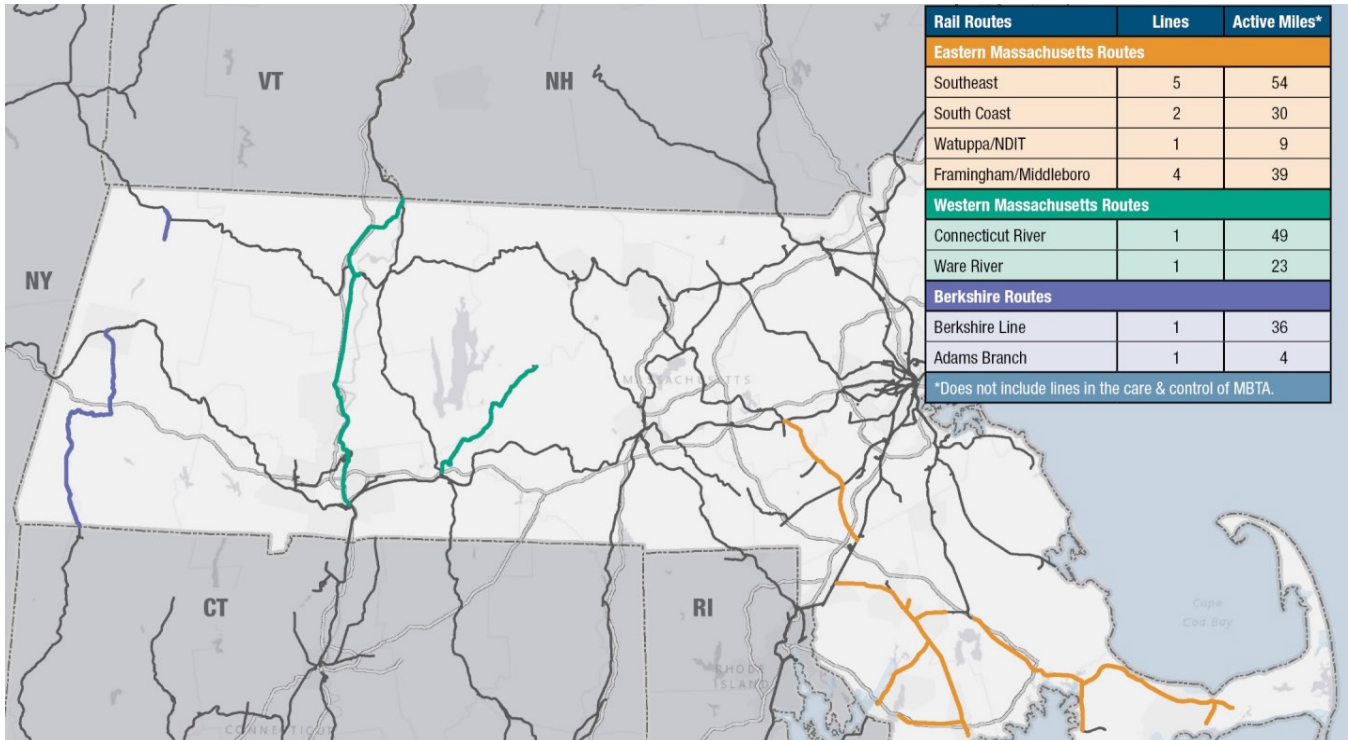


Figure ES-2: 2010 – FY 2016 Intercity Passenger Rail Ridership in Massachusetts



Source: Fact Sheet: Amtrak in Massachusetts, 2010-2016

Figure ES-3: Massachusetts Ownership of Freight Rail Lines in Massachusetts



Freight Rail

Freight rail offers Massachusetts economic and environmental advantages, as well as an opportunity to reduce highway congestion. Intermodal connections between freight rail and other modes also proves critical towards advancing the movement of goods. As described in Massachusetts’ 2017 Freight Plan, the freight corridor that parallels Interstate 90 and Route 495 is a particularly important link to the national rail network. The freight network also offers manufacturers and distributors in rural areas a cost effective way to ship and receive products such as frozen fish, cranberries, building materials, chemicals, pulp and paper, scrap, and metal.

From a freight rail perspective, the Massachusetts system is comprised of a mix of Class I, regional, and short-line railroads serving freight shippers and receivers to the benefit of Massachusetts’ businesses and residents.

The following are freight railroads operating in Massachusetts.

Currently, Class I railroad operations include:

- CSX Transportation (CSX)

The regional railroads include:

- Pan Am Railways (PAR) and operating subsidiary Springfield Terminal Railway (ST)
- Pan Am Southern (PAS), a joint venture of Pan Am Railways and Norfolk Southern
- Providence and Worcester Railroad (P&W)
- New England Central Railroad (NECR)

The short line railroads include:

- Grafton and Upton Railroad (GU)
- Bay Colony Railroad (BCLR)
- Housatonic Railroad (HRRC)
- Pioneer Valley Railroad (PVRR)
- Massachusetts Central Railroad (MCER)

- Massachusetts Coastal Railroad (MCRR)
- Connecticut Southern Railroad (CSO)

The terminal railroads include:

- East Brookfield and Spencer Railroad (EBSR)
- Fore River Transportation Corporation (FRVT)

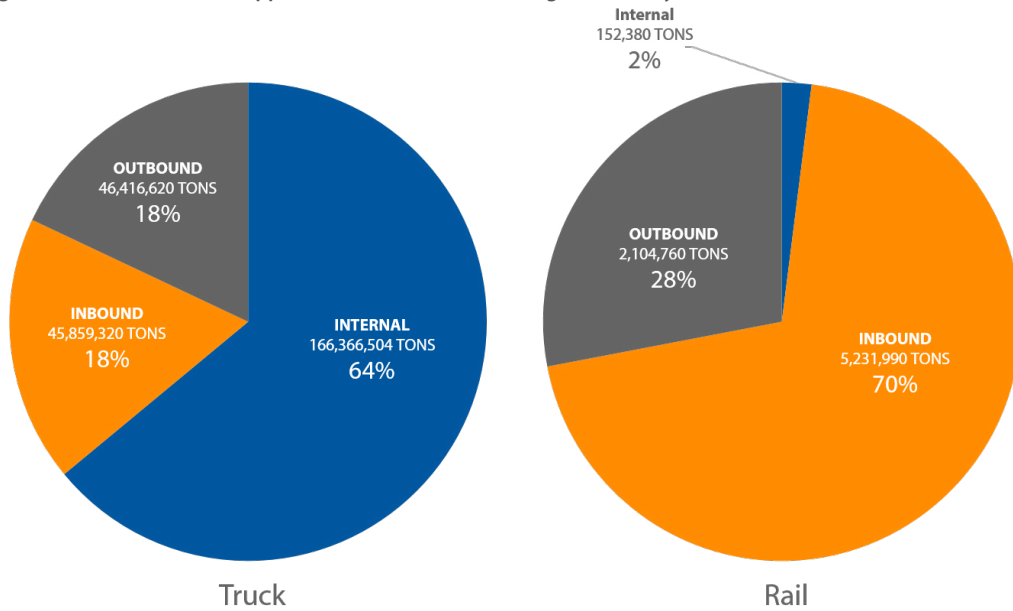
Although many of the freight railroads operate along lines that they own, some freight railroads operate and serve customers along lines owned by others. Figures ES-3 and ES-4 show the ownership of freight lines in Massachusetts and operation of freight lines in Massachusetts, respectively.

Five freight railroads operate on MassDOT-owned rail lines to serve more than 46 customers in 28 communities. Operators on the freight rail system in Massachusetts are presented in Figure ES-4 on the following page.

Figure ES-4: Operators of Freight Rail Lines in Massachusetts



Figure ES-5: Commodities Shipped and Relative Share of Freight Moved by Rail



- Other foodstuffs
- Newsprint/paper
- Waste/scrap
- Cereal grains

- Woods prods.
- Plastics/rubber
- Propane
- Basic chemicals

- Gravel
- Nonmetal min. prods.

Several MBTA Lines are shared with freight:

- Fairmount Line (Shared use, by CSX)
- Fitchburg Line (Shared use, by Pan Am and Pan Am Southern)
- Framingham/Worcester Line (Shared use, by CSX)
- Franklin Line (Shared use, by CSX)
- Greenbush Line (Shared use, by the Fore River Railroad)
- Haverhill Line (Shared use, by Pan Am)
- Lowell Line (Shared use, by Pan Am)
- Middleborough/Lakeville Line (Shared use, by CSX)
- Newbury/Rockport Line (Shared use, by Pan Am as far north as Salem)
- Providence/Stoughton Line (Shared use, by CSX)
- Foxboro — Special Events (Shared use, by Mass Coastal/CSX and the MBTA)

The freight rail network handles more than 6.6 million carload tons and 5.5 million intermodal tons either originating or terminating in the Commonwealth. Figure ES-5 shows the primary commodities shipped by rail and the relative share of freight that is moved by truck versus freight rail.

Accomplishments Since 2010 Rail Plan

The 2010 State Rail Plan identified several priorities and good progress has been made on them. Consistent with the 2010 Plan, improvements made to the state rail system between 2010 and 2016 primarily focused on safety, improving the rail system’s state-of-good-repair (SGR), economic development through the leveraging of federal and private funds and acquiring rights of way for the public good. The acquisitions that were carried out under the 2010 Plan will facilitate some priorities in the current plan (ex: South Coast Rail). Several acquisitions have already shown significant benefits, (ex: CSX’s Boston Main Line). Both the volume of freight at CSX’s new Worcester facility and the frequency of MBTA service to Worcester have increased.

Between 2012 and 2016, there were 24 bridge and structure-related projects and 85 at-grade crossing projects that were completed, improving safety and asset conditions across the Commonwealth. Between 2012 and 2016, state-of-good-repair improvements include the installation of more than 249,000 railroad ties and 149 miles of track surfacing. In addition to these state-of-good-repair investments, the following sections describe MassDOT’s major accomplishments with regards to advancing initiatives from the 2010 State Rail Plan.

MassDOT Rail Acquisition

Acquiring rail throughout the Commonwealth was an important initiative of the 2010 State Rail Plan. Today nearly 60 percent of the active railroad system in Massachusetts is publicly owned (25% MassDOT, 32% MBTA, 1% Amtrak/MWRA/Federal). This allows MassDOT to preserve and maximize the public benefits from this important transportation asset.

In June 2010, MassDOT acquired South Coast Lines, Boston Terminal Running Track, West First Street Yard in South Boston, and the Grand Junction Branch. MassDOT agreed to buy Connecticut River Line in July 2012, and completed the acquisition in 2015. Additionally, in 2012, MassDOT acquired the Boston Main Line from Framingham to Worcester. Finally, MassDOT purchased the Berkshire Line from the Housatonic Railroad, completed acquisition of the Framingham Secondary Rail Line, and completed acquisition of the Adams Branch all in 2015. Some of these assets are already managed by the MBTA (ex: Grand Junction Branch) and control of others will be transitioned to the MBTA as new commuter rail services are developed and implemented.

Between 2010 and 2014, MassDOT acquired 78.6 miles of Right-of-Way, which consisted of 73.2 miles active and 5.4 miles inactive.¹ MassDOT acquired an additional 113 miles of Right-of-Way in 2015: 111 miles active and 1.9 miles inactive.

¹ MassDOT Board Presentation, 2017

Intercity Rail Investment

In addition to the acquisition of rail lines, MassDOT has successfully leveraged federal funding through the Federal Railroad Administration High Speed Intercity Passenger Rail (HSIPR) program to complete several important projects and studies, detailed below.

Knowledge Corridor Improvements — As described above, the U.S. Department of Transportation awarded MassDOT \$70 million in the first round of the competitive HSIPR Program for final design and construction of the Knowledge Corridor in 2010. Since then, nearly 50 miles of track have been acquired and rehabilitated and new stations have been added to support the Vermonter train service. Stations have been built in Northampton (former Amtrak station location), Greenfield, and Holyoke, Massachusetts.

Springfield Union Station was also rehabilitated since the 2010 State Rail Plan. With substantial state and federal investment this \$94 million local redevelopment project included restoration of the historic terminal building for rail and bus ticketing and a waiting area, including associated transit retail. In addition, a 26-bay intercity/regional Pioneer Valley Transit Authority (PVRTA) bus terminal and adjacent 377-car parking garage were constructed. Completion of a high platform for intercity service is expected in 2018.

Freight Investment

CSX Double Stack Initiative and Intermodal Investment — In 2012, an agreement was made between CSX and the Commonwealth to provide Massachusetts with ownership of the rail tracks and control of operations along the Framingham/Worcester line. In addition to increased passenger service between Boston and Worcester as a result of this agreement, the partnership has helped continue to strengthen the Commonwealth's freight rail system and support economic activity, particularly in Western Massachusetts.

Industrial Rail Access Program (IRAP) — The 2010 State Rail Plan recommended that Massachusetts create an IRAP as a way to enhance industrial development opportunities, leverage private investment, and encourage freight shipment by rail to help reduce roadway congestion and emissions. IRAP is a competitive state-funded public/private partnership program that provides financial assistance to eligible applicants who are prepared to invest in industry-based rail infrastructure access improvement projects. IRAP awards of \$12.7 million have leveraged \$19.3 million in private sector investment in the first five years of the program.

Grade Crossing Safety Programs

— Between 2010 and 2016, there were 100 grade crossing improvement projects funded across Massachusetts, helping to improve safety in key corridors throughout the Commonwealth.

Concurrent Processes

Long-term MBTA Commuter Rail investment ideas are being considered in separate planning processes from the State Rail Plan.

MBTA Commuter Rail Vision — The MBTA Commuter Rail Vision is an initiative intended to identify the most cost effective strategies for leveraging the MBTA's extensive rail network

Focus40 — Focus40 is the MBTA-wide 25 year capital plan for the MBTA. which aims to position the MBTA to meet the needs of the evolving and dynamic nature of the Greater Boston region in 2040. In addition to infrastructure challenges that exist today, the long-term strategy recognizes the shifting demographics, changing climate, and evolving technologies that may play a role in the future.

Studies in Development

There are several rail projects currently being studied by MassDOT for their feasibility, costs, benefits, and other considerations. These studies are recognized, but not being evaluated as part of this plan. Instead, the findings from these studies will indicate future courses of action. These planning studies include:

Berkshire Flyer — The study is examining the potential for seasonal passenger rail service between New York City and the Berkshires, based on the CapeFLYER example.

North-South Rail Link — A feasibility reassessment is being done to examine a proposed pair of 1.5 mile-long tunnels that would connect the MBTA's North Station and South Station.

Patriot Corridor Double Stack Initiative — The study is examining the feasibility of double-stacked freight operations on the Patriot Corridor's right-of-way between Mechanicville, New York, and Ayer, Massachusetts.

Short- and Long-Term Investments

The State Rail Plan includes a detailed short-term investment plan as well as a longer term vision for rail investment that includes a strategy to address major project ideas that have surfaced either through the State Rail Plan outreach process or through other efforts.

Short-Term Project Priorities

Near-term projects included in the Rail Plan were primarily identified through the 2018-2022 MassDOT Capital Investment Plan (CIP) development process, which determines state funding for the state transportation networks and sets priorities for funding programs. Short-term priorities for MassDOT are focused on achieving a state-of-good-repair, improving at-grade crossing locations, expanding passenger rail service to the South Coast, working with Connecticut to facilitate added passenger service between New Haven and Springfield, and pursuing federal funding to increase weight limits for freight traffic. Projects currently in line to be funded in the near-term are provided in Chapter 5 of the State Rail Plan. The 2018-2022 CIP identifies \$468 million of rail investments within the Rail and Transit Division.

MassDOT has a number of important short-term objectives, which include:

- Modernizing Freight Rail - Applying for federal funds to increase weight limits on New England Central freight line to 286,000 lb. (national standard)
- Supporting Connecticut's initiative to establish added service between New Haven and Springfield
- Advancing South Coast Rail Phase I to provide service to the South Coast in advance of completion of the Stoughton Electric Full Build

Long-Term Project Priorities

To help identify freight and passenger rail priorities for the longer term, a list of projects was assembled for consideration. The list was developed through discussions between MassDOT and partnering agencies, a review of completed and ongoing studies, and input from members of the public, elected officials, regional MPOs, and civic associations. MassDOT's commitment to achieve a state-of-good-repair would continue unabated and form an overarching priority.

With so many potential projects and finite funding, it was essential to develop a process to prioritize which transportation projects should be pursued and consider when they should move ahead. The long-term projects identified through this process are expected to be considered over time, following the implementation of near-term rail priorities in Massachusetts.

The following evaluation criteria were used to initially screen the passenger and freight rail projects. The criteria reflect the goals of the plan and the long-term vision for rail in the Commonwealth.

Criteria

- Enhances Mobility
- Improves Safety & Security
- Maximize use of Existing Right-of-Way
- Supports Economic Growth
- Environmental Benefits
- Improves Intermodal Connectivity

Projects included in this prioritization effort are considered long-term and therefore range from conceptual ideas to more fully developed proposals with prior planning studies. For that reason, the cost and feasibility of each project were evaluated at a high level if information was available. Projects with limited information were identified as such.

The long-term projects were grouped into three tiers based on the factors described above:

- **Tier 1 – Priority for Implementation:** Included in Tier 1 are projects that most clearly support the long-term vision of the State. Tier 1 projects have the potential to promote mobility, improve intermodal connectivity and support economic vitality. These projects do not require further study and can advance through design and implementation.
- **Tier 2 – Warrants further study:** Projects that have been grouped into Tier 2 warrant further study (either by MassDOT or other stakeholders) of costs, feasibility, constructability, and net benefits. These projects require further understanding of the project definition (type of service, alignment, etc.) and the relationship between the magnitude of costs and benefits. These projects will be revisited in subsequent plans.
- **Tier 3 – No action recommended at this time:** Projects included in Tier 3 have associated implementation challenges, are either complex and/or expensive, are less consistent with the vision for rail in the Commonwealth, or have benefits not commensurate with the cost that are apparent through the screening in this exercise. These projects would require significant partner support or a change in circumstance for further consideration in subsequent plans.

The section that follows presents the projects that were identified as falling within each of these tiers.

The following tables provide a list of long-term passenger and freight rail projects and identify corresponding rail lines and regions. In addition, potential benefits, feasibility, and cost associated with each project are presented on a high, medium, low scale. Limitations and challenges that may impact the feasibility of the project are also provided within the tables.

Tier 1 – Priority for Implementation

Tier 1 projects have a high potential benefit relative to the cost and promote mobility, improve intermodal connectivity and support economic vitality. These projects have priority for implementation and are important for the long-term vision of the State. Tier 1 passenger and freight rail projects can be seen in tables ES-1 and ES-2, respectively.

New Haven to Springfield Passenger Rail Service

— More frequent rail service from New Haven into Springfield is slated to begin in 2018. Massachusetts is working with Connecticut to determine a long-term annual contribution.

Springfield to Greenfield Passenger Rail Service

— MassDOT is working with Amtrak and Connecticut to assess the feasibility of a pilot that would extend passenger rail service from Springfield to Greenfield. Next steps for future investment along the corridor and with the route would be informed by the results of the pilot.

Table ES-1: Long-Term Passenger Rail Projects - Tier 1

TIER 1 - PRIORITY FOR IMPLEMENTATION (LONG-TERM PASSENGER RAIL PROJECTS)							
	PROJECT TITLE	LINE	REGION	BENEFITS	FEASIBILITY		COST
Tier 1	New Haven to Springfield Service	NHHS	Western	High	High	Coordination with Amtrak/ Connecticut	\$
	Springfield to Greenfield Passenger Rail Service	Knowledge Corridor	Western	High	High	Dependent on pilot program, which is a near-term priority	\$
	South Station Expansion (SSX)	South Station	Eastern	High	Med	Purchasing and relocation of postal service facility and associated challenges	\$\$\$
	Improve Tower 1	South Station	Eastern	High	Med	Some improvements will require purchase of postal service facility to obtain full benefits, but signal and other components can be done as SSX early action items	\$\$
	South Coast Rail Stoughton Electric	Stoughton	South Coast	High	Med	Permitting challenges	\$\$\$\$

Table ES-2: Long-Term Freight Rail Projects - Tier 1

TIER 1 - PRIORITY FOR IMPLEMENTATION (LONG-TERM FREIGHT RAIL PROJECTS)							
	PROJECT TITLE	LINE	REGION	BENEFITS	FEASIBILITY		COST
Tier 1	Priority 286K network not previously completed	Varies	Varies	High	High	Dependent on near-term 286K projects completed	\$\$-\$
	Fall River Secondary Extension to Rhode Island Border	Fall River Secondary	Southeastern	Med	High	Dependent on near-term Fall River Extension Phase	\$
	Ware River Secondary Projects	Ware River Secondary	Central	Med	High	Dependent on leveraging existing investments and addressing challenges associated with acquiring track & ROW	\$

Tower 1 Upgrade — This project would entail upgrading the signals, power, and track. Track improvements could lead to increased reliability, better on-time performance and reduced delays for trains approaching South Station. To obtain the full benefit, track improvements are necessary and require the purchase of the postal service facility. Signal and other components of this upgrade, which can have substantial benefits on their own, can be done as early action items for the South Station Expansion.

South Station Expansion — Seven new tracks and four platforms for a total of 20 tracks and 11 platforms would substantially expand the passenger capacity at South Station. This project will allow for the passenger rail system to meet current and future high-speed, intercity, and commuter rail service needs for rail trips originating or ending at South Station. The project requires the acquisition of the neighboring post office facility.

South Coast Rail Stoughton Electric — The South Coast Rail project will extend commuter rail to New Bedford and Fall River — the two largest cities within 50 miles of Boston that do not have commuter rail service. Commitment long-term is to the Full Build of the Stoughton Electric Route for South Coast Rail. For the Full Build, the route will travel from Boston's South Station to Stoughton using a track portion of the Northeast Corridor. The route continues south along a combination of what is currently inactive right-of-way and freight rail lines before splitting south of Taunton for terminus stations in Fall River and New Bedford.

Priority 286k network not previously completed — Building off of existing weight-on-rail upgrades, this priority item entails completing identified 286K improvements not accomplished in the near-term rail priorities. The State is identifying funding opportunities with railroads and leveraging funding to modernize the freight rail system. These investments will generate improved shipper efficiency, reduced transportation costs to local businesses that use rail for shipping product, and increased options to move cargo.

Fall River Secondary Extension to Rhode Island Border — Facilitating rail service to local industries will reduce roadway congestion in a heavily traveled part of the State. The Fall River Secondary Extension will also improve access to the larger freight rail network.

Ware River Secondary Projects — The Ware River Secondary projects would secure access to the 1.2 mile segment that connects the MassDOT owned Ware River Secondary to the CSX Main Line. Acquiring and upgrading this link will greatly improve freight access between a MassDOT owned line and the CSX main line, the one Class I Railroad in Massachusetts.

Tier 2 — Warrants further study

Tier 2 projects warrant further study of feasibility, cost, constructability or net benefits. These projects may be reconsidered in subsequent plans. Tier 2 passenger and freight rail projects are shown in tables ES-3 and ES-4, respectively.

Western Massachusetts to Boston Passenger Rail Service Study — The Northern New England Intercity Rail Initiative (NNEIRI) study, published in 2016, looked at Boston to Springfield service as part of a larger study of a New Haven to Montreal service. Through the State Rail Plan outreach, MassDOT understands that there is also interest in a higher speed rail alternative that does not need to connect with the broader service models examined through NNEIRI. Given the lack of consensus on the appropriate type of service to pursue between Western Massachusetts and Boston, as well as a lack of full understanding of the costs and impacts of a higher speed service, further study is necessary. This study, at the direction of MassDOT, will address more than ridership. It will examine safety needs (including Positive Train Control) associated with the expectation of higher speed trains, right-of-way acquisition, constructability, community impacts, and the need to protect freight rail capacity, as well as MBTA commuter rail service on the Worcester line. The study might also look at a fare structure and will need to be done in collaboration with the current railroad owner in order to fully understand the constraints and opportunities.

Otis Industrial Track Study — The Otis Industrial Track is a spur off of the Falmouth Secondary Rail Line into the Joint Base Cape Cod (JBCC) and the recently re-opened transfer facility. This section of track could provide an opportunity for a useful investment because the JBCC uses it for the movement of military equipment. The proposed long-term infrastructure improvements to the Otis Industrial Track aim to replace ties, rail, ballast, surface, and trans load equipment.

New Bedford Marine Commerce Terminal Rail Spur Study — This project would extend the New Bedford Secondary rail line 3,750 feet to a newly constructed marine facility. This extension project can create new connection points for multiple large fish processing enterprises along the route, supporting the local economy and reduce reliance on trucks in the port area. An initial estimate for the full cost of the project is \$12 million. Although this project demonstrates potential for significant economic development at the port, more complete understanding of the costs and impacts of the projects would be necessary.

Table ES-3: Long-Term Passenger Rail Projects - Tier 2

TIER 2 - WARRANTS FURTHER STUDY (LONG-TERM PASSENGER RAIL PROJECTS)							
	PROJECT TITLE	LINE	REGION	BENEFITS	FEASIBILITY		COST
Tier 2	Western Massachusetts to Boston Passenger Rail Service Study	Inland Route	Western (primary)	TBD	TBD	Challenges associated with line ownership and freight conflicts; prerequisite investments.	TBD

Table ES-4: Long-Term Freight Rail Projects - Tier 2

TIER 2 - WARRANTS FURTHER STUDY (LONG-TERM FREIGHT RAIL PROJECTS)							
	PROJECT TITLE	LINE	REGION	BENEFITS	FEASIBILITY		COST
Tier 2	Otis Industrial Track Study	Falmouth Secondary	Southeastern	Med	High	N/A	\$-\$
	New Bedford Marine Commerce Terminal Rail Spur Study	New Bedford Secondary	Southeastern	High	Med	Challenges with establishing a new rail corridor in a urban area.	N/A Limited Info

Table ES-5: Long-Term Passenger Rail Projects - Tier 3

TIER 3 - NO ACTION RECOMMENDED AT THIS TIME (LONG-TERM PASSENGER RAIL PROJECTS)							
	PROJECT TITLE	LINE	REGION	BENEFITS	FEASIBILITY		COST
Tier 3	Privately Operated Commuter Rail Service between Worcester and Providence	P&W Mainline	Central	Med	Low	Interest by private sector initiator, but challenges associated with ridership and access agreements.	N/A Limited Info
	Palmer Station	Inland Route	Western	Low	Low	Limited market with little local planning to establish station context.	\$-\$
	Housatonic Passenger Rail Service	Berkshire Line	Berkshires	Low	Low	No current likelihood of service improvements in Connecticut.	\$\$\$
	Passenger Service to Montreal via Springfield	Inland Route	Western/Vermont	Low	Low	Challenges associated with line ownership/shared use and coordination with CSX. Low ridership and capacity on line.	\$\$\$\$

Table ES-6: Long-Term Freight Rail Projects - Tier 3

TIER 3 - NO ACTION RECOMMENDED AT THIS TIME (LONG-TERM FREIGHT RAIL PROJECTS)							
	PROJECT TITLE	LINE	REGION	BENEFITS	FEASIBILITY		COST
Tier 3	Extend New Bedford Secondary to New Bedford Airport	New Bedford Secondary	Southeastern	Low	N/A	No information available	N/A Limited Info

Tier 3 — No action recommended at this time

Tier 3 projects would require significant partner support or a change in circumstance for further consideration in subsequent plans. There is no recommended action for these projects at this time. Tier 3 passenger and freight rail projects are shown in tables ES-5 and ES-6, respectively.

Privately Operated Commuter Rail Service between Worcester and Providence — This proposal by Boston Surface Railway Company, involves making track upgrades to accommodate privately operated commuter rail service between Worcester, Massachusetts and Providence, Rhode Island. Boston Surface Railway Company (BSRC) secured station rights in Worcester and entered into a long-term lease-to-own for the historic train station in Woonsocket, Rhode Island. Further negotiations between Boston Surface Railway and the host railroad company, Genesee & Wyoming Railroad, are necessary for the proponent to advance this project.

Palmer Station — A new station on the CSX Line in the Town of Palmer could be served by Amtrak's Lake Shore Limited service and potential Inland Route service. The future intercity passenger service through this station was studied as part of the NNEIRI Study and reconsidered in the Central Corridor study. Those studies concluded that existing and expected future conditions do not warrant further action at this time.

Housatonic Line Passenger Rail Service — There has been interest in adding intercity passenger rail service in the Berkshires along the Housatonic Line between Pittsfield, Massachusetts and Danbury, Connecticut with connecting service into New York City. However, passenger service would require significant investment beyond what was initially funded when MassDOT purchased the line. The high cost of upgrades in both Massachusetts and Connecticut is a significant inhibitor as both states would need to partner for the introduction of service.

Boston to Montreal via Springfield Passenger Rail Service — The multi-state partnership identified a preferred service alternative for a New Haven to Montreal via Springfield route with up to 79 mph speeds, 4 round trips per day, and stops at Palmer, Worcester, and Framingham. Low demand for the full route, coupled with high operating costs and shared use challenges, impact the cost-effectiveness of providing this proposed passenger rail service to Montreal.

Extend New Bedford Secondary to New Bedford Airport — This proposed project idea involves building a freight rail spur from the New Bedford Secondary Line to the New Bedford Airport, and was proposed at a State Rail Plan public meeting. The intention would be to support intermodal connections between freight rail and cargo transported via air. Mass Coastal Railroad and CSX operated trains over the New Bedford Secondary Line. There is limited information about the demand, benefits, cost, or feasibility of this project.

Conclusion

MassDOT's long-term strategy for rail in the Commonwealth involves continued investment in state-of-good-repair, implementing the Tier 1 priority investments and study Tier 2 projects. Together, these investments will result in a more modern, higher capacity freight rail system, and a passenger system that better connects major job and activity centers.

Chapter 1:

The Role of Rail in Statewide Transportation

1.1 State Rail Plan Purpose

The purpose of the State Rail Plan is to guide the future of the rail system and rail services in the state. Specifically, it is intended to:

- Set forth Commonwealth policy involving freight and passenger rail transportation.
- Establish policies, priorities and strategies to enhance rail services in the Commonwealth that provides benefits to the public.
- Serve as the basis for federal and state rail investments within Massachusetts.
- Establish the means and mechanism to coordinate with adjoining states, private parties and the Federal Government in projects of regional and national significance, including corridor planning and investment strategies.

The State Rail Plan includes both a near-term 5-year plan, where funding has already been identified in the five year financially constrained Capital Investment Plan (CIP) or where MassDOT is committed to allocating funding in the upcoming CIP development process, as well as a 20 year, long-term strategy for state investment in rail. Due to concurrent planning processes underway focused on the long-term strategy for commuter rail, this State Rail Plan will not be identifying proposals or recommendations in relation to MBTA commuter rail investments. In order to provide the full context for rail planning in Massachusetts, the focus of the near and long-term plans are on investments that provide public benefit, and are prioritized for funding by the Commonwealth.

The State Rail Plan follows the six-chapter structure recommended by the Federal Railroad Administration (FRA) for State Rail Plans.

- Chapter 1 provides an overview of the role of rail in the state’s multimodal transportation system;
- Chapter 2 describes the state’s existing rail system, including recent investments, future trends, forecasts, needs, and opportunities;
- Chapters 3 and 4 outline long-term passenger and freight rail investments under consideration in this plan
- Chapter 5 describes the state’s rail service and investment program; and
- Chapter 6 documents the coordination with other plans and stakeholder outreach conducted as a part of this effort.

This State Rail Plan builds upon the technical analyses and findings of the 2010 State Rail Plan, incorporates information on changes and happenings between 2010 and 2017, and reflects the most current state of the system and stakeholder comments.

1.2 Rail Transportation in the State Transportation Network

The rail system in Massachusetts is a critical part of the transportation network for moving both passengers and goods. The Massachusetts freight rail system consists of a mix of Class I, regional, and short-line railroads serving freight shippers and receivers. The intercity system links Massachusetts to other parts of the Northeast megaregion and relieves demand for gate capacity at Logan Airport. Amtrak provides passenger rail service for intercity travel within Massachusetts and to cities across the Northeast United States. The Massachusetts Bay Transportation Authority (MBTA) commuter rail network provides access to job centers in Eastern Massachusetts.

The Massachusetts passenger and freight rail system is essential to the State’s economy and future economic development. The State’s rail system serves businesses and industries that create jobs and transport goods used every day. The Commonwealth’s 2015 Economic Development Plan¹ states that transportation is a key component of the State’s economic success, and future transportation programs will seek to “foster deep cross-secretariat collaboration around transportation, economic development, sustainability, and in policy planning and project execution.”

Rail helps to maintain the State’s high quality of life and enhance the state’s environmental sustainability and resiliency. In addition to providing many contributions to the state’s economic vitality.

¹ “Opportunities for All, The Baker-Polito Strategy and Plan for Making Massachusetts Great Everywhere,” <http://www.mass.gov/hed/docs/economic-development-plan.pdf>

Table 1-1: Economic Impact of MassDOT-Owned Freight Lines

Impact Metric	Direct	Indirect	Induced	Total
Eastern Massachusetts Lines				
Output	\$252.5	\$79.1	\$81.2	\$412.8
Value Added	\$123.3	\$46.0	\$49.5	\$218.8
Labor Income	\$89.8	\$32.8	\$30.5	\$153.0
Employment	1,313	454	569	2,336
Western Massachusetts Lines				
Output	\$143.1	\$64.4	\$30.4	\$237.9
Value Added	\$25.3	\$30.4	\$17.5	\$73.2
Labor Income	\$22.0	\$21.1	\$10.7	\$53.8
Employment	380	380	235	994
Berkshire Lines				
Output	\$138.9	\$27.6	\$32.1	\$198.6
Value Added	\$61.2	\$12.7	\$18.5	\$92.4
Labor Income	\$39.9	\$8.9	\$11.5	\$60.4
Employment	537	172	268	977
Output, value added, and labor income are expressed in 2016 million dollars.				

Note: Revenue and employment data for current customers on MassDOT-owned rail lines were obtained from InfoUSA, a third-party database that collects business information. This data was combined with IMPLAN input-output modeling system multipliers to estimate output, value added, employment, and wages.

1.2.1 Impact on Massachusetts Economy and Quality of Life

Massachusetts has a diverse economy that relies on an effective transportation system that includes freight and passenger rail. Freight rail provides businesses with the goods and materials that they need to operate and may provide a cost-effective alternative for shipping some important commodities. Pulp and paper products, for example, are often most cost-effectively transported by rail.

Railroads also contribute to the State’s high quality of life. Passenger rail provides residents with alternatives to congested roads and airports, particularly when they are at or above capacity during peak periods.

Rail provides environmental benefits and more resilient infrastructure as well. Rail services contribute less to air pollution than comparable private automobiles and other modes of freight shipping.

MassDOT-owned freight lines support the economy of the Commonwealth by increasing the value of goods and services sold in Massachusetts (i.e., economic output) by \$850 million annually. In addition, the annual value of Massachusetts-made products increases by \$385 million annually. Labor income generated by businesses that use MassDOT-owned rail lines is estimated to be \$267 million annually. Finally, more than 4,300 jobs are supported by the MassDOT-owned rail network².

1.3 Institutional Structure of Massachusetts' State Rail Program

Since 2009, the Massachusetts State Rail program has been administered and coordinated by MassDOT. The MassDOT Rail and Transit Division has primary oversight of the Commonwealth-owned rail infrastructure in the State and the MBTA serves as the primary operator of the state's commuter rail system.

The Rail & Transit Division develops, promotes, and preserves a safe, efficient and convenient rail system for the movement of passengers and freight in the Commonwealth. Chapter 161C of Massachusetts General Laws specifically requires that MassDOT work to encourage and develop rail services that promote and maintain the economic well-being of the residents, visitors, and businesses of the Commonwealth and which preserve the environment and the Commonwealth's natural resources. To this end, MassDOT has long sought to ensure dependable, widely accessible passenger rail service and to improve the relative position of freight rail service within the overall transportation network.

The goals and objectives of the MassDOT Rail and Transit Division include overseeing the Commonwealth's railroad investments, and emphasizing "best-in-class" transportation operations to support Massachusetts commuters and businesses. Included in this mission are:

- Encouraging excellence and innovation in transportation operations.
- Promoting that transportation assets are kept in a state-of-good-repair.
- Managing system improvements and program/project delivery effectively, by adhering to scope, schedule and budget.
- Providing financial and technical support and oversight to regional transportation services and collaborate to develop consistent performance standards and public reporting.
- Managing revenue collection and budgeting in a fiscally responsible fashion.
- Continuing aggressive implementation of cost containment, internal productivity and new revenue generation initiatives.
- Managing state rail transportation and related partnerships.

² MassDOT Board Presentation, March 2017

The MBTA is responsible for the maintenance and operation of public transportation services in and around the Greater Boston Metropolitan Area. It operates both heavy, light, and commuter rail as well as bus and ferry services for residents of Eastern Massachusetts.

1.4 Existing Rail Services

Massachusetts has an existing network of passenger and freight rail services that provide many regions of the state with rail service. Additionally, plans are in place across the state for improvements to be made to the rail network. The following section describes the existing network of freight and passenger rail lines, improvement projects that are planned or under development in the state, and efforts with other states to improve the rail network across New England. This section also provides highlights of projects and milestones achieved over the past five years in the effort to improve the Massachusetts rail network.

1.4.1 Freight Rail Services

Freight rail offers Massachusetts economic and environmental advantages, as well as an opportunity to reduce highway congestion. The freight network offers manufacturers and distributors a cost effective way to ship and receive products such as frozen and preserved food product, materials, chemicals, and paper. Massachusetts freight system depends on multimodally connectivity. As described in Massachusetts' 2017 Freight Plan, the freight corridor that parallels Interstate 90 and Route 495 is an important link to the national rail network.

Currently, the Massachusetts railroad environment is characterized by connections with several Class I railroads and its in-state regional and short line railroads (see Chapter 4 for a discussion of railroad classification). The following are railroads operating in Massachusetts.

Current Class I railroads include:

- CSX Transportation (CSX)

The regional railroads include:

- Pan Am Railways (PAR) and operating subsidiary Springfield Terminal Railway (ST)
- Pan Am Southern (PAS), a joint venture of Pan Am Railways and Norfolk Southern
- Genesee and Wyoming (G&W) and
- New England Central Railroad (NECR)

The short line railroads include:

- Grafton and Upton Railroad (GU).
- Bay Colony Railroad (BCLR);
- Housatonic Railroad (HRRR)
- Pioneer Valley Railroad (PVRP)
- Massachusetts Central Railroad (MCER)
- Massachusetts Coastal Railroad (MCRR)
- Connecticut Southern Railroad (CSO)

The terminal railroads include:

- East Brookfield and Spencer Railroad (EBSR); and
- Fore River Transportation Corporation (FRVT)

Figures 1-1 and 1-2 show the ownership of freight lines in Massachusetts and operation of freight lines in Massachusetts, respectively.

Figure 1-1: Operators of Freight Rail Lines in Massachusetts



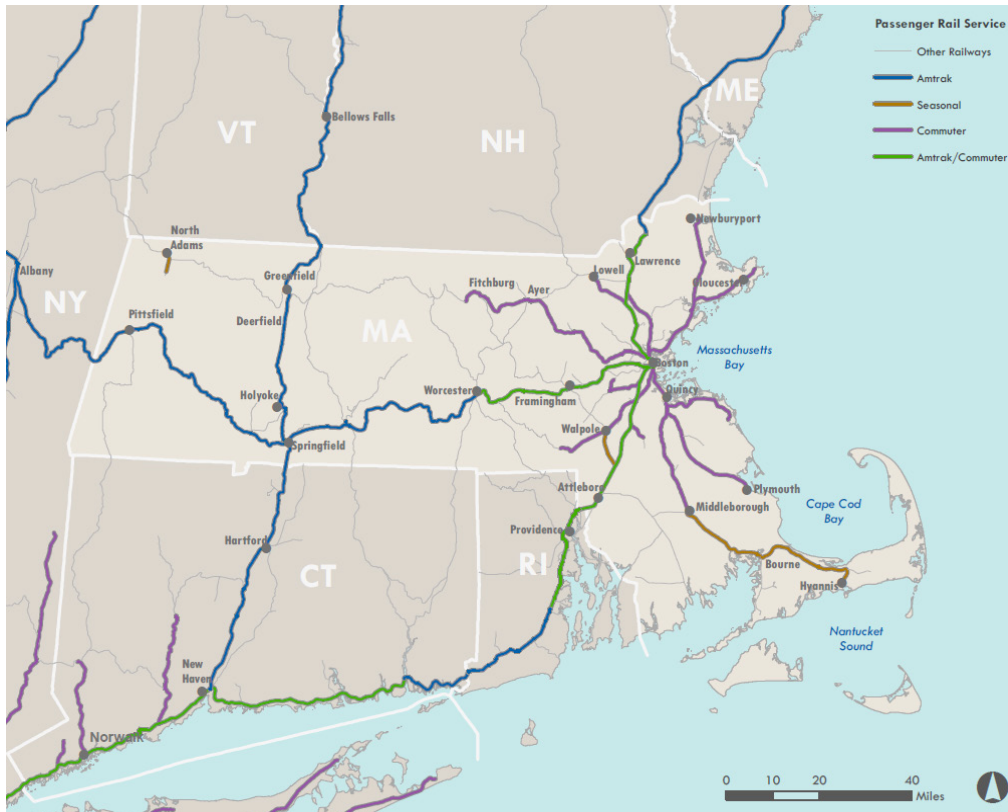
Figure 1-2: Ownership of Freight Rail Lines in Massachusetts



Several MBTA lines are also used to move freight. Any lines shared by passenger and freight services have special constraints and challenges that need to be considered in planning for improved operations.

- Fairmount Line (Shared use with CSX)
- Fitchburg Line (Shared use with Pan Am and Pan Am Southern)
- Framingham/Worcester Line (Shared use with CSX)
- Franklin Line (Shared use with CSX)
- Greenbush Line (Shared use with the Fore River Railroad)
- Haverhill Line (Shared use with Pan Am)
- Lowell Line (Shared use with Pan Am)
- Middleborough/Lakeville Line (Shared use with CSX)
- Newbury/Rockport Line (Shared use with Pan Am as far north as Salem)
- Providence/Stoughton Line (Shared use with CSX)
- Foxboro — Special Events (Shared use with Mass Coastal/CSX and the MBTA)

Figure 1-3: Passenger Rail Operations in Massachusetts



1.4.2 Passenger Rail Services

Passenger rail service in the Commonwealth consists of intercity, commuter and tourist rail services, providing Massachusetts’ residents and the nation’s travelers with safe, convenient, reliable, and energy efficient transportation. Passenger rail service offers travel alternatives and essential mobility to the public. While the focus of this plan is on inter-city passenger rail and MassDOT investment in passenger rail, the MBTA network makes up a significant portion of rail in the State and its operations have implications for passenger on freight rail.

Figure 1-3 shows the location of passenger rail services across the State.

Currently operating inter-city passenger rail services in Massachusetts include:

- Amtrak Acela (Boston to Washington DC)
- Downeaster (Boston to Brunswick, ME)
- Lake Shore Limited (Boston to Chicago, IL)
- Northeast Regional (Boston to New York, New York)
- New Haven-Springfield Shuttle (Springfield to New Haven, Connecticut)
- Vermonter (St. Albans, VT to Washington, DC - via Springfield, Massachusetts)

1.5 Rail Milestones since the 2010 Massachusetts State Rail Plan

A number of investments have been made to the Commonwealth's rail system for both freight and passenger services to support the goals and policies of the 2010 State Rail Plan.

The Massachusetts' passenger rail system has been enhanced through federal aid programs, competitive federal grants, prior stimulus funding through the American Recovery and Reinvestment Act (ARRA), state transportation funds, and other sources, providing upgrades to rail lines operated by both the MBTA and Amtrak. The South Coast Rail project has made significant progress, and the freight rail system has benefited from new investment, most notably through an innovative public-private partnership with CSX and the state funded Industrial Rail Access Program (IRAP).

The following sections highlight how MassDOT has worked to improve intercity and freight passenger rail since the 2010 State Rail Plan.

MassDOT Rail Acquisition

MassDOT has acquired rail lines to maintain essential transportation services, as well as facilitate current or future passenger service and potentially other transportation uses. Acquiring rail throughout the Commonwealth was an important initiative of the 2010 Rail Plan. Today, nearly 60 percent of the active railroad system in Massachusetts is publicly owned (25% MassDOT, 32% MBTA, 1% Amtrak/MWRA/Federal). This allows MassDOT the opportunity to preserve and maximize the public benefits from this important transportation asset.

In June 2010, MassDOT acquired South Coast Lines, including the Middleborough Secondary, Boston Terminal Running Track, West First Street Yard in South Boston, and the Grand Junction Branch. MassDOT agreed to buy the Connecticut River Line in July 2012, and completed the acquisition in 2015. Additionally, in 2012, MassDOT acquired from CSX the Boston Main Line from Framingham to Worcester. Finally, MassDOT purchased the Berkshire Line from the Housatonic Railroad, and completed acquisitions of the Framingham Secondary Rail Line, and the Adams Branch all in 2015.

Between 2010 and 2014, MassDOT acquired 78.6 miles of Right-of-Way, which consisted of 73.2 miles active and 5.4 miles inactive.³ MassDOT acquired an additional 113 miles of ROW in 2015: 111 miles active and 1.9 miles inactive.

Grade Crossing Safety Projects

At-grade crossing safety improvement projects are funded through the federal Section 130 program, which requires the state to use a data-driven process to prioritize and select projects. In addition, the state must develop a survey and schedule of projects. Massachusetts uses Hazard Index (HI) Formula to prioritize and select projects, which incorporates risk attributes. Between Calendar Year 2010 and 2016, there have been 100 grade crossing improvement projects across Massachusetts. Fifty-nine of the 100 grade crossing projects were on railroad owned by MassDOT. The remaining 41 improvements were located on the following rail roads: Chessie-Seaboard Transportation (CSXT), Grafton & Upton, New England Central, Pan Am Railway, Pan Am Southern, and Providence & Worcester owned railroad.

Intercity Rail Investment and Tourist Service

In addition to the acquisition of rail lines, MassDOT has successfully leveraged federal funding through the FRA High Speed Intercity Passenger Rail (HSIPR) program to complete several important projects to improve passenger rail operations.

Knowledge Corridor — In 2010, the U.S. Department of Transportation awarded MassDOT \$70 million in the first round of the competitive HSIPR Program for the final design and construction of the Knowledge Corridor. Since the 2010 State Rail Plan, nearly 50 miles of track have been acquired and rehabilitated and new stations have been added to support the Vermonter train service. Stations have been built in Northampton (former Amtrak station location), Greenfield, and Holyoke.

Downeaster and Merrimack River Rail Bridge — The rehabilitation of the Merrimack River Bridge in Haverhill, used by both Amtrak and the MBTA, is addressing a critical element of the region’s transportation system. Current bridge construction is projected to be complete in the Spring of 2018. Until that time, MBTA and Amtrak are operating with a single track over the bridge.

Tourist Service — Another type of passenger rail now operating in the Commonwealth is seasonal tourist service. The Cape Flyer began service in 2013 and is based on a successful relationship between MassDOT, Cape Cod Regional Transit Authority (CCRTA) and the MBTA. This service runs on weekends, beginning Friday evenings and including holidays from Memorial Day weekend to Labor Day weekend. Due to its early success, and its ability to operationally support itself through fare revenue, MassDOT announced the service would return for subsequent years, with an additional stop added in Wareham in 2014. Year-round weekend service over the route is provided from Boston to Hyannis.

MassDOT has also funded capital improvements along the Adams Branch to provide for passenger service. The Berkshire Scenic Railway Museum begun tourist rail service on the line starting in May 2016 and is in the process of extending the service area.

Commuter Rail Extensions and Capacity Enhancements

Since the last State Rail Plan, MassDOT and the MBTA have made significant progress in advancing commuter rail initiatives. The following three initiatives are those related to new service, shared service with Amtrak, and partnerships with other states.

South Coast Rail — MassDOT and the MBTA are advancing South Coast Rail through early action items including upgrades along the South Coast line — most notably in the Southern Triangle — that provide an immediate and tangible benefit to existing freight operations, and will improve overall conditions for future commuter rail service. Since 2016, the MBTA has upgraded five rail crossings and MassDOT has reconstructed four bridges along the South Coast Corridor. To advance Phase I, upgrades to the Middleborough Secondary have been undertaken. MassDOT continues to advance the Stoughton Electric Route full build scenario.

Haverhill Line Improvements — The MBTA installed double-tracking and improved the train control systems between Lawrence and Andover. This project improved reliability and on-time performance for the Haverhill commuter rail line, Amtrak’s Downeaster trains, and freight rail operations.

Extension of MBTA service to T.F. Green Airport — During the fall of 2010, the MBTA Providence Line service was extended to T. F. Green Airport in Warwick, Rhode Island, as part of the long-standing Pilgrim Partnership agreement with the State of Rhode Island. Under the agreement, Rhode Island provided capital funds to the MBTA in exchange for operating service in and to the State. The MBTA used these capital funds to purchase equipment and make improvements to facilities in Massachusetts. Boston area residents now have improved access to Providence jobs and an additional airport that provides more options for inter-city travel.

Freight Investment

MassDOT has undertaken many of the freight recommendations from the 2010 State Rail Plan, particularly through public private-partnerships. The partnership with CSX allowed for increased rail service between Boston and Worcester and generated significant economic benefits for Western Massachusetts through investment in improved freight operations and facilities. The Industrial Rail Access Program (IRAP) has also generated significant economic benefits for the Commonwealth.

CSX Double Stack Initiative and Intermodal Investment — In 2012, CSX and the Commonwealth entered into an innovative public-private partnership to provide Massachusetts with ownership of the tracks and control of operations along the Framingham/Worcester line. In addition to the passenger rail benefits generated through this agreement, this arrangement has helped continue to strengthen the Commonwealth's freight rail system. CSX invested \$150 million in its recent expansion at Worcester, making the line between Selkirk, New York and Worcester a critical piece of infrastructure for its priority intermodal service. The improved facilities and MassDOT/CSX agreement have helped CSX continue to grow in Massachusetts and provide a recent and successful example of a rail related, public-private partnership in Massachusetts. CSX currently has 170 employees and 319,000 carloads available to support freight rail service in the State.

As an element of the CSX transaction, MassDOT and CSX provided full double stack access between the New York State line and the newly-expanded intermodal terminal in Worcester, reducing transit times by as much as 24 hours. In addition, CSX has made over a \$100 million investment in intermodal facilities in Worcester, West Springfield and Westborough that greatly benefit the Western Massachusetts economy. Due to the investments in double-stack clearance, intermodal rail access opportunities have opened up in Western Massachusetts for freight shippers.

Industrial Rail Access Program (IRAP)

— The 2010 Rail Plan recommended that Massachusetts create an Industrial Rail Access Program (IRAP) as a way to enhance industrial development opportunities and encourage freight shipment by rail to help reduce roadway congestion and emissions. Since the 2010 Rail Plan offered this recommendation, Massachusetts has created IRAP that provides financial assistance to support investment in industry-based infrastructure. The objective of this program is to stimulate economic development, retain and grow corporations in Massachusetts, keep manufacturing jobs and create new jobs. As a competitive, public/private partnership grant program, the private sector provides a minimum of 40 percent of IRAP project cost. IRAP awards of \$12.7 million have leveraged \$19.3 million in private sector investment in the first five years of the program.

1.6 Massachusetts' Goals for the Statewide Multi-modal Transportation System and State Rail Plan

1.6.1 Goals for Rail in the Multimodal Transportation System

The goals and objectives designed to fulfill the rail vision were developed over the past decade in collaboration with stakeholders, including rail industry representatives, state and local officials, metropolitan planning organizations (MPO), various interest groups and residents. They have been revisited for this plan to reflect what MassDOT has accomplished since the 2010 Rail Plan. The goals of the State Rail Plan are as follows:

1. Maintain the Commonwealth's existing rail system in a state-of-good-repair, expand accessibility, and preserve railroad rights-of-way.
2. Support economic growth throughout the state and enable Massachusetts to compete in the changing global economy.
3. Improve the safety and security of the rail system.
4. Provide a rail system that is environmentally and financially responsible.
5. Improve intermodal connectivity for both passenger and freight rail facilities by stronger coordination between rail system users to promote system use and efficiency.
6. Maximize the return on public dollars towards rail investment by maximizing the use of existing rights-of-way.

1.6.2 MassDOT Vision for Massachusetts Passenger and Freight Rail Service

MassDOT's existing rail assets are valuable and are too often underutilized. The vision for the next 20 years is focused on maximizing the use of assets to achieve the greatest benefit from prior investments. MassDOT's acquisitions over the last few decades include significant segments of track and right-of-way for freight and passenger rail. MassDOT aims to strategically look for opportunities to leverage these investments to better serve the Commonwealth over the next 20-year horizon. The Commonwealth's Rail Vision, as it relates to both freight and passenger improvements across the state can be summarized as follows:

- **Long-Term Reliability & Resiliency:** Maintain and improve the rail system in Massachusetts to enable efficient and dependable passenger and freight rail operations.
- **Modernize:** Improve existing systems to meet industry standards and federal regulations to ensure proper operations for both freight and passenger rail services.
- **Optimize:** Pursue opportunities to leverage prior investment to improve service
 - Maximize return on prior investments
 - Leverage partnership opportunities
- **Regional Balance:** Pursue strategies that balance the costs and benefits of rail throughout the Commonwealth.

1.7 State Rail Plan Context

This State Rail Plan was developed understanding that specific and regional planning efforts are underway. In addition, several projects are currently being advanced that impact the investments proposed in this plan. The following section discusses these projects as well as related planning efforts. The conclusion of this section provides the federal context for the State Rail Plan.

1.7.1 Rail Initiatives Under Development

The Commonwealth is undertaking several projects that are in planning and design. Projects and plans currently under development or study include:

South Station Expansion — South Station is the primary terminal for Northeast Corridor Amtrak service and commuter rail in Boston. However, South Station currently has less track and platform capacity than is necessary to accommodate projected rail passenger demand. MassDOT, through an FRA HSIPR Grant has established an alternative to expand South Station. MassDOT has completed both state and federal environmental review. MassDOT is currently exploring further design of potential signal and power improvements associated with Tower 1 interlocking.

South Coast Rail — In March 2017, the Massachusetts Department of Transportation (MassDOT) submitted a Notice of Project Change to the Massachusetts Environmental Policy Act (MEPA) Office proposing a phased approach to South Coast Rail (SCR). A new station in Middleborough has emerged as the most desirable option. MassDOT determined it could provide earlier service to the region by extending the existing Middleborough Line to Fall River and New Bedford along the Middleborough Secondary Line, as Phase 1. A new station in Middleborough at Pilgrim Junction has emerged as the most desirable option. It optimizes operations, provides the shortest travel time from Fall River and New Bedford, while also allowing for a one-seat ride for the majority of passengers. This approach also supports a connection for future Cape shuttle service, and allows the existing station to serve Cape Flyer service. This alternative is being fully evaluated in the Draft Supplemental Environmental Impact Report (DSEIR), which MassDOT will submit for full public review early in 2018.

Freight Planning in Massachusetts

Massachusetts Freight Plan — The State Rail Plan has been developed in close collaboration with the Massachusetts Freight Plan. In 2017, the Draft Massachusetts Freight Plan was released. The plan evaluates the entire freight system, in examining how short, medium, and long-term strategies guide future freight policies, investments, and partnerships. The plan focuses on truck freight, but examines all modes, including rail and pays special attention

to intermodal connections. The preliminary findings from the State Rail Plan helped inform the rail portion of the Freight Plan and feedback received during the Freight Rail plan process helped inform this State Rail Plan.

Freight Studies

Patriot Corridor Double Stack Initiative — The Pan Am Southern Patriot Corridor initiative is a proposal to examine the feasibility of double-stacked freight operations on the Patriot Corridor, a freight rail right-of-way between Mechanicville, New York, and Ayer, Massachusetts. The study has received both federal and state funding.

MBTA Commuter Rail Planning

MBTA Commuter Rail Vision — An on-going initiative intended to identify the most cost effective strategies for leveraging the MBTA’s extensive rail network with the goals of increasing ridership and meeting the transportation and economic growth needs in the Greater Boston region.

Focus40 — A 25-year investment plan, which aims to position the MBTA to meet the needs of the evolving and dynamic nature of the Greater Boston region in 2040. In addition to infrastructure challenges that exist today, the long-term strategy recognizes the shifting demographics, changing climate, and evolving technologies that may play a role in the future.

Passenger Rail Studies

North-South Rail Link Feasibility Reassessment — The North South Rail Link is a proposed pair of 1.5 mile-long tunnels that would connect the MBTA’s North Station and South Station. A \$2 million dollar feasibility reassessment is current being conducted to reassess the costs and benefits of the project given current conditions.

Berkshire Flyer Study — The Berkshire Flyer Study will evaluate the potential for using a New York rail route to establish a seasonal passenger rail service between New York City and the Berkshires, based on the successful example of the CapeFLYER. This study is the result of legislation directing MassDOT to assemble a working group of key stakeholders to provide expertise into studying the potential for initiating new rail service.

Infrastructure For Rebuilding America (INFRA) Grant Applications

Another important context for this plan is the opportunities to pursue grant funding. MassDOT is seeking to leverage Federal discretionary funding in the first-round of the INFRA Grant program to complete two projects important to the state’s freight network.

The **NECR Western Massachusetts Freight Rail Upgrade Project** is identified as a high priority project, and involves upgrading more than 31 miles of rail and twenty bridge structures on the New England Central (NECR) freight line running from Connecticut to Canada. There is \$9.6 million in private funding committed to this project in addition to \$9.6 million in state funds. Federal funds would provide the remaining amount needed to upgrade this line to the national weight limit standard of 286K (286,000 pounds from its current 263,000 pound weight limit). This added capacity would give shippers and receivers the ability to fully load standard 286 cars - instead of having to load them only part way (due to the existing rail line weight limitations), or use older 263 cars that are in increasingly short supply for some commodities. Neither alternative is as cost effective as a 286 system.

The lack of a 286K rail line forces Massachusetts rail customers into a practice that is inherently not cost effective or competitive. The upgrade is necessary to close the last “gap” in the 286K rail network being built in Vermont and Connecticut.

In addition, MassDOT has submitted a request for funds for the **I-495 Corridor Improvement Project**, a highway corridor improvement project that will also lead to improved access to CSX intermodal rail facilities.

1.7.2 Involvement in Multi-State Rail Planning Efforts

The Commonwealth of Massachusetts coordinates or is included in rail planning efforts with adjacent states or at a regional level. These planning efforts have impacts on project needs within Massachusetts. Recent regional planning efforts, in which Massachusetts was a partner include:

Northern New England Intercity Rail Initiative (NNEIRI) – The Massachusetts Department of Transportation (MassDOT) and the Vermont Agency of Transportation (VTrans) conducted a feasibility and planning study – the Northern New England Intercity Rail Initiative – that examined the opportunities and impacts of adding more frequent and higher speed intercity passenger rail service on two major rail routes, the Inland Route and the Boston-to-Montreal Route (the NNEIRI Study). The Inland Route runs between Boston, Massachusetts, and New Haven, Connecticut, via Springfield, Massachusetts. The Boston-to-Montreal Route runs between Boston and Montreal, Quebec, via Springfield, Holyoke, Northampton and Greenfield Stations. The two routes share trackage between Boston and Springfield, Massachusetts, and are collectively identified as the NNEIRI Corridor.

The Federal Railroad Administration (FRA) provided grant funding to MassDOT and VTrans for the NNEIRI Study. The NNEIRI Study defined and evaluated a Build Alternative for implementing improved passenger rail service in the NNEIRI Corridor; identified and evaluated the potential environmental effects of railroad infrastructure and service improvements necessary to increase train speed and frequency; forecasted ridership and revenue; and estimated capital and operating costs.

In June 2016, MassDOT and VTrans, in coordination with FRA, completed a Tier 1 Environmental Assessment (EA) for the NNEIRI Study in accordance with the National Environmental Policy Act of 1969 (NEPA) External Link, the NEPA implementing regulations, 40 CFR parts 1500–1508, and FRA’s Procedures for Considering Environmental Impacts, 64 FR 28545 (May 26, 1999). Based on the information presented in the Tier 1 Service-Level EA, FRA signed a Finding of No Significant Impact (FONSI) on July 14, 2016.⁴

NEC FUTURE – NEC FUTURE is the Federal Railroad Administration’s (FRA) comprehensive plan for improving the Northeast Corridor (NEC) from Washington, D.C., to Boston, Massachusetts. Through NEC FUTURE, the FRA has worked closely with NEC states, including Massachusetts, as well as railroads, stakeholders, and the public to define a long-term vision for the corridor’s future. MassDOT offered comments while the plan was under public review and stressed the importance of SGR in the plan, which NEC FUTURE took into account. Through the NEC FUTURE program, the FRA has determined a long-term vision and investment program for the NEC, and completed a Tier 2 Environmental Impact Statement (EIS) and a Record of Decision was made in 2017.

1.7.3 Involvement in Multi-State Rail Implementation

Massachusetts has coordinated with Connecticut on planning for New Haven to Springfield service, which is anticipated to begin in January of 2018.

New Haven-Hartford-Springfield Commuter Rail Services

– This Connecticut Department of Transportation (CTDOT) program will provide improved intercity rail and new commuter rail services between Springfield and New Haven with connecting services to New York City. This program also benefits from the renovation of Massachusetts Springfield Union Station.

1.7.4 Federal Mandate for State Rail Plans

This Rail Plan is consistent with Massachusetts’ transportation planning goals and programs, as well as the requirements under section CFR 135 title 23. It sets forth rail transportation’s role within the state transportation system, including regional metropolitan planning organization (MPO) plans and the Statewide Transportation Improvements Program (STIP). This Rail Plan incorporates the rail-related tasks and deliverables from the multi-modal State Freight Plan, along with a detailed analysis of rail infrastructure and operations.

4 <https://www.fra.dot.gov/Page/P0975>

The most recent federal planning requirement that the State Rail Plan will fulfill is Section 11315(a)(1) of the Fixing America's Surface Transportation Act (P.L. 114-94, December 4, 2015), which revised the requirement for State-approved plans from 5 years to 4 years for acceptance by FRA. The origins of federal state rail plans are found in the Passenger Rail Investment and Improvement Act of 2008 (PRIIA), which was signed into law in October 2008. PRIIA outlined a set of requirements for State Rail Plans that must be fulfilled for a state to become eligible for Intercity Passenger Rail Capital Assistance grants. The State Rail Plan is consistent with the federal planning guidelines contained in Title 49, Part 266 of the Code of Federal Regulations.

1.7.5 Integration with the National Rail Plan

In PRIIA, Section 307(b)(j)(2) of the Act directed the FRA to “develop a long-range national Rail Plan consistent with approved state rail plans and the rail needs of the nation as determined by the Secretary in order to promote an integrated, cohesive, efficient, and optimized national rail system for the movement of goods and people.”

A Preliminary National Rail Plan was published in October 2009, which “lays the groundwork for developing policies to improve the U.S. transportation system” and lays out goals to “improve safety, to foster livable communities, to increase the economic competitiveness of the United States, and to promote sustainable transportation.” This was followed by the release of a National Rail Plan Progress Report in September 2010. The progress report details the interplay of factors that demonstrate the importance of efficient and effective rail infrastructure to the nation's economy, including population growth, freight growth and need for improved safety. The report describes the different yet complementary visions for the two rail systems, a high-speed and intercity passenger rail system and a high-performing freight rail system. Both systems use many of the same resources and much of the same infrastructure. Working in tandem, the two systems are intended to connect people and goods in a seamless and efficient manner.

Chapter 2:

The State's Existing Rail System

2.1 Massachusetts Rail System

The Massachusetts rail system includes a freight network that serves communities and businesses throughout the State. Freight operations are provided by both national carriers and local/regional short line railroads. The passenger rail system includes intercity rail services, a commuter rail system focused on the Boston region, as well as tourist and seasonal railroads.

2.1.1 Freight Rail System

The freight rail system in Massachusetts serves a wide range of customers including manufacturers, distributors, and shippers. On the MassDOT-owned freight lines alone, it increases the value of goods and services sold in Massachusetts by \$850 million annually, and the annual value of Massachusetts-made products increases by \$385 million annually. Labor income generated by businesses that use the MassDOT-owned rail lines is estimated at \$267 million annually, and more than 4,300 jobs are supported by the MassDOT-owned rail network.¹

¹ MassDOT Board Presentation, March 2017.

National and Regional Context

From Massachusetts, customers can ship products by rail across North America. The Massachusetts freight rail network is connected to the national freight rail network through the larger rail carriers, and through a combination of smaller railroad carriers the State is connected to other points in the Northeast United States and eastern Canada.

National Rail Classification Standards

Freight rail carriers in Massachusetts are classified based on national standards developed by the Surface Transportation Board (STB), an independent federal agency. STB identifies the relative size of the railroads in terms of Class I, Class II, and Class III. STB determines a railroad's class based on an inflation-adjusted revenue metric.²

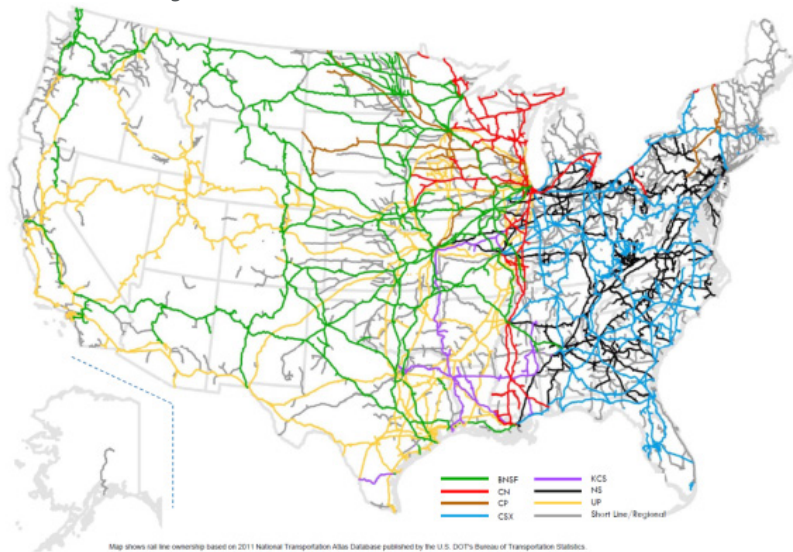
² In 2014, the most recent year the STB updated the classifications, Class I railroads included any company with operating revenue exceeding \$475.75 million, Class II included companies with \$37.4 and under \$475.75 million in revenue, and Class III are railroads with under \$37.5 million in revenue. (Based on Railroad Revenue Thresholds for last 5 years thru 2014, available at <http://www.stb.dot.gov/econdata.nsf/DeflatorFactors?OpenView>)

The Massachusetts rail system includes passenger and freight networks that serve both major population centers and rural areas. Chapter 2 details the existing rail network infrastructure and operations in Massachusetts, including passenger, freight, and shared facilities. The chapter includes an analysis of rail system trends and forecasts and summarizes needs identified for the state rail system.

Within the rail freight industry, the STB classification system helps differentiate between national, regional, and local railroads. Class I railroads own and operate the primary long distance rail corridors that serve as the backbone for the freight rail network. The presence of Class I railroads in a region is important in providing ease of access to the national freight network. Of the seven Class I railroads, only CSX directly owns and operates railroad lines in Massachusetts. Norfolk Southern operates in the State but is only a partial owner of the lines that it operates over.³ Additionally, through haulage arrangements via the New England Central Railroad (NECR), Class I carriers Canadian Pacific (CP) and Canadian National (CN) have access to Massachusetts customers for commodities and intermodal shipments. Figure 2-1 profiles the Class I freight railroads in the United States.

Class II carriers are generally regional railroads operating mid-size lines. Class II carriers provide access to regional markets, not served directly by Class I railroads. Class III carriers are primarily short lines, terminal railroads, or switching railroads and are frequently owned by railroad holding companies and serve small industrial operations.

Figure 2-1: Class I Freight Railroads in the United States



Source: American Association of Railroads, Rail Facts for 2012

Massachusetts Freight Rail Lines

The Massachusetts freight rail network handles more than 6.6 million carload tons and 5.5 million intermodal tons either originating or terminating. The number of rail units in Massachusetts, intermodal container and carload, was 342,300 in 2015.

³ Norfolk Southern owns a 50% share of Pan Am Southern, which owns and operates along the line from Williamstown to Ayer from Surface Transportation Board Decision STB Finance Docket No. 35147, Norfolk Southern Railway Company, Pan Am Railways, Inc., Et Al. – Joint Control And Operating/Pooling Agreements – Pan Am Southern LLC, Decided: March 10, 2009.

Figure 2-4: Freight Railroad Operators



Freight Rail Line Owners and Operators

Freight and passenger rail lines in Massachusetts are owned by both public and private entities. The largest owner of rail infrastructure in Massachusetts is the Commonwealth of Massachusetts. Figure 2-2 shows the location of the MBTA and MassDOT owned freight rail lines in the State.

The largest private owner is CSX Transportation Inc. Segments of the rail network are owned by at least nine other private entities and numerous other public agencies. In terms of mileage, short line and regional railroads comprise approximately 60 percent of the active railroad route system in Massachusetts.⁴ Figure 2-3 is a map of freight rail line ownership and profiles ownership by miles of active corridor owned. Figure 2-4 illustrates primary freight railroad operators on the rail lines in Massachusetts. The primary difference from Figure 2-3 is that many rail companies do not own the rail lines on which they operate.

⁴ On the national scale, the Class I railroads dominate in all metrics – miles of road operated, tonnage and revenue. The Class I railroads combined handle approximately 90% of all freight rail.

Table 2-1: Massachusetts Active Freight Rail Mileage by Owner

MASSACHUSETTS ACTIVE FREIGHT RAIL MILEAGE BY OWNER	
RAIL OWNER	TOTAL ACTIVE RAIL CORRIDOR MILES OWNED
MBTA (Active Freight Miles Only)	343
MassDOT	299
Amtrak	6
Federal	6
Massachusetts Water Resource Authority (MWRA)/Fore River RR	2
SUBTOTAL PUBLIC: 639	
CSX Corporation	160
Pan Am Railways	43
Pan Am Southern	111
Providence and Worcester Railroad	62
New England Central Railroad	54
Grafton and Upton Railroad	15
Bay Colony Railroad	6
Pioneer Valley Railroad	17
Massachusetts Central Railroad	2
SUBTOTAL PRIVATE: 471	
TOTAL: 1,110	

Notes:

- 1.) Active Rail Corridor Miles Owned refers to ownership of railroad rights-of-way in active freight rail use.
- 2.) Mileages estimated from Federal Railroad Administration GIS database. (Web Application)
- 3.) All routes are in active use by freight operators.

Publicly Owned Rail Lines

In Massachusetts, agencies and passenger corporations, including MassDOT, MBTA, Amtrak, and other state and federal agencies, own substantial components of the rail network.⁵ MassDOT and the MBTA own 56 percent of the total rail transportation network in the State but, in some cases, ownership is subject to retained freight rail operating rights or trackage rights agreements with private freight railroads. Rail corridors owned by Amtrak, Massachusetts Water Resources Authority (MWRA), and the Federal Government represent approximately 2 percent of the overall rail line ownership. The remaining 42 percent of the active freight rail lines are owned by private rail carriers.

Bay Colony Railroad (BCLR)

The BCLR is a privately held, Class III railroad with headquarters in Braintree, Massachusetts. BCLR owns and operates along the six mile segment of the Fall River Branch between Fall River and New Bedford (a.k.a. Watuppa Branch) in southeastern Massachusetts with a connection to the Massachusetts Coastal Railroad (MC). The railroad used to also operate along the Millis Branch, a line between Needham Junction and Millis. Once their primary customer, GAF Roofing, closed, BCLR ceased operation along the line.

⁵ The National Railroad Passenger Corporation, doing business as Amtrak, is a for-profit corporation owned entirely by the United States Government.

Connecticut Southern Railroad (CSO)

The CSO is part of the Genesee & Wyoming Company (GW), a publically traded corporation that owns or maintains 120 short line and regional railroads worldwide. CSO headquarters are located in East Hartford, Connecticut, and GW is headquartered in Darien, Connecticut. CSO is a Class III railroad with approximately 77 miles of track in Connecticut and Massachusetts. The CSO interchanges with: CSX at West Springfield, Massachusetts, and New Haven, Connecticut; Providence and Worcester (PW) in Hartford; and the Central New England Railroad in Hartford and East Windsor. The CSO does not serve any customers within Massachusetts, but operates over the Amtrak-owned Springfield Line between North Haven and Springfield and the CSX Boston Line to interchange with CSX in West Springfield. All of CSO's freight customers are located in Connecticut. The CSO is the sole freight rail provider in central Connecticut.

CSX Corporation (CSX)

CSX Corporation is a publicly traded company with its operating headquarters in Jacksonville, Florida. CSX has operations in 23 states and 2 Canadian provinces with approximately 21,000 miles of rail routes and also intermodal facilities. CSX is the largest private owner of rail property in Massachusetts and the only Class I freight rail owner/operator in the State. Within Massachusetts, CSX owns 160 miles of active rail routes and operates 283 route miles. The approximate 123 miles of the network operated but not owned by CSX within Massachusetts is operated under terms of retained freight easements or trackage rights agreements with the MBTA, MassDOT, and private sector railroads.

Operationally, CSX's most important rail line in Massachusetts is the route from Worcester to the Massachusetts/New York border, with continued service to a major CSX classification yard and junction in Selkirk, New York. The Selkirk yard is the major freight yard for CSX in the New England-New York region and is a key component of the CSX system. Every freight railroad operating in the Commonwealth (with the exception of PAS) interchanges with CSX.

Since 2010, CSX has sold approximately 43 miles of railroad right-of-way (ROW) to the Commonwealth of Massachusetts. This includes 22 miles of the Boston Line between Framingham and Worcester, the Framingham Secondary Rail Line, a 21-mile segment of rail that connects Framingham and Mansfield, and the South Coast rail lines to Fall River and New Bedford. As a part of the 2010 agreement with the Commonwealth of Massachusetts, CSX expanded and modernized the intermodal facility in Worcester.

The expanded intermodal facility in Worcester, coupled with the projects undertaken by the Commonwealth of Massachusetts to increase vertical clearances between Worcester and New York to 21 feet has enabled CSX to open New England's first double-stack cleared intermodal route on the line. This allows intermodal trains to operate with containers stacked two-high. Previously, double-stack intermodal trains entering the New England region had to stop in Syracuse, New York for conversion to single-stack configurations. CSX reports that the change reduces transit times on key lanes by as much as 24 hours.

East Brookfield and Spencer Railroad (EBSR)

The EBSR is a privately held terminal operation company and operates over four miles of trackage owned by CSX in East Brookfield, Massachusetts, where EBSR connects to CSX. This railroad, the newest constructed in Massachusetts, serves as the terminal operator for the auto unloading facilities located just off the CSX main line in East Brookfield.

Fore River Transportation Corporation (FRVT)

This FRVT is a Class III railroad owned by its largest customer, Twin Rivers Technology LLC, a manufacturer of industrial inorganic chemicals (rendering of glycerin, fatty acids). The Quincy, Massachusetts, plant has access to worldwide ocean shipping lanes through its own port facilities and storage terminal.

Headquartered in Quincy, the FRVT currently provides freight rail services on three miles of track and is wholly owned by the Massachusetts Water Resource Authority (MWRA). FRVT operates over MBTA-owned tracks on CSX trackage rights between East Braintree and South Braintree where it interchanges traffic with CSX.

Grafton and Upton Railroad (GU)

The GU is a privately held Class III railroad with headquarters in Marlborough, Massachusetts. The GU owns trackage running from an interchange with CSX in North Grafton to a second interchange with CSX in Milford, a distance of approximately 15 miles. However, the line is not currently in operation for the entire length. The active customers and operation on the line are clustered at the north end of the corridor in North Grafton, but the railroad has an active program to develop business along its entire route.

Housatonic Railroad (HRCC)

The HRCC is a privately held, Class III railroad with operations in Massachusetts, Connecticut, and New York. The operating headquarters of HRCC is located in Canaan, Connecticut. The HRCC operates about 38 miles of ROW in the Commonwealth but sold ownership of the ROW to the Commonwealth in 2015.

Massachusetts Central Railroad (MCER)

The MCER is a privately held Class III railroad. The MCER operates freight rail service over the 25-mile Ware River Secondary in central Massachusetts; the railroad owns approximately 1.5 miles of the ROW, while MassDOT owns 23.5 miles of the ROW. MCER operates under a license and operating agreement with MassDOT. Company headquarters, yard, and intermodal facilities are located in Palmer, Massachusetts, where it receives and ships trailers via CN, CSX, Canadian Pacific Rail Services, or NECR. The MCER interchanges with CSX and NECR in Palmer and has a plastics transloading operation in Barre, Massachusetts.

Massachusetts Coastal Railroad (MC)

MC is a privately held Class III railroad and is principally owned by Iowa Pacific Holdings LLC. MC also operates the tourist Cape Cod Central Railroad excursion train. The company is headquartered in Wareham, Massachusetts. MC connects to CSX in Middleborough and Taunton, and to BCLR in New Bedford. MC operates freight rail service over about 59 miles of MassDOT-owned ROW in southeastern Massachusetts and Cape Cod under a lease and operating agreement with MassDOT.

Massachusetts Coastal Railroad also recently acquired the freight operating rights from Taunton to Fall River and New Bedford from CSX, bringing its total mileage operated to about 95 miles. In addition, MC maintains the Framingham Secondary Line that MassDOT purchased from CSX in June 2015.

New England Central Railroad (NECR)

NECR is owned by GW and headquartered in St. Albans, Vermont. NECR is a Class III railroad that operates 394 miles of railroad between the Vermont/Quebec border, and New London, Connecticut. A 54 mile segment of the line passes through Massachusetts between Monson and Northfield. The primary NECR Massachusetts facility is located at Palmer, where it interchanges with CSX. NECR also interchanges with PAR in Northfield and Montague. NECR provides a major north-south rail corridor in the region, linking Canada with Connecticut.

Pan Am Railways (PAR)

PAR is a privately held Class II rail carrier with operations in five New England states and New York. Its operational headquarters are located in North Billerica, Massachusetts. PAR has connections to the NECR in Montague and Northfield, and the P&W in Gardner and Worcester. PAR exchanges traffic with CSX in Worcester and Ayer. PAR also connects with PAS in Ayer.

PAR owns approximately 43 miles of railroad ROW in Massachusetts and operates on over 178 miles of ROW in the State. PAR's rail ownership and operations are carried out by its subsidiaries, the Boston and Maine Corporation (B&M), which is the property owner, and Springfield Terminal Railway, which operates the railroad. PAR operates on 135 miles of MBTA ROW and provides train dispatching for the MBTA Commuter Rail Fitchburg Line west of Ayer, Lowell Line near Lowell Station, and the Haverhill Line east of Andover.

Pan Am Southern (PAS)

PAS and PAR jointly operate the freight main line that runs 475 miles from northern Maine to eastern New York, 155 of which run through Massachusetts. The PAS owned segment of the line includes 111 miles of right of way between the Vermont border and West Groton.⁶ In addition to the freight main line PAS operates along the state-owned Connecticut River Line from Northfield to Springfield and the Adams Branch in North Adams and Adams.

On May 15, 2008, Norfolk Southern and PAR announced the formation of a joint venture called Pan Am Southern to combine operations for lines owned by both railroads. While this railroad is operated by PAR, Norfolk Southern owns a 50 percent share of PAS. PAS conducts freight rail operations across parts of western and central Massachusetts with connections to Mechanicville, New York. The new entity was approved by the U.S. Surface Transportation Board in 2009, and PAS began operations in the spring of that year. This joint venture enhances rail competition in New England with the influence of another Class I freight railroad operating in the Commonwealth.

An important element of the joint venture is the rehabilitation of the PAS Main Line between Ayer and Mechanicville, New York. The partnership included rehabilitation of 138 miles of track, replacement ties, and the addition of over 35 miles of new rail. This effort to modernize the line, known as the Patriot Corridor, began in 2009 and included a new intermodal and auto terminal in Mechanicville, as well as expansion and improvement to the auto and intermodal facilities in Ayer. The investments in the Patriot Corridor have increased capacity and reliability to Ayer.

⁶ Approximately 13.5 miles of the Freight Main Line is owned by the MBTA as part of the MBTA Fitchburg Line in the segment from Ayer to Fitchburg.

Figure 2-5: Freight Rail Vertical Clearances

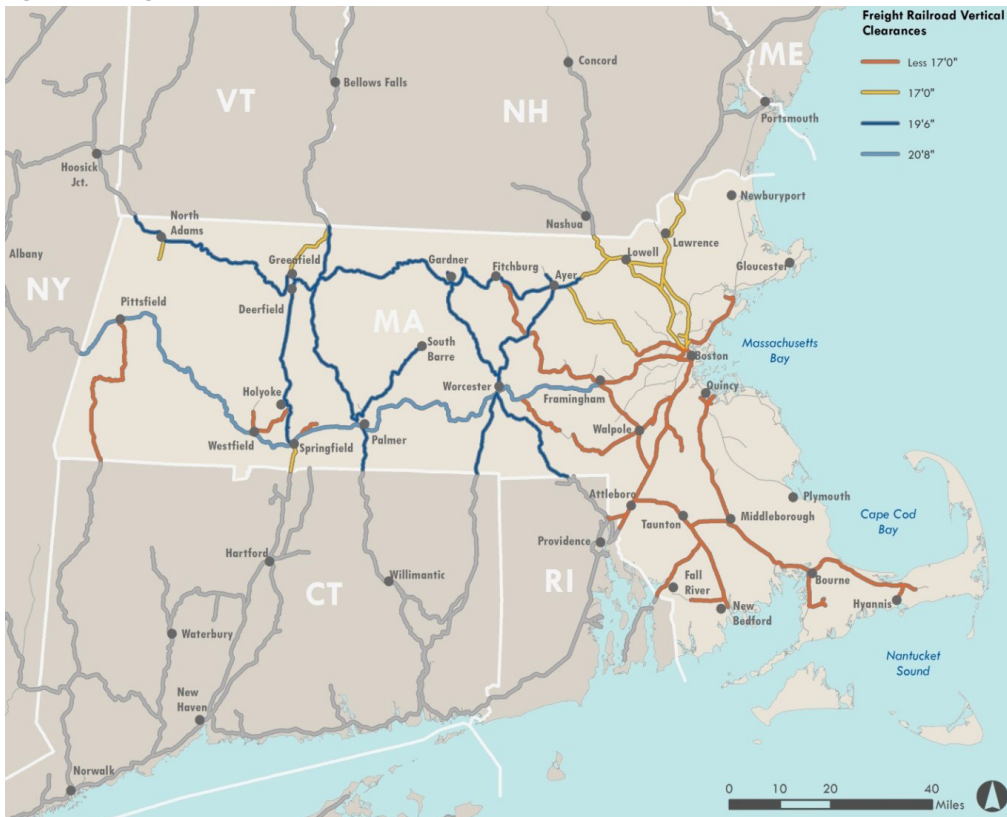
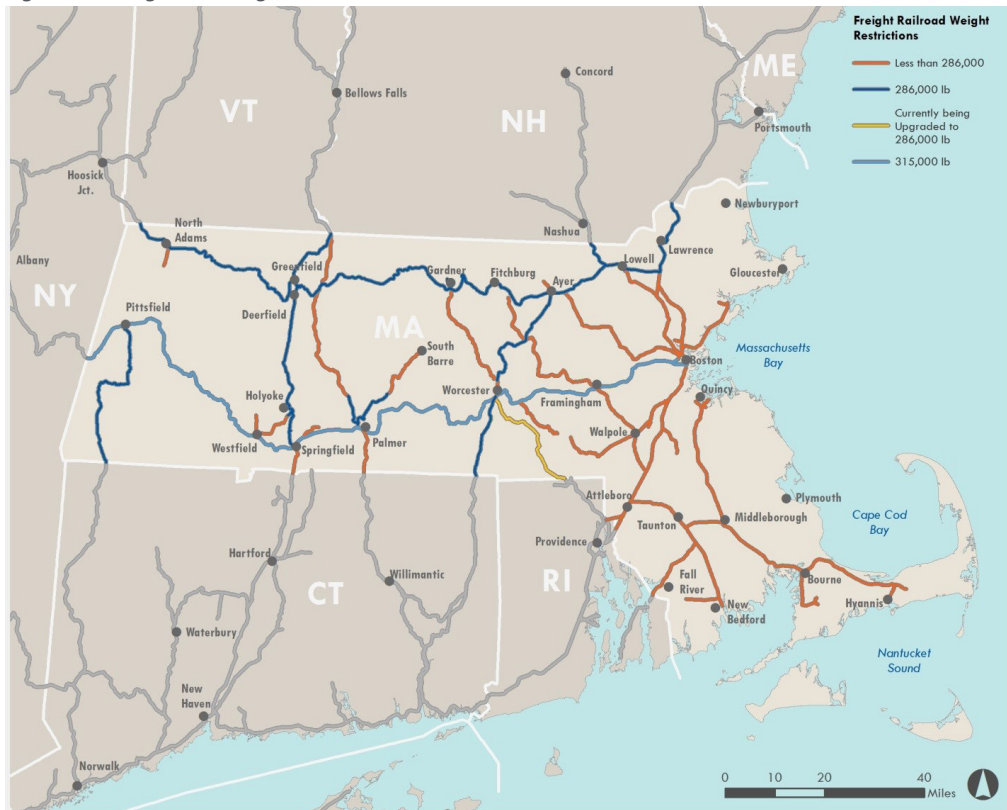


Figure 2-6: Freight Rail Weight Limits



Pioneer Valley Railroad (PVRT)

The PVRT is one of several railroads owned by the Pinsky Railroads holding company, a privately held firm. PVRT is a Class III railroad that owns and operates about 17 miles of rail ROW in and around the Westfield and Holyoke areas of western Massachusetts. PVRT also provides transloading, warehousing, and trucking services through its subsidiary firm, Railway Distribution Services (RDS) of Massachusetts. PVRT interchanges with CSX in Westfield, Massachusetts.

Providence and Worcester Railroad (PW)

The PW is a Genesee & Wyoming (GW)-owned Class II regional freight railroad operating in Massachusetts, Rhode Island, Connecticut, and New York with headquarters in Worcester, Massachusetts. The PW's rail system extends over approximately 516 miles of track regionally, of which it owns approximately 163 miles. The company has the right to use the remaining 353 miles pursuant to perpetual easements and long-term trackage rights agreements.

The PW owns about 62 miles of rail ROW in the Commonwealth, including lines running from Worcester to Gardner, and to the state line on routes to Providence, Rhode Island, and Norwich, Connecticut. The PW also has overhead⁷ trackage rights over various segments of MBTA, MassDOT and CSX-owned lines in southeastern Massachusetts to access and serve its Newport Secondary Track in Rhode Island. The PW serves two major intermodal terminals in Worcester operated by Intransit Container Inc. The PW connects with PAS in Gardner and CSX and PAR in Worcester.

PW has partnerships with NECR and Vermont Railway System, which also provide connections to the CN and CP systems. PW has also made capital improvements, most notably a \$5 million investment to rehabilitate four bridges and replace one bridge along their main line, which will provide the ability to haul 286,000 pound railcars between Worcester and Providence, Rhode Island.

FREIGHT RAIL LINE CHARACTERISTICS

Corridor Vertical Clearances in Massachusetts

Double stacked rail cars allows freight carriers to move more goods on high traffic lines; double stacking now accounts for over 80 percent of total rail freight shipments. Vertical clearances determine whether freight companies can double stack intermodal freight containers on rail cars. A minimum clearance of 20'6" is required to accommodate double stack freight.

Only the CSX line that can handle double stack freight in Massachusetts. Other rail lines require single stack operations. Figure 2-5 shows vertical freight rail clearances in Massachusetts.

Weight Limitations in Massachusetts on Rail Lines

The weight load that it is permitted along rail lines differs across the State. A lower weight limit means a less efficient use of the system. The current U.S. standard is for a rail line to accommodate rail cars weighing up to 286,000 pounds, known as the "286K" standard. A higher rating is "315K", 315,000 pounds, for moving even heavier loads. Many rail lines in Massachusetts have a weight limit of 263,000 pounds, which is lower than the national standard. This inefficiency puts Massachusetts rail customers at a disadvantage and can require the use of old rail cars that are no longer in production. The weight ratings are determined primarily by bridge and culvert strength and condition, and also track weight. A substandard rating, where a rail line fails to meet a 286K weight limit standard, causes a potentially economically productive rail line to be avoided by national carriers.

Figure 2-6 shows Massachusetts rail lines by weight rating. Of the lines shown, only the CSX line is rated at 315K. MassDOT owned Housatonic and Ware River Lines and the PAR Main Line are rated at 286K. However, the remainder of the Massachusetts freight rail network is rated at 263K.

⁷ Overhead trackage rights refer to a right to pass over the route, but do not allow service to on line industries.

Table 2-2: Ranking of Northeast Freight Rail Operations

STATE BY STATE COMPARISON					
STATE	RAIL MILES	NATIONAL RAIL MILES RANK	ANNUAL TONS (MIL)	ANNUAL CARLOADS	CARLOADS PER MILE
Maryland	758	43	89.4	2,077,900	2,741
New Jersey	981	41	43.8	1,499,900	1,529
Pennsylvania	5,151	5	189	4,356,300	846
Rhode Island	19	50	1	13,900	732
New York	3,447	14	67.9	1,679,500	487
Massachusetts	973	42	15.2	396,200	337
Vermont	590	44	6.4	148,300	251
New Hampshire	344	47	5.6	70,700	206
New England Region	3,406	15	36	728,400	202
Connecticut	364	46	2.9	31,400	86
Maine	1,116	40	5.3	67,900	61

Source: Association of American Railroads (AAR) 2012 annual statistics.

Note: National rank assigned by AAR based on total miles in each state. The New England entry is based on combining the six New England states. Annual tons refer to total freight rail tonnage volume originating or terminating in each state.

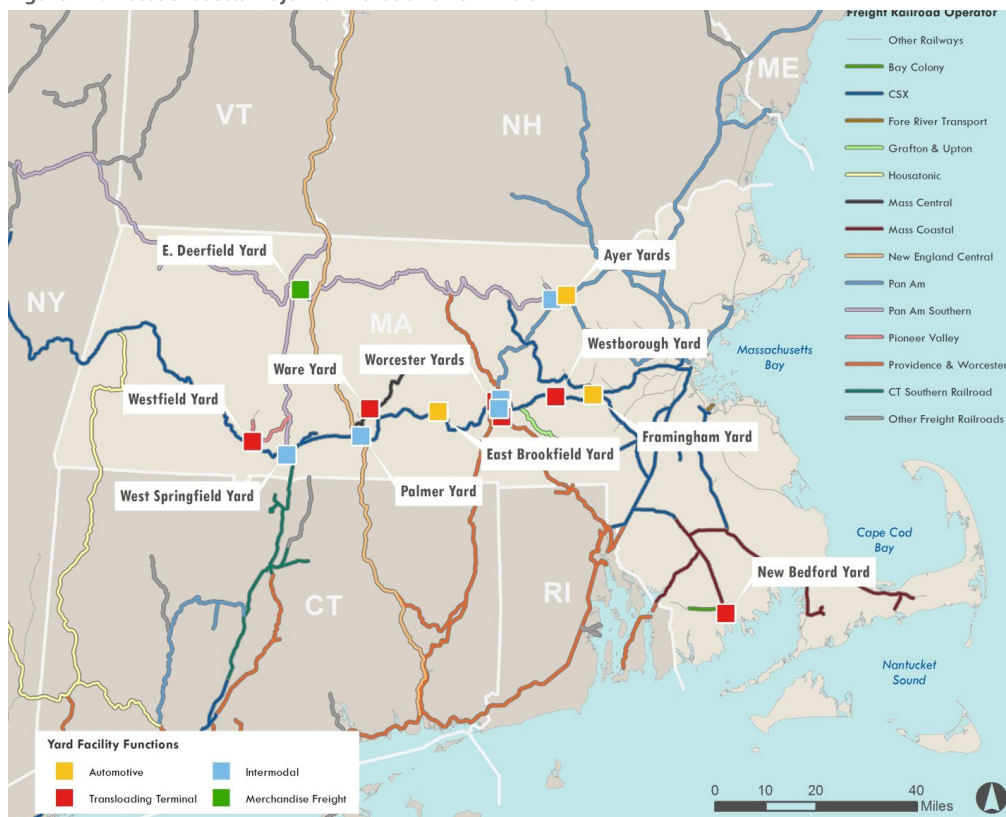
Regional Connections

Class I railroads CSX and Norfolk Southern (through joint ownership on PAS) enter New England through New York and utilize interchange points in Massachusetts for continued service to Connecticut, Maine, New Hampshire, Rhode Island, and Vermont. Additionally, the State is served by Class II railroads with service from ports in Rhode Island and Connecticut and international connections between Canada and Vermont. Massachusetts is indirectly served by CN through the NECR interchange at St. Albans, Vermont and CP through the entry points on the PAS and NECR.

Inbound shipments to New England are the largest volume of freight rail, reflecting large consumer markets, particularly in eastern Massachusetts. The second largest volume of rail activity is through-trips that start and end outside of the State, such as paper shipments from Maine destined for national markets. Most outbound shipments are empty cars. According to Freight Analysis Framework (FAF) 3.6, 2013 Provisional Data, for the Commonwealth, 8.4 percent of total rail tons are inbound, 3.8 percent are outbound, and 96.8 percent are transported within the State. Additional data related to freight rail volumes is included in Section 2.2.

Table 2-2 compares the Massachusetts freight rail system to other states in the New England region and the broader Northeast region of the United States. The table is organized by carloads per active freight rail mile, a metric that measures the relative usage of the overall network in the State.

Figure 2-7: Massachusetts Major Rail Yards and Terminals



Freight Rail Facilities

In addition to the rail lines, rail yards and intermodal terminals are essential components of the State’s freight rail infrastructure. Freight facilities provide connections between rail line operators and rail freight customers, and they provide critical integration between rail and trucks.

Freight facilities in Massachusetts are illustrated in Figure 2-7. Freight facilities are further described by type in the following section.

Intermodal Container/Trailer Terminals

Principal intermodal shipments to Massachusetts and New England are a key component of container/trailer movements on rail cars. In Massachusetts, the rail intermodal container/trailer terminals are:

- Worcester (CSX)
- Worcester (PW)⁸
- West Springfield (CSX)
- Ayer (PAS)
- Palmer (CSX/MCER)

⁸ The Worcester, MA, intermodal terminal on the P&W is also a CN intermodal terminal and is reached via a haulage agreement between CN, NECR, and P&W.

Intermodal Automotive Terminals

These facilities move automobiles off of rail cars. Once unloaded, distribution of the new vehicles to local dealers is accomplished by truck auto carriers. This type of intermodal traffic requires significant vertical clearance because vehicles are transported on automotive rack cars from manufactures or ports of entry to automotive unloading facilities. In Massachusetts, the rail terminals for new automotive unloading are:

- Ayer (PAS)
- Framingham (CSX)
- East Brookfield (CSX)

Transload Facilities

Transloading may be accomplished at any facility where modes are able to connect. Transloading freight yards and terminals in Massachusetts vary significantly in size and function. Transload facilities typically include equipment designed to move shipping containers between modes, fuel and material transfer points, storage facilities, inspection facilities, service facilities for rail equipment, and crew facilities. The key rail facilities with transloading capabilities in Massachusetts include:

- Westborough Yard (CSX)
- Worcester (CSX)
- Worcester (P&W)
- Westfield Yard (PVRT)
- Ware Yard (MCER)

Because of the wide variety in the nature of transloading operations, rail transloading facilities vary in size and level of activity. A critical consideration for transload operations is the availability of land for rail transload operations. Thus, the issues related to land use are of significant interest to transload based rail operators and users.

Seaports

Seaports can function as a transload or intermodal yard for the transfer of freight from rail to ship or truck. In Massachusetts, there are five seaports that are at least partially accessible via rail, including:

- South Boston Industrial Park (rail inactive)
- Fall River
- New Bedford
- Quincy
- Everett

There are also port freight facilities outside of Massachusetts that are critical to effective goods movement within the State. To the north, the ports of Halifax, Portland, Montreal, and Portsmouth provide essential marine and/or rail services to businesses in Massachusetts. For example, the Port of Portsmouth in New Hampshire is a major regional location for the importation of road salt for the region. To the south and west are the ports of Providence, New London, New York/New Jersey, and Albany. The largest port on the east coast is the Port of New York/New Jersey, which helps meet the import and export needs of the entire region, including all of Massachusetts. The Port of Albany and the rail reload centers in the Albany Capital District also serve Massachusetts shippers and consumers.

2.1.2 Passenger Rail Network

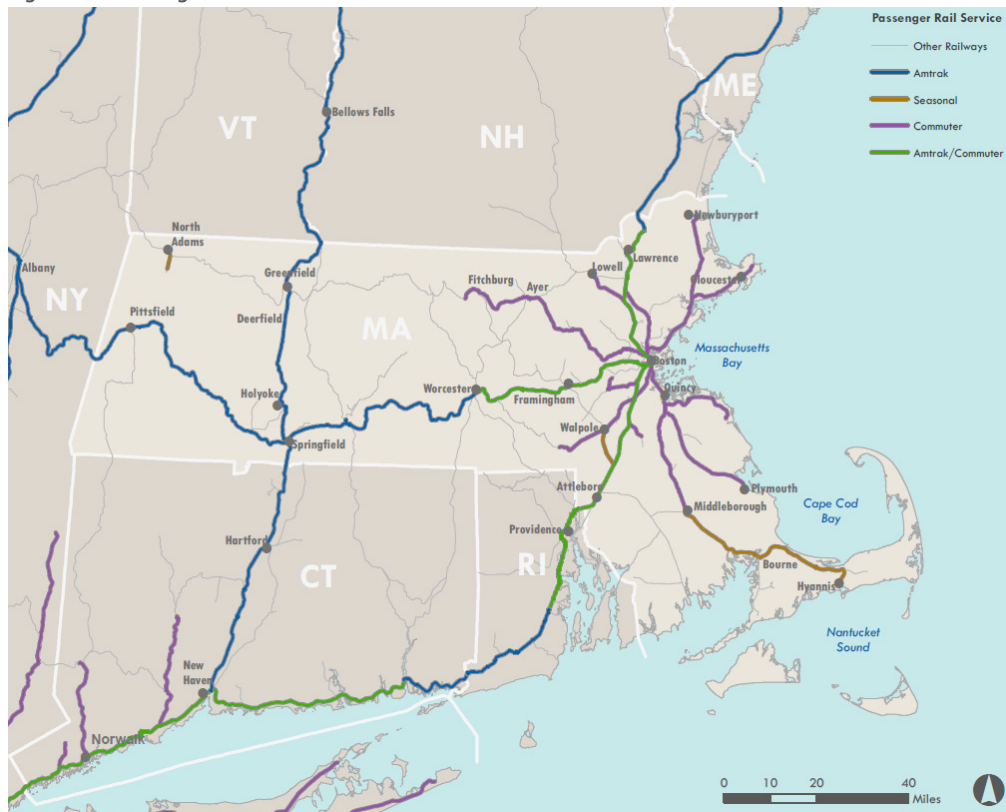
Passenger rail is important to the quality of life in Massachusetts, and provides residents with additional travel options. Robust passenger rail service has the ability to reduce congestion during the peak period, provide for more cost-effective travel, and improve safety by reducing the number of roadway fatalities and collisions. The Massachusetts passenger rail network includes intercity services, commuter rail services, and tourist railroads. Passenger rail services in Massachusetts are operated by the MBTA for commuter rail and Amtrak for intercity travel. Additionally, several tourist or seasonal railroads operate limited services in the State.

The MBTA and MassDOT are the primary owners of passenger rail infrastructure in the State. Amtrak owns a short segment between Springfield and the Massachusetts/Connecticut border. Otherwise, Amtrak has operating rights with the MBTA and along the CSX owned main line.

Passenger Rail Line Ownership

Rail lines in Massachusetts that host regular passenger rail services are owned by the Commonwealth of Massachusetts (including the MBTA), Amtrak, and CSX Corporation. There are over 650 route miles of railroad in the Commonwealth of Massachusetts over which regularly scheduled commuter rail and/or intercity passenger rail trains operate. Of the 650 miles, approximately 393 miles are part of the MBTA commuter rail system. In all, there are six distinct commuter/intercity passenger train services in Massachusetts.

Figure 2-8: Passenger Rail Network



Commonwealth of Massachusetts

The Commonwealth of Massachusetts owns all rail lines with regular MBTA Commuter Rail service in Massachusetts either through the MBTA or MassDOT.⁹ Beginning in 1972, the MBTA began to acquire rail lines in eastern Massachusetts with the purchase of rail lines south and west of Boston from the Penn Central Railroad. In 1976, the MBTA completed the acquisition of the Boston & Maine's (B&M) rail lines north and west of Boston and the rolling stock used to provide the already-subsidized commuter rail service. Additional lines were acquired by the Commonwealth of Massachusetts in the early 1980s, in order to prevent their loss through abandonment.

The Commonwealth of Massachusetts, through a 2009 agreement with CSX Corporation, purchased additional rail infrastructure in eastern Massachusetts. Ownership of rail infrastructure enabled the State to expand and improve commuter rail services. Through this agreement, MassDOT acquired CSX-owned rail lines in Massachusetts in two phases. On June 11, 2010, the Commonwealth and CSX completed the first closing of the transaction through which MassDOT acquired the South Coast Lines from CSX to support the South Coast Rail Project. With the first closing, MassDOT also acquired CSX's ownership of the Boston Terminal Running Track, West First Street Yard in South Boston, and the Grand Junction secondary line. In October 2012, the second closing of the transaction was completed during which MassDOT received the property rights from CSX along the Boston Main Line from Framingham to Worcester, allowing additional commuter rail service between Boston and Worcester.

In July 2012, the State agreed to buy the north-south line paralleling the Connecticut River from Springfield to Vermont for \$17 million from PAS. The purchase enabled the State to improve the right-of-way through speed upgrades, improved signal systems, and new stations at Holyoke, Northampton, and Greenfield.

On June 17, 2015, MassDOT completed the acquisition of Framingham Secondary Rail Line, a 21-mile segment of rail that connects Framingham and Mansfield. The line was purchased from CSX Corporation for \$23 million.¹⁰ The purchase of this line provides redundancy for the MBTA system, supports existing needs for freight transport and creates potential for future pilot of passenger service.

The proactive nature of the Commonwealth of Massachusetts' rail policies and programs has also allowed MBTA to grow and expand commuter rail services throughout eastern Massachusetts. MBTA ownership of railroad lines has facilitated Amtrak expansion of the Downeaster and the improvements to the NEC.

⁹ The MBTA operates on the Amtrak owned NEC in Rhode Island.
¹⁰ MassDOT News & Updates. 6/17/15. <https://www.massdot.state.ma.us/main/tabid/1075/ctl/detail/mid/2937/itemid/578/MassDOT-Completes-Acquisition-of-Framingham-Secondary-Rail-Line.aspx>

Amtrak

In Massachusetts, Amtrak owns the six miles of the Springfield Line that are located within the State. The line provides the connection between Springfield and New Haven, Connecticut. The remainder of Amtrak services in Massachusetts operates on rail lines owned by either CSX or the Commonwealth of Massachusetts.

In August of 2017, Amtrak and the Massachusetts Bay Transportation Authority (MBTA) reached a new agreement governing the operation, maintenance and use of the 37.9-mile Attleboro Line, between Boston and the Rhode Island state line. This line is owned by the MBTA, but is a part of the Northeast Corridor Amtrak service. The agreement has Amtrak providing maintenance-of-way and dispatching services on the line through 2021. The MBTA now assumes responsibility for directing the capital program on the Attleboro Line. MBTA and Amtrak will contribute to capital projects and operating costs in a manner consistent with PRIIA and the Cost Allocation Policy. The Commonwealth and the MBTA will work collaboratively with Amtrak to ensure the proper long-term success of the line.

Private Sector Routes Hosting Passenger Rail

The single line in Massachusetts hosting passenger rail and not owned by a government entity or passenger company is the CSX-owned line between Worcester and the Massachusetts/New York border. The line hosts one daily Amtrak Lake Shore Limited round-trip and the line is maintained and dispatched by CSX.

Intercity Rail Services

Long distance intercity passenger rail service in the United States is provided by Amtrak. Amtrak’s national passenger rail system currently covers over 21,300 miles and serves more than 500 destinations in 46 states. During federal fiscal year 2017, 31.7 million passengers rode Amtrak, an increase of 1.5 percent over fiscal year 2016 ridership. The Northeast Corridor (NEC), State supported service, and long-distance routes all had an increase in ridership.¹¹

Amtrak has five routes in Massachusetts, including Acela, with the majority of ridership and services on the NEC between Boston and the Massachusetts/Rhode Island border. The NEC supports Amtrak’s Northeast Regional Service and Acela Express services between Boston and Washington, D.C. (with some Northeast Regional services continuing south to points in Virginia). In Massachusetts, the train makes three station stops; namely at South Station, Back Bay and Route 128. The services use the MBTA-owned corridor between Boston and the Massachusetts/Rhode Island border, which is also shared with MBTA Commuter Rail services. The total distance for the NEC from Boston to Washington, D.C. is 457 miles, with 38 miles in Massachusetts.

¹¹ Amtrak Sets Ridership, Revenues, and Earnings Records. News Release. November 16, 2017. <https://media.amtrak.com/2017/11/amtrak-sets-ridership-revenue-and-earnings-records/>

In Massachusetts, there were in total 3.29 million riders in fiscal year 2017, an increase of 0.9 percent from fiscal year 2016.¹² In addition to providing service to residents and visitors, Amtrak employed 708 Massachusetts residents in fiscal year 2017.¹³ Amtrak provides service to 13 stations in Massachusetts.

Amtrak Lines in Massachusetts

Table 2-3 summarizes key statistics about the Amtrak services and routes in Massachusetts. Some stations are served by more than one route.

¹² Amtrak Fact Sheet, Fiscal Year 2017. State of Massachusetts. <https://www.amtrak.com/content/dam/projects/dotcom/english/public/documents/corporate/statefactsheets/MASSACHUSETTS17.pdf>

¹³ Amtrak Fact Sheet, Fiscal Year 2017. State of Massachusetts

Table 2-3: Amtrak Intercity Rail Network Summary

AMTRAK INTERCITY RAIL NETWORK SUMMARY						
ROUTE	DISTANCE (MI.)	NUMBER OF STATIONS SERVED IN MA	NUMBER OF TRAINS PER WEEKDAY	ANNUAL MASSACHUSETTS BOARDINGS/ALIGHTINGS	FRA CLASS OF TRACK	LINES SHARED WITH FREIGHT TRAFFIC
Acela/Regional Northeast Corridor	457	3	38	2,552,000	VI	Y
Downeaster	145	3	10	485,000	IV	Y
Lake Shore Limited	1,017	6	2	67,100	IV	Y
Vermonter	606	4	2	24,700	IV, III	Y

Source: Amtrak Fact Sheet Fiscal Year 2016; National Association of Railroad Passengers, Ridership Statistics by Route

Figure 2-9: Amtrak Intercity Passenger Rail Corridor Routes Serving Massachusetts



Figure 2-9 provides an overview of the Amtrak lines operating in Massachusetts and that extend to neighboring states, including the Vermonter, Northeast Regional, Lake Shore Limited, and Downeaster. Several of these routes are state-supported. State financial support can be assigned between states that are under contract with Amtrak through terms established by the Passenger Rail Investment and Improvement Act of 2008 (PRIIA). PRIIA provides the framework for Amtrak and states to provide passenger rail service on state-supported routes through Section 209 of the legislation, on standard operating and capital costs for state-supported services.

Northeast Corridor

Amtrak operates 19 round trips on the NEC originating in Boston; other Amtrak NEC services originate or terminate at points south and west of Boston, such as New York City. In 2016, total Northeast Regional ridership was 8,267,188 passengers and Acela ridership was 3,439,363 passengers.¹⁴

New Haven-Springfield Services

The New Haven-Springfield corridor hosts Amtrak’s New Haven-Springfield Shuttle (Shuttle) service, a state-supported service between New Haven and Springfield, and Northeast Regional, with services between Springfield to Washington, D.C. In Massachusetts, the corridor has one station stop at Springfield. The service uses the Amtrak-owned corridor between the Connecticut/Massachusetts border and Springfield and the CSX-owned corridor in the vicinity of Springfield Union Station. The total distance for the New Haven-Springfield corridor is 63 miles, with six miles in Massachusetts.

The Shuttle has four weekday and five weekend round trips between New Haven and Springfield. Shuttle schedules are synchronized with Northeast Regional services in New Haven to provide connections to New York City and points south. In 2015, total Shuttle ridership was 351,307 passengers.¹⁵ State financial support for the service is allocated between Massachusetts and Connecticut under contract with Amtrak through terms established by PRIIA. Additionally, Amtrak operates one Northeast Regional round-trip from Springfield to Washington, DC.

14 Amtrak Fact Sheet. 2017. <https://www.narprail.org/site/assets/files/1038/trains-1.pdf>

15 Amtrak Fiscal Year 2015 Ridership and Revenue (10/01/14-9/30/15). http://media.amtrak.com/wp-content/uploads/2015/10/FY15Ridership_Revenue_Fact_Sheet_11-5-15.pdf

Vermonter

The Vermonter is a state-supported (PRIIA Section 209) Amtrak service between Washington, D.C. and St. Albans, Vermont. In Massachusetts, the train makes stops at Springfield, Holyoke, Northampton, and Greenfield. The service uses the Amtrak-owned corridor between the Connecticut/Massachusetts border, the CSX-owned corridor in the vicinity of Springfield Union Station, and the MassDOT-owned corridor between Springfield and the Massachusetts/Vermont border. The total distance for the Vermonter is 606 miles, with 56 miles in Massachusetts.

The Vermonter has one round-trip daily between Washington and St. Albans. In 2016, total Vermonter ridership was 88,006 passengers.¹⁶ State financial support for the service is allocated between Massachusetts, Vermont and Connecticut under contract with Amtrak.

Lake Shore Limited

The Lakeshore Limited is a long distance Amtrak service between Boston and Chicago, Illinois. In Massachusetts, the train makes stops at Boston (South Station and Back Bay), Framingham, Worcester, Springfield, and Pittsfield. The service uses the MBTA-owned corridor between Boston and Worcester and the CSX-owned corridor between Worcester and the Massachusetts/New York border. The total distance for the Lake Shore Limited is 1,017 miles, with 162 miles in Massachusetts.

The Lake Shore Limited has one round-trip daily between Boston and Chicago. In Albany, New York, the Boston-originating train is combined with a New York City-originating train for the remainder of the journey to Chicago. In 2016, total Lake Shore Limited ridership was 382,238 passengers.¹⁷

Downeaster

The Downeaster is a state-supported Amtrak service between Boston and Brunswick, Maine. In Massachusetts, the train makes station stops at Boston (North Station), Anderson/Woburn Station, and Haverhill. The service uses the MBTA-owned corridor between Boston and the Massachusetts/New Hampshire border. The total distance for the Downeaster is 145 miles, with 37 miles in Massachusetts.

The service has five daily round trips between Boston and Portland, Maine, with two trips continuing to Brunswick. In 2016, Downeaster ridership was 494,712 passengers.¹⁸ Amtrak operates the Downeaster as a state-supported service under contract with Northern New England Passenger Rail Authority (NNEPRA). NNEPRA was created in 1995 by the State of Maine and administers Downeaster operations and subsidies.

Recent/Active Intercity Rail Projects

The intercity rail system in Massachusetts continues to expand and improve services through infrastructure enhancements. This section describes recent and active intercity rail projects.

Knowledge Corridor

Amtrak currently operates the Vermonter service, providing a daily round-trip between St. Albans, Vermont, and Washington, D.C through Springfield, Massachusetts. The Knowledge Corridor project restored Amtrak’s intercity passenger train service to its original route by relocating the Vermonter from the NECR mainline to its former route on the Connecticut River Line (from Springfield to East Northfield, Massachusetts), a more direct route that improves travel times. As well, three intercity rail stations in Greenfield, Northampton, and Holyoke have all opened.

¹⁶ Amtrak Fact Sheet: Vermont Service. 2017. <https://www.narprail.org/site/assets/files/1038/trains-1.pdf>

¹⁷ Amtrak Fact Sheet: Lake Shore Limited Service. 2017. <https://www.narprail.org/site/assets/files/1038/trains-1.pdf>

¹⁸ Amtrak Fact Sheet: Downeaster Service. 2017. <https://www.narprail.org/site/assets/files/1038/trains-1.pdf>

The program was the result of a joint undertaking between MassDOT, Vermont Agency of Transportation (VTrans), PAS, and Amtrak. Additionally, the Pioneer Valley Planning Commission (PVPC), as the regional planning agency, provided planning and stakeholder coordination support. The Knowledge Corridor improvements were awarded a \$75 million High Speed Intercity Passenger Rail (HSIPR) grant in addition to funds that MassDOT spent to rehabilitate 49 miles of track and construct two stations for the Vermonter train service in Western Massachusetts. Additionally, MassDOT and the City of Holyoke constructed a third new rail station in Holyoke. This project was complemented by other FRA HSIPR awards in Connecticut and Vermont, which included additional improvements to the New Haven - St Albans corridor. The Vermonter has been operating its revenue service on the Knowledge Corridor since December 29, 2014. Springfield Union Station has also been under renovation with significant state and Federal financial support. Completion of a new high level platform is planned for 2018. The renovated Springfield Union Station integrates multiple transit modes in one terminal complex.

New Haven – Hartford –Springfield (NHHS) High-Speed Intercity Passenger Rail (HSIPR) Project

The New Haven-Hartford-Springfield (NHHS) HSIPR Project is a partnership between Amtrak, FRA, and CTDOT, to improve rail services on the Amtrak-owned line between Springfield and New Haven. The first phase of the program, led by CTDOT and currently under construction, began in 2012. The initial phase includes sufficient double-tracking and infrastructure upgrades from New Haven to Hartford to increase line capacity from six to 17 daily round trips between New Haven and Hartford and 13 daily round trips between Hartford and Springfield. The expected date for completing construction and launching the commuter rail service is May 2018.¹

The long-term vision of the NHHS program is to substantially increase capacity and speed on the NHHS corridor, permitting additional passenger rail service expansion to New York, Massachusetts, and possibly Vermont. Planned improvements will allow 25 daily round trips between Springfield and New Haven with trains operating up to 110 mph. The faster speeds and improved capacity will reduce travel time between Springfield and New Haven from 90 minutes to 79 minutes.²

1 New Haven-Hartford-Springfield Rail Program. <http://www.nhhsrail.com/objectives/schedule.aspx>

2 New Haven-Hartford-Springfield Rail Program. NHHS Vision Factsheet. http://www.nhhsrail.com/info_center/library.aspx

2.1.3 Amtrak Intercity Rail Service Performance Evaluation

The following section provides an evaluation of intercity passenger rail service performance within Massachusetts. Metrics used to evaluate service include ridership, passengers per train mile, and on-time performance for intercity services in Massachusetts.

Ridership

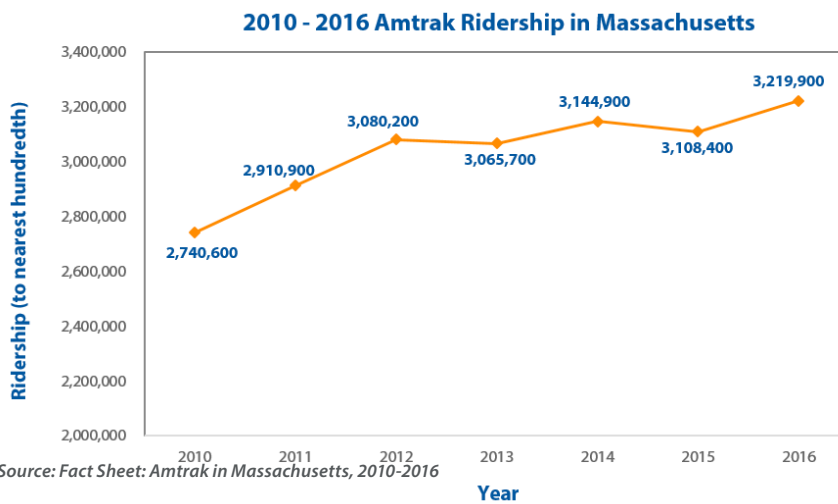
Intercity passenger rail service in Massachusetts is provided by Amtrak. In 2017, Amtrak provided intercity services at 13 stations in the State. Service at these stations includes Acela Express, Northeast Regional, Downeaster, Vermonter and Lake Shore Limited.

Figure 2-10 shows the ridership change at all Massachusetts stations from 2010 to 2016, there has been an overall 17.5 percent increase in ridership; most of the increase occurred between 2011 and 2012 with ridership growing at a slower pace over the past four years.

Much of the ridership growth is due to gains in passengers along the NEC Corridor. Meanwhile, other services in Massachusetts have experienced lower ridership due to interim operational issues, such as construction outages, that have impacted total annual ridership volumes.

The Knowledge Corridor program has overall positive results, despite the complications in the interim, with the need for bus service in Connecticut and construction activity at Springfield Union Station. As complicating factors become resolved, the new station facilities and a more direct route for the Vermonter service is expected to benefit patronage over the long-term. A shifting of ridership on the Vermonter was also expected, as three new stations were added, and one (Amherst) eliminated. Ridership from the existing Amherst station has been distributed between the Greenfield, Holyoke and Northampton Stations.

Figure 2-10: 2010 – 2016 Intercity Passenger Rail Ridership in Massachusetts



Source: Fact Sheet: Amtrak in Massachusetts, 2010-2016

Table 2-4: FY 2013 – FY 2017 Annual Ridership per Station

FY 2013 – FY 2017 ANNUAL RIDERSHIP PER STATION					
SERVICE	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Pittsfield	7,656	7,541	7,468	7,827	8,464
Greenfield	-	-	5,316	5,920	6,290
Northampton	-	-	11,923	17,332	19,974
Holyoke	-	-	96	1,203	1,487
Amherst	13,357	14,124	4,206	-	-
Springfield	141,947	135,243	124,580	93,650	89,629
Worcester	9,552	8,439	7,237	6,152	6,665
Framingham	2,674	2,154	1,963	1,892	1,954
Route 128 (Boston)	426,032	436,359	444,670	450,301	448,784
Haverhill	44,660	38,481	34,857	44,510	44,827
Woburn	19,573	22,754	16,901	21,485	18,953
Boston-North Station	475,447	433,060	358,286	424,600	448,483
Boston-Back Bay	540,770	566,892	578,403	611,527	626,003
Boston-South Station	1,434,148	1,491,095	1,544,169	1,574,450	1,567,627
TOTAL	3,115,816	3,156,142	3,140,075	3,260,849	3,289,140

Source: Amtrak Fact Sheet, Fiscal Year 2013-2017 State of Massachusetts³

Table 2-5: Passenger - Miles per Train - Mile

PASSENGER - MILES PER TRAIN - MILE								
SERVICE	2009	2010	2011	2012	2013	2014	2015	2016
Amtrak Downeaster	91	98	104	100	93	95	88	84
Amtrak Vermonter	130	147	142	133	138	137	139	137
Amtrak Lake Shore Limited	215	218	248	242	231	235	218	201
Amtrak NEC (Boston – Washington)	192	199	213	220	223	221	225	229
Amtrak NEC (New Haven – Springfield)	109	117	123	119	113	116	111	116

Source: PRIAA Section 207 - FRA Rail Service Metrics and Performance Reports

³ Starting in August 2015, Amtrak replaced trains with buses from New Haven to Springfield to provide for longer construction windows. As a result, ridership had declined along the Knowledge Corridor, while construction was accelerated for the New Haven Hartford Springfield Project. The busing ended on January 2nd 2018. Ridership is expected to increase over pre-construction levels as a result of the improvements from the project. Increased service is expected in 2018, along with the recent return of train service.

Passenger-Miles per train-mile

Part of what the passenger-miles per train-mile metric shows is the distance that the trains are used by customers. Along the Lake Shore Limited and the NEC from DC to Boston longer-distance trips are common, whereas the distances passengers travel along the other Amtrak routes are typically shorter. A passenger-mile is defined as one passenger traveling one mile and a train-mile is one train moving one mile. Passenger-miles per train-mile are calculated by the total passenger —miles divided by the total train-miles. Total passenger miles per service are listed in Table 2-5.

On-time Performance

On-time performance measures how a train performs compared to the published schedule at each station from the origin station to the final destination station. Amtrak considers a train to be on-time if it arrives at the end point terminal or intermediate stations within:

- 10 minutes for routes 250 miles or less in distance;
- 15 minutes for routes 251–350 miles;
- 20 minutes 351–450 miles in distance;
- 25 minutes 451–550 miles in distance; and
- 30 minutes for routes greater than 550 miles.⁴

Table 2-6 shows end point and all station on-time performance for the third quarter of FY 2017 to help illustrate how close these services are to achieving these standards. Note that quarterly on-time performance numbers can vary significantly across the year.

The Downeaster, for example, used to experience an extremely low on-time performance in May, June and July 2014 due to crews performing track repairs in northern Massachusetts. 12.1 percent of Downeaster trains were considered on-time. The majority of construction activities were completed by the summer of 2016, allowing regular services to resume. However, with the majority of construction activities completed by 2015, end point on-time performance has increased to 78.1 percent in 2017.

Table 2-6: 3rd Quarter FY 2017 On-Time Performance

3RD QUARTER FY 2017 ON-TIME PERFORMANCE		
SERVICE	END POINT ON-TIME PERFORMANCE	ALL STATION ON-TIME PERFORMANCE
Amtrak Downeaster	78.1%	92.5%
Amtrak Vermonter	64.3%	63.3%
Amtrak Lake Shore Limited	39.4%	39.1%
Amtrak NEC	71.1%	77.5%

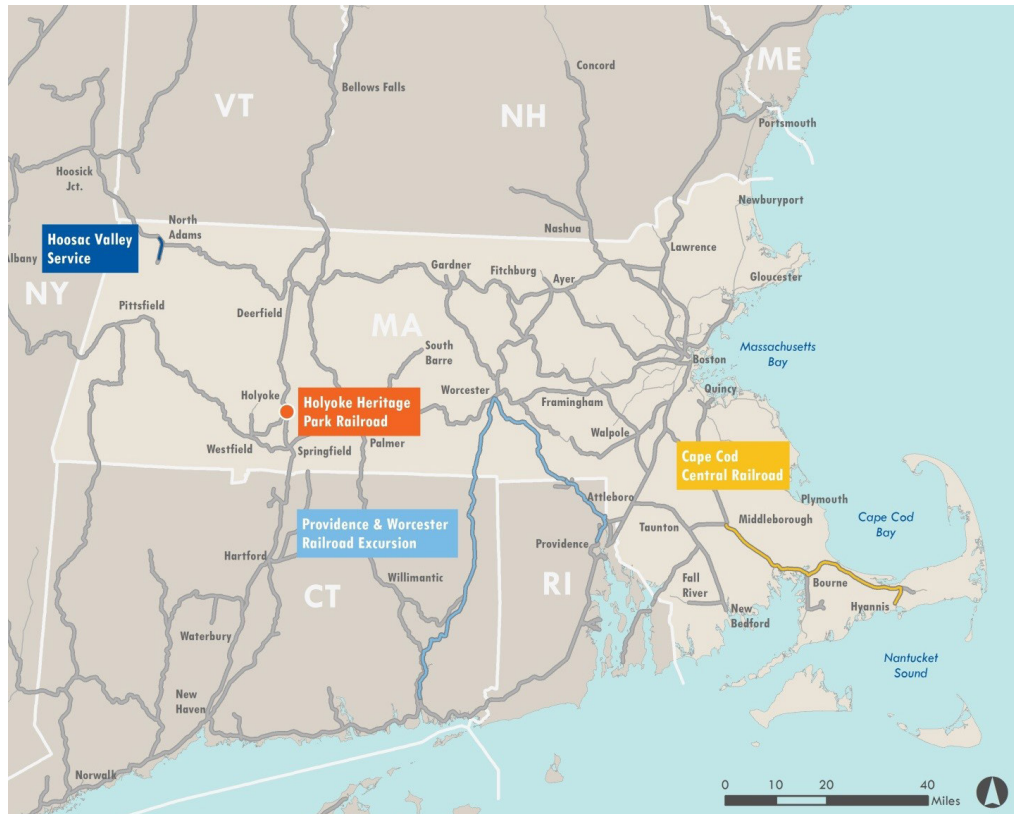
Source: PRIAA Section 207 - FRA Rail Service Metrics and Performance Reports

Cause of Delays

Delays along the corridors can be caused by the host railroad, Amtrak itself, or for other reasons unrelated to the railroads. These delays result in a decrease of on-time performance. Common delays faced by Amtrak trains include slow order delays, freight train interference, and commuter rail and other passenger train interference. There are also other miscellaneous delays that can occur, which taken together can greatly reduce on-time performance. Lower on-time performance records can lead to declines in ridership, given expectations of reliability for different travel options can greatly influence individual travel patterns.

4 "Amtrak On-Time Performance." Bureau of Transportation Statistics, U.S. Department of Transportation, http://www.rita.dot.gov/bts/publications/multimodal_transportation_indicators/2013_02/system_performance/amtrak_on_time

Figure 2-11: Tourist Railroads in Massachusetts



Source: MassGIS and HDR

Tourist Railroads

There are four tourist railroads operating in Massachusetts, as shown in Figure 2-11. With the exception of the Holyoke Heritage Park Railroad, these tourist services utilize the same tracks and systems as freight railroads, except that they operate during periods when freight rail is not in operation or service is limited.

Tourist Railroads fill a unique niche within the state’s transportation network by leveraging the nostalgia of historic train travel and utilizing existing railroad infrastructure to bring economic activity to communities. The figure above shows the location of the Tourist Railroad services in Massachusetts.

The Berkshire Scenic Railway

The Berkshire Scenic Railway Museum, Inc. (BSRM) is based in Lenox and is an all-volunteer, not-for-profit 501(c) 3 organization founded in 1984. Until 2011, the museum operated tourist passenger service over an 11-mile segment of the Housatonic Railroad utilizing a temporary MassDOT-owned passenger easement. Beginning in late 2015, the museum started offering a tourist rail service on the Adams Branch between North Adams and Adams. This service, called the Hoosac Valley Service, started providing intermittent service in late 2015 with hopes of offering more regular weekend service during 2016. The line it operates along is utilized on the weekends exclusively by the BSRM while the line's freight operator, PAS, serves customers along the line on weekdays. The line is owned by MassDOT.

Cape Cod Central Railroad

Cape Cod Central Railroad operates tourist and dinner train services on state-owned rail lines (approximately 24 miles) on Cape Cod through a license and operating agreement with MassDOT. Operating primarily in spring, summer and fall, the service operates under a shared rail use freight and passenger agreement with the Commonwealth. Freight operations on the same track segment are conducted by the Massachusetts Coastal Railroad. The MBTA also provides seasonal service to Cape Cod via the Cape Flyer train. The Cape Flyer is a passenger rail service between Boston and Hyannis that operates on the weekends in the summer months between Memorial Day and Labor Day.

Providence & Worcester Railroad

The Providence & Worcester Railroad (PW) offers occasional excursion trips utilizing its equipment and track on private railroad property. The PW excursion train operates from Worcester to Blackstone Valley and to Providence, Rhode Island, on existing freight main line tracks only. This private operation does not affect other passenger operations within the Commonwealth.

Holyoke Heritage Park

The Holyoke Heritage Park used to operate tourist railroad service in the 1980's and 1990's during the summer and fall season, but has not offered regularly scheduled service since 1996. Since that time, Pioneer Valley Railroad has provided service to the Heritage Park during special events such as the annual Polar Express train during the holiday season.

2.1.4 Programs and Projects to Improve Safety and Security

Safety and security are paramount considerations for public and private passenger and freight rail operators in Massachusetts. This section describes recent and active safety and security enhancements that are common for the passenger and freight rail systems and continues with sections that describe considerations individual to each type of rail.

Along both passenger and freight rail lines maintaining a state-of-good-repair (SGR) is important across a variety of investments, including: grade crossings, track improvements and along railroad right-of-way. Between 2012 and 2016, MassDOT has installed more than 249,000 railroad ties and resurfaced nearly 150 miles of track.

Safety and Security Issues Common to Both Passenger and Freight Rail

Positive Train Control: Passenger and Shared Freight Operations

In 2008, Congress required that major passenger and freight railroads in the United States implement positive train control (PTC) to improve safety and reliability on the nation's passenger rail networks. Class 1 freight railroads must comply when they carry particular types and amounts of potentially toxic commodities; intercity and commuter rail providers must also comply when service is at a certain level of frequency and regularity. MBTA seeks to have full PTC implementation by December 31, 2020 across its entire commuter rail system, which includes upgrades to signal infrastructure and systems on trainsets.¹

Highway-Rail Grade Crossing Safety at Passenger and Freight Corridors

Safety concerns at intersections with at-grade rail/road crossings include considerations for vehicular, pedestrian, and bicycle users. Although the number of crossing accidents are fewer than vehicular accidents, the consequences are typically more severe due to the weight and speed of rail equipment involved.

In Massachusetts, the Department of Public Utilities (DPU) has responsibility and regulatory authority for grade crossing safety at all public highway-railroad grade crossings. Federal funds are available under Section 130 of federal surface transportation law to assist in eliminating or mitigating hazards at public highway-railroad grade crossings. The MassDOT Highway Division administers these funds and works with the railroads and communities to identify and construct priority projects.

The MassDOT Grade Crossing Program focuses on improving safety at existing highway-railroad grade crossings primarily through the installation of warning devices. Such devices include: standard signs and pavement markings; installation or replacement of active warning devices (flashers and gates); upgrading active warning devices, including track circuitry improvements and interconnections with highway traffic signals; crossing illumination; crossing surface improvements; and general site improvements.

Ultimately, the safest option regarding highway-rail grade crossings is to eliminate them, thereby removing the possibility of crashes. While in some cases it may be impractical or too costly to close crossings, such an objective can be achieved via crossing consolidation, and/or grade separation. MassDOT tried to reduce the number of highway-railroad grade crossings on public thoroughfares. Dozens of highway-railroad grade crossings have been permanently closed under this initiative since 2011.

There are 1,430 highway-rail grade crossings in Massachusetts, of which 832 were operationally active grade crossings located at public roads. Of these crossings, 123 utilize passive protection devices, (e.g., stop signs or cross buck signs). All other locations use active warning devices (e.g., lights, bells or gates). Maintenance and repair of highway-railroad grade crossing warning device equipment are the responsibility of the railroad owner. The FRA has established minimum inspection requirements for railroad maintenance of the warning systems, and each operating railroad is responsible for inspecting crossing system signals and equipment. Grade crossings that are not operational are for lines without active service.

Table 2-7 shows that from 2014 to September 2017, there have been a total of 43 incidents at highway-rail crossings in Massachusetts, of which 8 were fatal.

¹ In a presentation to the Fiscal Management Control Board (FMCB) in August 2016 the MBTA showed total PTC program costs as just over \$459M. http://www.mbta.com/uploadedfiles/About_the_T/Board_Meetings/PTC-Jacobs-for-FMCB-8-1-16.pdf

Table 2-7: Total Highway-Rail Crossing Incidents

TOTAL HIGHWAY-RAIL CROSSING INCIDENTS	
YEAR	AT PUBLIC CROSSING
2014	13
2015	12
2016	10
2017	8

TOTAL FATAL: 8
TOTAL NONFATAL: 35
TOTAL: 43

Source: U.S. Department of Transportation, Federal Railroad Administration (FRA), Railroad Safety Statistics, Sep. 2017

Publicly Funded Safety and Security Projects

Similar to most states, Massachusetts participates in the Section 130 highway-rail grade crossing program, which is focused on improving the safety, security and operations of grade crossings to minimize the potential for accidents between rail and highway traffic. This funding sometimes is used to add new or improved grade crossing equipment such as signals but can also be used to help fund separation of rail and highway (e.g., roadway overpass). Massachusetts Section 130 expenditures on upgrading the safety and reliability of grade crossing projects from 2012 to 2017 are approximately:

- 2012 - \$2,347,000
- 2013 - \$2,410,000
- 2014 - \$2,425,000
- 2015 - \$8,778,000²
- 2016 - \$6,516,112
- 2017 - \$3,705,480

Some of the railroads receiving Section 130 funding for grade crossing projects over the past 6 years include: Bay Colony Railroad, Grafton & Upton Railroad, Pan Am Railways, Mass Central Railroad, Providence and Worcester, Mass Coastal Railroad, CSX, Housatonic Railroad, and New England Central Railroad.

² The large jump in funding for this program is due to federal legislation that increased funding for a limited period.

MBTA Safety Performance Monitoring

Safe operation of the MBTA's commuter rail trains, as well as the safety of passengers and employees using the system and working in the system, is the primary responsibility of Keolis Commuter Services (KCS). Since July of 2014, Keolis' operation of the MBTA system has been governed by a FRA Safety Compliance Agreement.

The agreement is a voluntary pact, suggested by the FRA, as a means of improving the overall safety of Keolis' activities. The Safety Compliance Agreement calls for enhanced safety reporting and recordkeeping, more training, and a greater emphasis on the supervision of employees. Safety monitoring of Keolis is also performed by the MBTA's Safety and Railroad Operations Departments and periodically by external organizations.

Safety and Security of Freight Rail

The Surface Transportation Board (STB), Federal Railroad Administration (FRA), and the U.S. Department of Homeland Security (DHS) are the primary overseers of freight rail security in Massachusetts. According to federal law, state and local laws and regulations are “preempted for railroad operations in order to ensure uniform regulation of railroad operations and to safeguard interstate commerce.”³ The rules and regulations included in this section primarily deal with federal rather than state-specific safety and security procedures.

A freight rail security consideration for communities near freight rail corridors is the transportation of hazardous materials. This section will discuss hazardous material shipments, freight safety and security plans, and state and local preparedness for freight rail emergencies.

Hazardous Materials

Railroads are required to comply with federal regulations regarding safety and hazardous materials handling and reporting requirements. There are numerous safety and security concerns related to the movement and handling of these hazardous materials, particularly when these movements are within close proximity to populated areas and on the State’s rail lines, which are shared with passenger service.

Under authority delegated by the U.S. Secretary of Transportation, the FRA administers a safety program that oversees the movement of hazardous materials.

The FRA’s current hazardous materials safety regulatory program includes the following items:

- Hazardous Materials Incident Reduction Program;
- Tank Car Facility Conformity Assessment Program;
- Tank Car Owner Maintenance Program Evaluations;
- Spent Nuclear Fuel and High-Level Nuclear Waste Program;
- Railroad Industrial Hygiene Program;
- Rulemaking, Approvals, and Exemptions;
- Partnerships in Domestic and International Standards-Related Organizations (e.g., AAR, American Society of Mechanical Engineers (ASME), Transportation of Dangerous Goods/Canadian General Standards Board (TDG/CGSB); and
- Education, Safety Assurance, Compliance, and Accident Investigation.

Freight Rail Carrier Emergency Safety and Security Plans

All facilities and shippers of hazardous materials are required to submit safety and security plans to DHS.⁴ In Massachusetts, hazardous chemicals are transported on both state and privately-owned rail lines. Companies with hazardous materials shipments in Massachusetts would therefore be required to follow this regulation.

³ “Report on the Safety Impacts of Ethanol Transportation by Rail.” Massachusetts Department of Transportation, March 29, 2013. http://www.massdot.state.ma.us/Portals/17/docs/CompletedStudies/EthanolStudyFinalReport_03.29.2013.pdf

⁴ “Report on the Safety Impacts of Ethanol Transportation by Rail.” Massachusetts Department of Transportation, March 29, 2013. http://www.massdot.state.ma.us/Portals/17/docs/CompletedStudies/EthanolStudyFinalReport_03.29.2013.pdf

Existing Emergency Response Capabilities in Massachusetts

While the safety and security of freight movements is regulated by the Federal Government, local and state governments have the need to respond to any incidents that occur on rail lines.⁵ Therefore, while states and municipalities are generally not privy to the specifics of freight transportation in their communities, they must be prepared to address emergencies on freight-related lines. In the event of a major incident on a freight rail line in the Commonwealth, local fire and police departments would be the first to respond.⁶

Safety and Security of Passenger Rail

Railroad and transportation agencies implement a wide array of safety plans and programs to comply with safety regulations that govern the railroad industry. While federal law is the primary source for railroad regulations, Massachusetts also has state-specific safety and security programs.

Federal Rules and Standards

FRA has developed model state legislation on sight distance at passive crossings; highway-rail grade crossing violations by motorists; railroad trespass prevention; and railroad vandalism prevention.

Current FRA safety initiatives include the Railroad Safety Advisory Committee’s (RSAC) Task Statement to prevent railroad employee distractions caused by personal electronic devices; Positive Train Control (PTC) legislations and regulations requiring certain railroads to implement PTC system; FRA’s rule for certification of conductors as required by the Rail Safety Improvement Act of 2008; and the Hours of Service Laws (HSL) that controls how many hours train employees, dispatching service employees and signal employees may work.⁷

Additionally, funding is provided to Amtrak by the DHS through its Transit Security Grant Program (TSGP) for security enhancements for Amtrak intercity rail operations between key, high-risk urban areas throughout the United States.

A number of the safety challenges related to passenger rail center on securing passenger operations, improving the rail system, and fortifying rail security. Open access and high ridership of mass transit systems make railroads more difficult to secure than airports. The section below highlights safety and security concerns specific to passenger rail.

Rail Openness and Trespassing

Trespassers are an ongoing problem for Amtrak and the MBTA, which have rights-of-ways that are open to trespassers through stations and gaps in fencing. Trespassers on railroad tracks are a security concern for operators and also the individual because trains are operating at high speeds, including the Acela at 150 miles per hour in parts of the NEC in Massachusetts. In an effort to respond to these safety concerns, MBTA, Keolis and Amtrak are engaged in the national Operation Lifesaver program that promotes safety on and around railroad property.

Public Rail Police Agencies

The MBTA Police Department has over 260-sworn police officers and is responsible for the MBTA subway, light rail, bus, and commuter rail systems. Additionally, Amtrak has a relatively small contingent of police officers in Massachusetts and work closely with the MBTA as most Amtrak operations are on MBTA property.

5 Ibid.
 6 Ibid.
 7 U.S. DOT FRA. Current Initiatives. <https://www.fra.dot.gov/Page/P0565>

2.1.5 Rail Transportation Impacts in Massachusetts

The rail system in Massachusetts has notable impacts in the State. These include impacts related to:

- Congestion Mitigation
- Safety
- Economy
- Sustainable Land Use
- Air Quality
- Energy

These impacts are discussed in this section with an emphasis on the impacts of rail on Massachusetts' residents, businesses, and quality of life. Increased passenger and freight rail ridership provides benefits through reducing auto congestion, lessening emissions and energy consumption, offering safe and resilient travel option, and facilitating sustainable growth.

Congestion Mitigation

Utilizing rail for passenger and freight movements reduces congestion from other modes, particularly on major highways and congested local roads in major metropolitan areas. Rail travel provides relief on congested roadways by diverting passengers and freight to rail, and away from airports, private automobiles, buses, livery services, and road-based freight transportation services.

Table 2-8: Passenger Fatalities per Billion Passenger Miles (2000-2009)

PASSENGER FATALITIES PER BILLION PASSENGER MILES (2000-2009)	
MODE	TOTAL
Driving or Passenger in a Car or Light Truck	7.28
Passenger on a Local Ferry Boat	3.17
Passenger on Commuter Rail or Amtrak	0.43
Passenger on Urban Mass Transit Rail*	0.24
Passenger on a Bus (with 10 or more passengers)	0.11

Source: Comparing the Fatality Risks in United States Transportation Across Modes and Over Time²⁹

Note: *This statistic includes fatalities related to onboard incidents, such as assaults and other violent acts.

Congestion mitigation benefits of passenger rail are particularly relevant to Boston's metro area, as well as the larger cities around the Massachusetts where traffic is a concern. With over 120,000 passenger trips a day, the MBTA commuter rail system provides benefits by reducing automobile trips in the region. Amtrak's intercity service provides a significant alternative for regional travel. The Northeast Regional and Acela service allow Boston's Logan airport to use its limited gate capacity for international and long haul flights rather than short trips to other Northeast Corridor cities. In addition, diverting freight from trucks to the freight rail system in the State offers another potential congestion mitigation benefits. The rail system in Massachusetts carries a volume of freight equivalent to approximately 850,000 trucks trips.

Safety

Rail compares favorably to other modes of transportation in terms of overall safety. Table 2-8 compares death rates between modes on the basis of billions of passenger miles. As noted, per passenger mile, traveling on rail or bus has a death rate of 7.28 people from 2000-2009 and passengers on rail systems had a 0.43 rate of death for an equivalent mileage traveled.

By diverting passengers and freight off of roadways and onto rail, traffic congestion will be reduced and accidents on the state's roadways will decrease.

8 Savage, Ian. "Comparing the Fatality Risks in United States Transportation Across Modes and Over Time." Research in Transportation Economics: The Economics of Transportation Safety 2013: Volume 43, Pages 9-22.




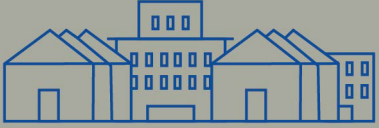
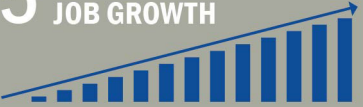

Economic


The freight rail system in Massachusetts provides critical infrastructure and operations that benefit both businesses and residents. Efficient, cost-effective freight and passenger movement is an important element of economic competitiveness for the State as it provides improved mobility and flexibility for the traveling public and shippers.

Economic benefits generated by rail include the following:

- Reduced congestion, as increased mobility and reliable travel times are provided for by rail service, allows for congested metropolitan areas to experience economic benefits. Travel and shipping by rail provides an option to a personal automobile or truck to transport freight and people. A recent Texas Transportation Institute congestion report reveals that road congestion costs \$818 per American commuter annually or over \$457 million in Massachusetts.⁹ Passenger rail infrastructure allows commuters to avoid congestion and improves mobility in metropolitan areas. It also allows the region to make more efficient use its airport capacity by provided an appealing alternative way to connect to other metropolitan areas in the same mega region
- Reduced freight shipping costs that result from shifts to less expensive per ton-mile modes (e.g., truck to rail) and/or improved service on existing routes
- Improved freight logistics, which result from improved reliability of travel times and supply chain logistics re-organization benefits for freight-dependent businesses
- Increased transit-oriented development near passenger rail stations, which provide new services to residents and businesses and support job growth. In Massachusetts, the proximity of rail in real estate is noted at suburban hub stations such as Route 128 Station, where transit-oriented development has created housing and jobs in close proximity to commuter and intercity rail

Benefits of RAIL

- 1 REDUCED CONGESTION**

- 2 REDUCED FREIGHT COSTS** **3 IMPROVED FREIGHT LOGISTICS**


- 4 INCREASED DEVELOPMENT**

- 5 LONG-TERM JOB GROWTH**

- 6 SAVINGS IN DAILY ROAD MAINTENANCE COSTS**


\$6,336
- 7 NATIONAL TRUCK DRIVER SHORTAGE**


⁹ "The Benefits of Passenger Trains: Growing America's Economy." National Association of Railroad Passengers, https://www.narprail.org/site/assets/files/3090/fact_sheet_-_trains_and_the_economy_2015.pdf.

- Created jobs during the infrastructure construction period, and long-term job growth from the operation of the new infrastructure investment. According to the U.S. Department of Commerce, 20,000 new jobs are created for every \$1 billion invested in rail.¹⁰ Rail operations also play an important economic role, with passenger and freight rail currently accounting for more than 300,000 in the United States and approximately 7,000 in Massachusetts¹¹
- Reduced highway maintenance costs, as additional freight is diverted to rail and off existing roadways. Roadway maintenance savings due to reduction in vehicle-miles on arterial roadways are estimated at \$0.003 per vehicle-mile avoided. At an average auto commute distance of 32 miles and 558,770 driving commuters (Massachusetts average), average daily maintenance costs due to vehicle impact are \$53,635.¹² Assuming that there are 66,000 daily rail users in Massachusetts (Amtrak and commuter rail combined), the State saves \$6,336 in daily road maintenance costs or approximately 11 percent of road related vehicle impact maintenance costs
- There is currently a national shortage of truck drivers. In 2014, there were an estimated 38,000 drivers; the demand for truck drivers is projected to grow to more than 175,000 drivers by 2024. This will lead to an increase in trucking costs, as the supply of drivers is expected to fall well below the demand¹³

Often freight transportation issues and potential solutions are linked to passenger transportation. In most cases where intercity rail passenger travel exists, there is also shared usage of tracks. This presents both a challenge, in scheduling and bottlenecks, and an opportunity. When common interests exist, collaboration between private freight operators and MassDOT can be made possible, as evidenced by the 2012 partnership between CSX and the Commonwealth to improve intermodal facilities in central Massachusetts and improve commuter services to Boston.

Sustainable Land Use

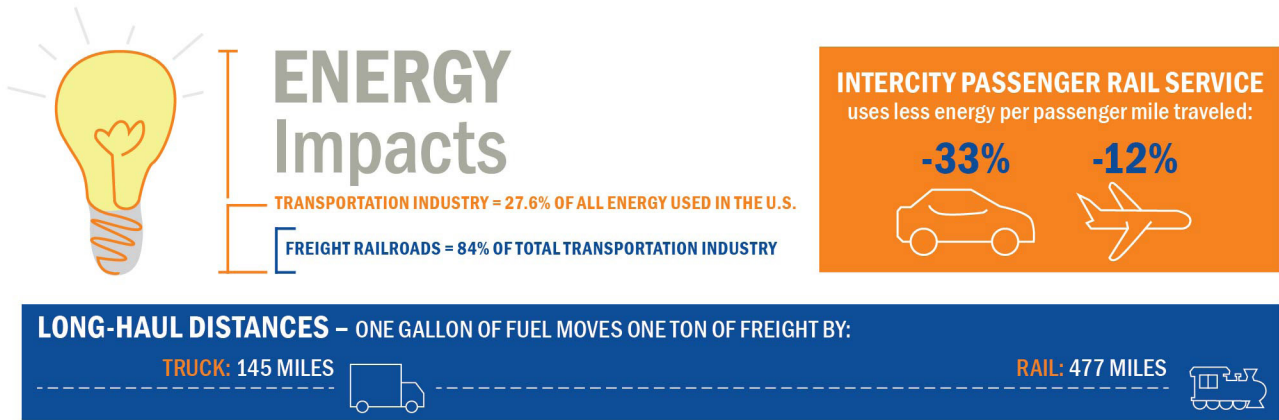
Passenger rail transportation is a key component of sustaining and cultivating sustainable land use practices. Established urban areas in Massachusetts rely on MBTA Commuter Rail and intercity services to provide transportation to major job centers, high density residential areas, and recreational activities. The presence of passenger rail stations is also a driver of new transit-oriented development in both urban areas and suburban areas. Development around existing transportation options and services is important to reducing the overall costs on infrastructure and municipal and state services. Massachusetts is growing fastest among states in the Northeast, and there is enormous opportunity to coordinate land use around existing transportation assets.

10 "The Benefits of Passenger Trains: Growing America's Economy." National Association of Railroad Passengers, https://www.narprail.org/site/assets/files/3090/fact_sheet_-_trains_and_the_economy_2015.pdf.

11 Ibid.

12 Charlotte Area Transit System North Corridor Commuter Rail Study. HDR. <http://charmeck.org/city/charlotte/econrecovery/documents/costbenefitanalysis.pdf>

13 Truck Driver Shortage Analysis, 2015 American Trucking Association



Energy Impacts

According to the most recently available data, in 2014 the transportation industry consumed 27.6 percent of all energy used in the United States.¹⁴ Freight railroads comprise 84 percent of the rail industry’s energy consumption, but are responsible for a significantly smaller share of emissions than other freight transportation modes.

The energy efficiencies available through the better utilization of railroads in Massachusetts are significant. Intercity passenger rail service uses 33 percent less energy per passenger mile traveled than automobiles and 12 percent less than airline travel.¹⁵ Using the average rate of fuel economy for passenger vehicles and average commuting distance in the State, rail users in Massachusetts save an estimated 693 million pounds of yearly CO2 emissions.

For long haul distances, freight rail transportation is more energy efficient than trucking or shipping by air. Based on a 2017 study by the Texas Transportation Institute, one gallon of fuel moves one ton of freight by rail 477 miles, compared to 145 miles by truck. Freight delivered by rail is on average four times more fuel efficient than trucks (in terms of ton-miles per gallon), and because greenhouse gas emissions are directly related to fossil fuel consumption, every ton-mile of freight moved by rail instead of truck reduces greenhouse gas emissions by 75 percent.¹⁶

Air Quality

Air quality is a critical concern for Massachusetts’ government agencies and cities and towns. When drivers take the train rather than drive their car this reduces auto vehicle miles traveled (VMT) and tailpipe emissions that worsen air quality. Similarly, freight diverted from truck to a more energy efficient rail mode results in fewer emissions.¹⁷ However, there are also localized air quality impacts near rail lines and rail yards, as most rail travel in Massachusetts is through the use of fossil fuels.

14 United States Department of Energy, “Transportation Energy Data Book”, Edition 34, 2015.
 15 United States Department of Energy, “Transportation Energy Data Book”, Edition 34, 2015, Table 2.14.
 16 Association of American Railroads (AAR), “Freight Railroads Help Reduce Greenhouse Gas Emissions”, August 2015.

17 Association of American Railroads (AAR), <http://www.aar.org/InCongress/Energy%20and%20Environment/Energy%20and%20Environment.aspx> December 29, 2009.

Environmental

Greenhouse gas emissions are recognized as a mobile source of emissions and contributor to global climate change. Massachusetts is committed to reducing total greenhouse gas emissions in all sectors by 80 percent in 2050 from 1990 levels, including emissions from the transportation sector. In Massachusetts, the transportation sector accounted for 39 percent of total GHG emissions in 2014, compared to 27 percent nationally.¹⁸ Given the high contribution that transportation has to total emissions in Massachusetts, it is important to achieve reductions within the transportation sector. Freight railroads can play a significant role in reducing GHGs through their fuel efficiency as compared to long-distance trucking. An increase in rail traffic, in terms of modal share, would be beneficial from a GHG emissions perspective. Given that long-haul freight by rail over truck has environmental benefits, MassDOT is committed to making the rail network more usable for businesses by making investments in the rail system in places where businesses can more effectively use the rail system and where certain rail corridors that are critical to freight movement can be improved to accommodate product with higher ton-weight capacity.

18 Massachusetts Executive Office of Energy and Environmental Affairs, "MA GHG Emission Trends", 2018. <http://www.mass.gov/eea/air-water-climate-change/climate-change/massachusetts-global-warming-solutions-act/ma-ghg-emission-trends/>

As well, for passenger rail travel, MassDOT continues to improve the passenger rail system to allow for more people to travel in a more environmentally-conscious way than a personal vehicle.

2.2 Trends and Forecasts

2.2.1 Demographic and Economic Growth Factors

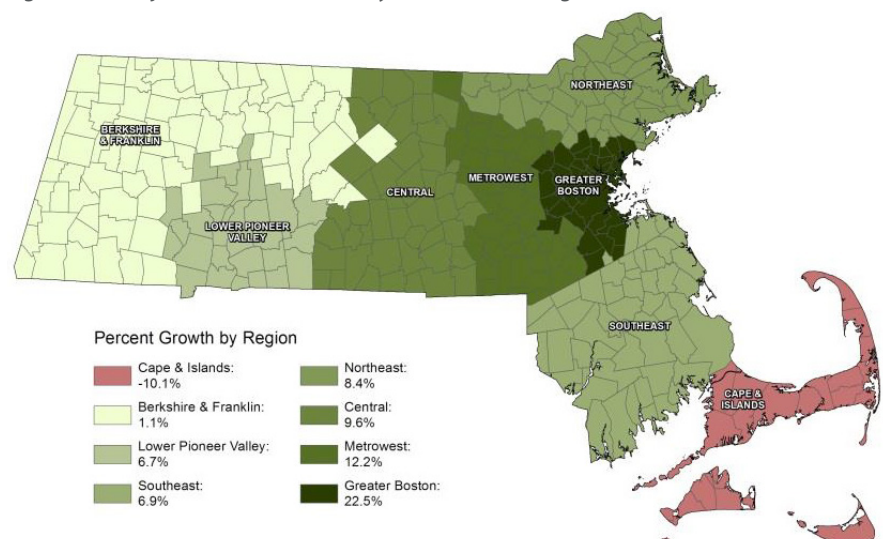
Trends in population, employment, and industry change may impact future passenger and freight rail activity in the Commonwealth, and are examined to provide context.

Population

Since 2010, the rate of population growth in Massachusetts has increased at a rate of 3.8 percent growth, with a 2015 estimated population of 6,794,422.¹⁹ Projected statewide population in 2035 is estimate to be 7,319,469.²⁰

Population growth is not projected to be evenly distributed across the State. The projected distribution of population growth in Massachusetts is shown in Figure 2-12.

Figure 2-12: Projected Percent Growth by Massachusetts Region (2010-2035)



Source: Long-term Population Projections for Massachusetts Regions and Municipalities 2015, UMass Donahue Institute

19 US Census

20 UMass Donahue Institute, 2016

Although the State as a whole is projected to increase in population by 11.8 percent between 2010 and 2035, some regions anticipate growth well above that average. The Boston region is expected to continue the pattern of strong growth from 0.8 to 1.1 percent annual growth, while the Berkshire region and other parts of Western Massachusetts are anticipated to have less growth, and the Cape and Islands region is anticipated to see a reduction in population during the 25-year period.

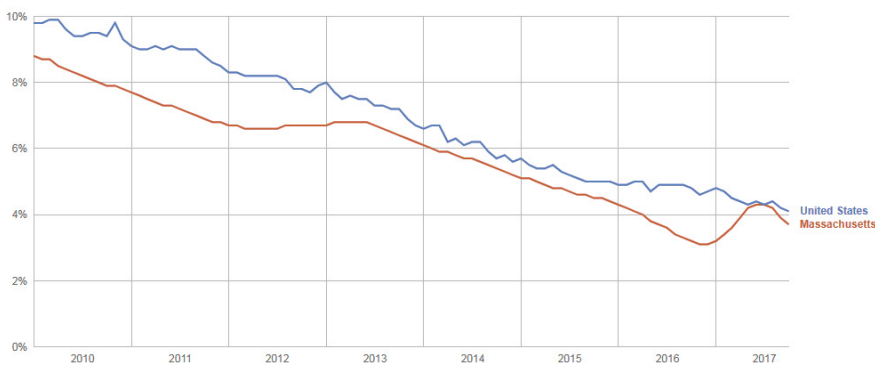
Employment

In 2016, Massachusetts' total employment was 3,459,910. The most recent employment outlook as seen in Table 2-9, shows that Massachusetts has a nearly 10 percent overall job growth rate.

Personal Income

Massachusetts workers have an annual mean wage of \$60,840 and a mean hourly wage of \$29.25, among the highest in the U.S. according to the May 2016 BLS data.²¹ In comparison, the U.S. annual mean wage is \$49,630 and mean hourly wage is \$23.86. In addition to having wages that exceed the U.S. average, Massachusetts is experiencing lower levels of unemployment than the national average, as illustrated in Figure 2-13.²²

Figure 2-13: U.S. and Massachusetts and Unemployment Rates (01/2010 to 10/2017)



21 May 2016 National Occupational Employment and Wage Estimates https://www.bls.gov/oes/2016/may/oes_nat.htm

22 Data from U.S. Bureau of Labor Statistics, last updated November 29, 2017.

Table 2-9: Employment in Massachusetts by Industry (2009-2015)

EMPLOYMENT IN MASSACHUSETTS BY INDUSTRY (2009-2015)				
INDUSTRY SUPER-SECTORS	EMPLOYMENT AT BEGINNING OF RECOVERY (OCTOBER 2009)	EMPLOYMENT IN MOST RECENT MONTH (SEPTEMBER 2015)	EMPLOYMENT CHANGE	EMPLOYMENT PERCENTAGE CHANGE
Natural Resources and Mining	1,300	900	-400	-30.8%
Construction	106,700	131,300	24,600	23.1%
Manufacturing	253,300	248,200	-5,100	-2.0%
Trade, Transportation & Utilities	539,300	563,400	24,100	4.5%
Information	86,100	86,600	500	0.6%
Financial Activities	210,300	210,800	500	0.2%
Professional and Business Services	452,100	542,700	90,600	20.0%
Education and Health Services	678,400	757,900	79,500	11.7%
Leisure and Hospitality	299,400	351,800	52,400	17.5%
Other Services, Excluding Public Administration	118,500	136,800	18,300	15.4%
Public Administration	437,300	462,400	25,100	5.7%
TOTAL, ALL INDUSTRIES	3,182,700	3,492,800	310,100	9.7%

Source: MassBenchmarks, 2015 (volume 17 issue 2), UMass Donahue Institute

Industrial Outlook by Sector

Between 2009 and 2015 the manufacturing industry in Massachusetts declined, as profiled in Table 2-9. This diverse industrial sector in Massachusetts remains an important sector of the economy, but according to MassBenchmarks (Table 2-9), employment decreased by two percent between October 2009 and September 2015.

In stark contrast, the Construction industry grew between 2009 and 2015, with future growth projected. This industrial sector, along with Trade, Transportation & Utilities, represents a very significant sector for the freight rail industry. The Trade, Transportation & Utilities sector includes jobs dealing with retail, the transportation of people and goods, and the provision of utilities to the public. The ability to move construction products (i.e., stone, cement, construction waste) is an important component in keeping construction costs down and that important industry competitive. These relative strengths, particularly in industry sectors that are traditionally freight dependent, highlights the importance of a robust freight rail transportation system in the Commonwealth.

2.2.2 Freight Demand and Growth

Three primary data sources were used in this section to generate a freight and commodity analysis for Massachusetts: the STB Carload Waybill Sample, the Federal Highway Administration (FHWA) Freight Analysis Framework (FAF), and data from the American Association of Railroads.

The information presented, when combined with an evaluation of freight-rail movements and major truck and water movements, helps to underscore the potential opportunities to divert truck freight movements onto the rail system, or foster more intermodal connections.

Carload Waybill Sample

The Carload Waybill Sample is a sampling of railroads that terminate (deliver) more than 4,500 rail cars per year; freight railroads that handle less than 4,500 rail cars annually are not counted. The data are considered representative of rail freight moved and provide insight into inbound, outbound, internal, and through movements by various metrics like measured weight, route type, interchange locations etc.

At the time of this analysis, the most recent available data from 2013 was examined (the 2015 data was released after the drafting of this chapter.) The complete waybill database for Massachusetts was requested by MassDOT for this analysis. However, since there is only one Class 1 railroad that operates in the State and most of the railroads in Massachusetts fall under the 4,500 rail cars per year threshold, this data set includes significant gaps. Additionally, because of STB's confidentiality requirements, which are designed to protect the data of various carriers, the most detailed information related to individual railroad commodity flows cannot be published. For these reasons, the data provided insight into details of commodity flows' in the State but could not be used to present a complete profile of freight rail commodity movements.

Freight Analysis Framework (FAF)

The FAF is a publicly available freight database produced by the Bureau of Transportation Statistics (BTS) and Federal Highway Administration (FHWA) with a geographic coverage of all states and major metropolitan areas. The FAF provides data classified by freight tonnage and freight value as well as mode share. It also provides a forecast of freight tonnage and value for each mode. The key limitation of these data is that they do not cover through trips. Only inbound, outbound, and intrastate flows are included. All freight data provided by the FAF and the Carload Waybill Sample classify freight using a two-digit Standard Transportation Commodity Code (STCC), which identifies the type of freight moved and assigns commodity descriptions.

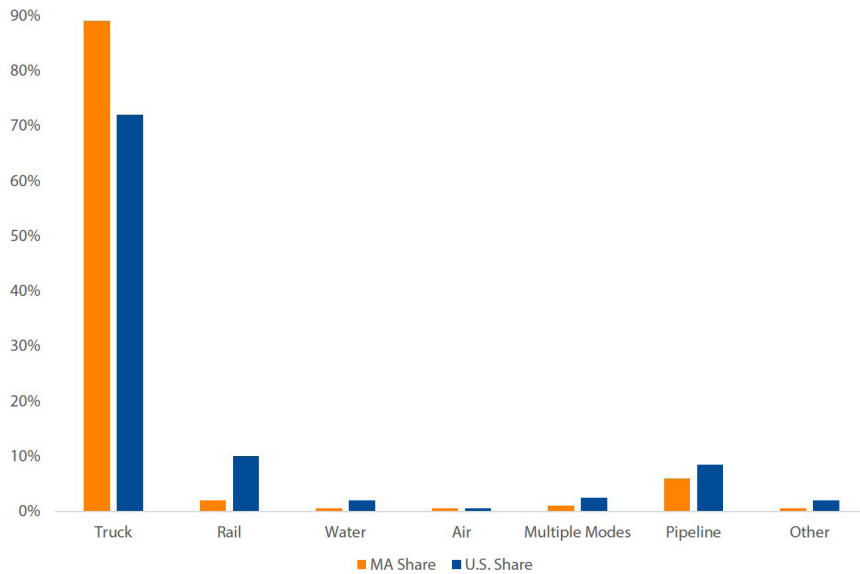
The FAF data included in this plan is from the FAF 3 data set, with the 2013 provisional data update. FAF 3 is based on the 2007 Commodity Flow Survey and has updated the data set in 2012 and 2013. Although the data is updated, the data follows the trends established in 2007 and therefore any drastic changes in volumes or flows are not reflected in the dataset. The FAF 3 data includes forecasts in 5-year increments for 2015-2040. A new version of FAF data based on 2012 Commodity Flow Survey (FAF 4) was released in early 2016 with preliminary data. Updates to FAF 4 data were anticipated throughout 2016, as FAF 4 was being finalized, and as a result, FAF 3 data were used in this plan in the early stages of analysis to avoid the potential for data changes occurring as the releases were being finalized.

The FAF provides data for both tonnage and value and thus is the source of data for commodity flow by value. It does not cover through-trips.

American Association of Railroads

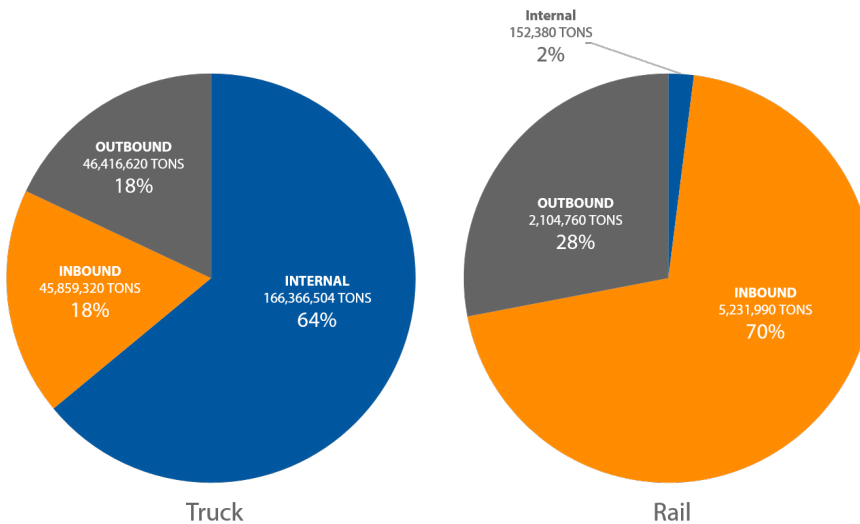
The American Association of Railroads (AAR) maintains a data set of freight rail commodity movements and volumes. The AAR utilizes a combination of the Waybill data with information received from their members. The data is not limited to those reporting in the waybill sample and can reflect significant changes that may occur in freight flows from year to year. In assessing Massachusetts freight rail flows it can provide a more complete picture. As demonstrated by the AAR data, many products now travel via multiple modes to reach their ultimate destination. This accentuates the need for an integrated and efficient intermodal and multi-modal freight system.

Figure 2-13: 2013 Modal Shares of Tonnage for All Freight Movements Excluding Through Traffic, Massachusetts and U.S.



Note: Other includes Other Intermodal Movements

Figure 2-14: Truck and Rail Shipping Patterns in Massachusetts, Excluding Through; 2013, Thousands of Tons



Source: FAF3.6, 2013 Provisional Data.

Freight Transportation by Mode

Freight moving through the Commonwealth travels by truck, rail, air, water, or a combination of those listed. Figure 2-13 shows that most Massachusetts and U.S. freight movements are through trucks, and Massachusetts is more heavily reliant than the U.S. on trucks for goods movement. Approximately 10 percent of movements being made by rail nationally, while only 2.6 percent of all rail movements are made by rail in Massachusetts.

Figure 2-14 provides a breakdown of Massachusetts truck and rail tonnage by inbound, outbound and internal movements. More than half of the truck tonnage in Massachusetts is internal movements. The primary movement of freight tonnage is inbound, rather than outbound, and only a small amount of tonnage is shipped internally within Massachusetts. Rail shipping patterns reflect freight coming in long distance to the State and being distributed via rail within the State. Trucks have a large relative advantage over rail for internal movements.

Rail represents a smaller share of goods movement in Massachusetts when measured by value than when measured by weight due to two reasons. First, the data available on value does not include through-trips at the state level so the relatively large share of rail through-trips is not included. Second, and likely more applicable, is that rail tends to ship heavy, lower valued products. Rail products tend not to be as time sensitive in nature as truck movements. In addition, heavy goods distribution would be inefficient if done by truck due, in part, to weight restrictions on roadways. Heavy trucks also produce more wear on the roadway.

Total Freight Commodities

Combined commodity tonnage for all freight using FAF3.6 data shows that in 2013, the top commodities ranked by weight for all freight were gasoline/fuel, stone and sand, waste/scrap and farm products/food/beverages. Total commodities transported for Massachusetts summed to a total of 290.15 million tons.

Rail Freight Commodity Flows

The following commodity analysis focuses on the top four commodities by tonnage that are transported on the Massachusetts rail network. The data contained in this section is primarily from AAR and is limited to Massachusetts' originating and terminating carloads.

Table 2-10: Rail Traffic Originated in 2010 and 2013

RAIL TRAFFIC ORIGINATED IN 2010 AND 2013				
TOP COMMODITIES	2010		2013	
	TONS	CARLOADS	TONS	CARLOADS
Intermodal	769,000	73,500	1,391,890	133,042
Waste and Scrap	378,000	4,500	597,000	7,100
Chemicals	209,000	2,600	155,000	3,400
Pulp and Paper	191,000	14,000	262,000	19,000

Source: Association of American Railroads

Table 2-11: Rail Traffic Terminated in 2010 and 2013

RAIL TRAFFIC TERMINATED IN 2010 AND 2013				
TOP COMMODITIES	2010		2013	
	TONS	CARLOADS	TONS	CARLOADS
Intermodal	1,168,000	83,700	1,381,000	105,500
Food Products	1,150,000	22,500	1,163,000	25,700
Pulp and Paper	806,000	14,400	968,000	17,600
Chemicals	767,000	10,900	714,000	10,200

Source: Association of American Railroads

Table 2-10 shows the rail commodities originating in Massachusetts for the years 2010 and 2013. Top rail commodities in this time frame are intermodal, waste and scrap, chemicals, as well as pulp and paper. While intermodal is not commonly referred to as a commodity, this is how AAR data are categorized.

As is apparent in Table 2-10 and Table 2-11, the amount of originating tons of intermodal commodities changed dramatically in the past few years. Intermodal increased by 81 percent between 2010 and 2013. This demonstrates the advantage that rail has is primarily from its large hauling capacities and economies of scale, which can substantially undercut the cost of trucking over long distances, and particularly with high volumes. Because of the advantage that rail has over trucking, single-commodity unit trains and intermodal service have both grown rapidly. Intermodal, in particular has grown, as compared to the traditional carload "loose car" service. The traditional carload is more of a niche product, as it is successful where volumes are sufficiently high to leverage the larger capacity of railcars and the origin or destination have direct rail access.

Table 2-12: Rail Traffic Terminated in 2010 and 2013

MASSACHUSETTS FREIGHT MODAL GROWTH, EXCLUDING THROUGH TRAFFIC, 2013- 2040	
MODE	GROWTH 2013-2040
Rail	29.8%
Truck	28.0%
Air	108.4%
Water	-64.9%
TOTAL 31%	

Source: FAF3.6 Provisional Data

Total Freight Flows Forecast

Freight forecasts from analyzing FAF 3.6 provisional data indicates that air freight will experience the greatest growth in tonnage traffic when compared to truck, rail, and maritime shipping modes. From 2013 to 2040, air freight is expected to grow 108.4 percent. Rail and truck modal growth are expected to grow similarly at 29.8% and 28%, respectively. Overall, the total growth will be 31 percent for all freight.

The largest percent growth in commodities over this time period is in precision instruments, with a growth rate of 581 percent by 2040. Miscellaneous manufacturing products are also expected to grow significantly. Total tonnage for all combined commodities is expected to grow from 290.15 million tons to 378.75 million tons, a growth rate of 31 percent, from 2013 to 2040 or approximately 1.15 percent per year. The State’s rail network is expected to face a similar growth rate in freight tonnage that will require new investments to accommodate this growth.

The only commodity group that is expected to see a decline in freight tonnage over the period is coal. Coal tonnage transported is anticipated to decrease by approximately six percent.

Destination growth is expected to exceed both origin and internal growth. Figure 2-15 represents the projected growth in freight movements by direction in Massachusetts for origin, destination, and internal in terms of total tonnage. All directions show an increase in tonnage from 2013 to 2040. Freight tonnage originating in Massachusetts is forecasted to increase from 56 million tons in 2013 to 75 million tons in 2040. Freight tonnage terminating (indicated as “Destination”) is forecasted to increase from 63 million tons in 2013 to 98 million tons in 2040. Internal freight tonnage is forecasted to grow from 172 million tons in 2013 to 206 million tons in 2040.

Future Freight Flows in Massachusetts

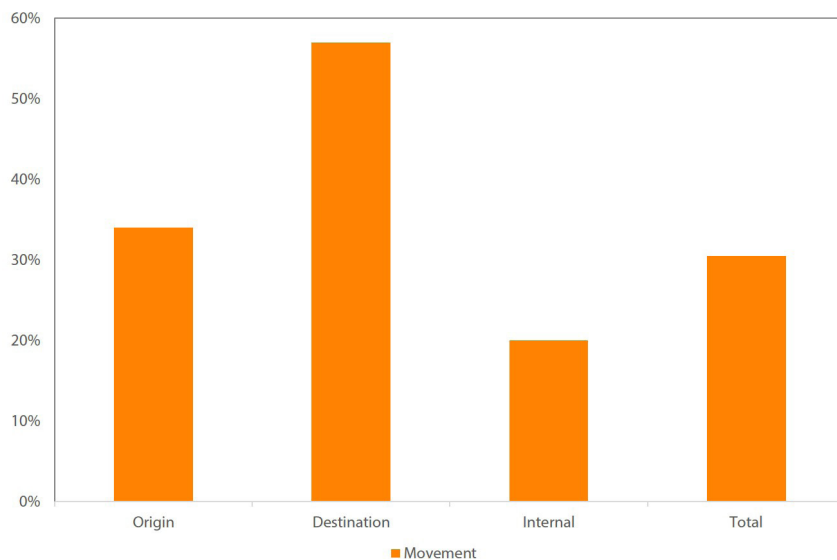
Based on the freight flow data examined, the rail system in Massachusetts will need to accommodate roughly 19 million more tons of originating freight tonnage, 25 million tons of terminating freight, and 34 million tons of internal freight than it does now. The commodities expected to grow the most are precision instruments, miscellaneous manufacturing products, electronics/ machinery, and plastics/rubber. This commodities’ growth and growth in freight tonnage may encounter more capacity constraints if no improvements are made to the State’s rail network.

Table 2-13: Combined Commodity Tonnage and Growth for All Freight in Massachusetts, 2013-2040 (in millions)

COMBINED COMMODITY TONNAGE AND GROWTH FOR ALL FREIGHT IN MASSACHUSETTS, 2013-2040 (IN MILLIONS)				
COMBINED COMMODITY	2013	2025	2040	GROWTH 2013-2040
Farm Prods/food/beverages	30.12	37.40	45.64	51%
Stone and Sand	42.30	43.73	51.85	23%
Minerals and Ores	25.28	26.33	33.45	32%
Coal	2.81	1.62	2.63	-6%
Gasoline, Fuel	83.02	93.67	88.31	6%
Chemicals/Pharmaceuticals/Fertilizer	14.41	16.10	22.44	56%
Plastics/Rubber	5.13	6.92	9.10	78%
Wood/furniture	10.28	11.72	13.60	32%
Paper	9.72	10.91	14.09	45%
Textiles/leather	1.41	1.96	2.41	71%
Base Metals	6.90	8.16	6.89	0%
Electronics/Machinery	5.73	7.81	10.37	81%
Transportation Equipment	1.87	2.31	2.60	39%
Precision Instruments	0.28	1.05	1.88	581%
Miscellaneous Mfg Products	2.32	4.06	7.88	239%
Waste/Scrap	32.95	31.26	39.82	21%
Mixed Freight/Unknown	15.61	19.12	25.80	65%
TOTAL	290.15	324.14	378.75	31%

Source: FHWA FAF3.6.

Figure 2-15: Freight Tonnage Growth by Direction of Movement, 2013-2040



Source: FHWA FAF3.6

Table 2-14: Anticipated Low and High Fuel Costs between 2016 and 2040 (in 2015 Dollars)

ANTICIPATED LOW AND HIGH FUEL COSTS BETWEEN 2016 AND 2040 (IN 2015 DOLLARS)									
YEAR	2016	2017	2018	2019	2020	2021	2022	2023	2024
Low	\$2.38	\$2.39	\$2.41	\$2.44	\$2.49	\$2.55	\$2.58	\$2.63	\$2.66
High	\$4.13	\$4.48	\$4.62	\$4.73	\$4.82	\$4.91	\$5.01	\$5.12	\$5.21
YEAR	2025	2026	2027	2028	2029	2030	2031	2032	
Low	\$2.81	\$2.85	\$2.88	\$2.89	\$2.90	\$2.91	\$2.92	\$2.93	
High	\$5.59	\$5.72	\$5.85	\$5.98	\$6.11	\$6.24	\$6.37	\$6.50	
YEAR	2033	2034	2035	2036	2037	2038	2039	2040	
Low	\$2.94	\$2.95	\$2.96	\$2.98	\$2.99	\$3.01	\$3.02	\$3.03	
High	\$6.67	\$6.82	\$6.92	\$7.07	\$7.22	\$7.38	\$7.53	\$7.71	

Source: Annual Energy Outlook 2015, U.S. Energy Information Administration

2.2.4 Fuel Cost Trends

Table 2-14 shows the expected prices of gasoline and diesel in the United States from 2016 to 2040, according to the U.S. Energy Information Administration. Due to variability in global energy markets, low and high estimates are provided by year. While fuel prices have mirrored the low estimates in 2016 and 2017, over time fuel price shocks like those most recently felt in 2007 are probable. Overall, the high and variable price of fuel creates a favorable environment for passenger and freight rail. Fuel costs are relatively fixed for rail use, adjusted annually to reflect the operator's costs. In addition fuel costs are lower for rail on a per-ton per-passenger basis than comparable journeys by truck and automobile, respectively. Therefore, one conclusion to be drawn from this is as fuel prices rise, rail will become a relatively more cost-effective option, and travelers and shippers are likely to expand their interest in using rail.

2.2.5 Rail Congestion Trends

Rail congestion in Massachusetts, like most other states along the East Coast, is due to both passenger and freight rail system capacity constraints, resulting in constraints to operations and less reliable service than optimal. As both passenger and freight rail usage continues to increase, schedule reliability as well as the ability to expand operations will be limited due to infrastructure constraints.

Passenger Rail Congestion Trends

Passenger rail traffic in Massachusetts has grown considerably since the 1980s, as both the MBTA and Amtrak have expanded passenger rail services and improved infrastructure. As a result, passenger counts have grown and are projected to continue growing as population and job growth continue in dense urban areas.

The increases in rail services and passenger counts have led to congestion on key parts of the system, particularly at major passenger rail terminals, key line segments, and maintenance yards. The following are identified capacity choke points at facilities that are used by intercity passenger rail services.

- **South Station in Boston** has limited track space availability during peak hours and is constrained from expanding by existing buildings.

- **Worcester Union Station** is constrained by the single platform and track at the station. Expansion is limited by freight operations and urban development around the station.
- **Northeast Corridor (NEC)** services are constrained between Canton Junction and South Station due to trains merging onto the NEC from MBTA branch Commuter Rail lines at Canton Junction, Readville, and Forest Hills.
- **Worcester Line in Boston** is constrained due to the track and signal configuration as the line approaches South Station. This prevents trains from entering and leaving South Station simultaneously on the Worcester Line.
- The **MBTA Haverhill Line** between Ballardvale and Haverhill Stations, which is also used by the Amtrak, is constrained by both single track operations, single platforms at key stations, and freight operations.

Passenger Rail Capacity Programs

FOCUS 40 and the MBTA Rail Vision will address long-range issues to the MBTA Commuter Rail system, but MassDOT and the MBTA are also working with Amtrak to address rail congestion through the following studies:

- **South Station Expansion:** MassDOT is studying the potential for expanding South Station in Boston with added track and platform capacity. This program also has the potential to expand maintenance and layover yard capacity.
- **Northeast Corridor (NEC)** services are being considered due to the long-term FRA NEC Future program.

Freight Rail Congestion Trends

The Massachusetts freight rail network has seen an increase in usage and will also experience capacity constraints if future growth continues. Nationally and in Massachusetts, the freight rail industry has seen substantial consolidation since the Staggers Rail Act of 1980 deregulated the industry. As discussed in section 2.1, between 1980 and 2003, Class I railroads consolidated from 22 carriers to seven (four of which have 96 percent of Class I revenue). This resulted in the mileage of track that is maintained and operated by Class 1 railroads was reduced from 271,000 to 169,000 miles as redundant routes and corridors were abandoned or sold. At the same time (between 1980 and 2003) while the number and mileage of Class 1 freight railroads was decreasing, the freight ton-miles carried by these railroads grew by 69 percent. Although this process has led to a more efficient railroad system, it has also reduced excess capacity in the network. This has resulted in increases in congestion at certain locations in the network as freight rail traffic changes or grows.

In Massachusetts, current and future capacity constraints exist at major terminal yards. Because of the urban development occurring in and around the yards, capacity is expected to become more constrained over time. According to a comparison of forecasts conducted by FHWA, national freight rail volumes are expected to grow by approximately 1.7 percent per year, which may result in lengthened trains and additional runs added.²³ However, yard capacity will be a major impediment to growth. Freight rail operators will have few options for expanding operations.

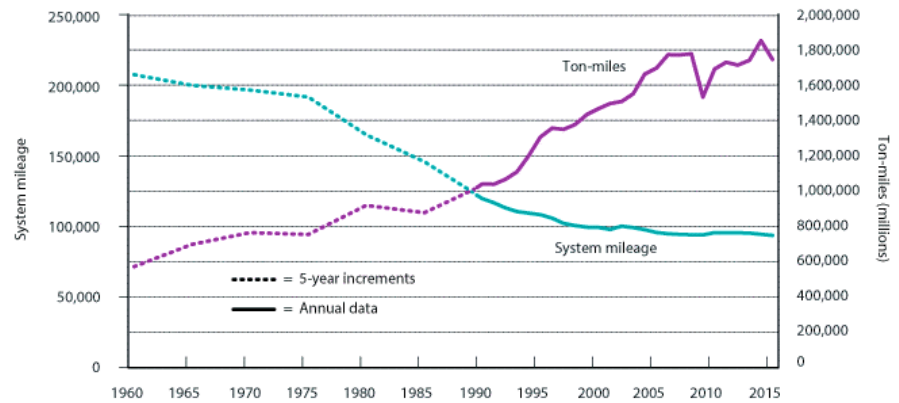
²³ "Assessing the Effects of Freight Movement on Air Quality at the National and Regional Level National Freight Transportation Trends and Emissions," https://www.fhwa.dot.gov/environment/air_quality/publications/effects_of_freight_movement/chapter02.cfm.

Freight Rail Capacity Programs

The national rail network in key interchange areas and routes is experiencing increasing levels of congestion. Utilization of existing rail capacity has grown substantially over the years. In order to accommodate forecasted traffic growth, the AAR estimates that the highway system must add capacity to handle 98 percent more tonnage, while railroads must add capacity to facilitate 88 percent more tonnage by 2035. This equates to \$148 billion in rail infrastructure investment (in 2007 dollars).²⁴

The ability to handle more freight does not necessarily mean the addition of miles of new track. This is demonstrated in Figure 2-16. The increase in ton-miles per mile of track and ton-miles handled nationally has been managed on a rail network that has experienced a decline in total track miles. While it would be difficult to sustain this trend because of track capacity constraints, it does show that the railroads have substantially increased overall efficiencies in the use of the national rail network. 286K investments made by private railroads and supported by MassDOT can further the amount of goods moved on a ton-mile basis by rail without adding new system mileage.

Figure 2-16: Freight Rail Ton-Miles and System Track Miles - Class 1 Railroad System, 1960-2015



Source: Association of American Railroads, Railroad Facts, Statistical Highlights

Shared Use, Rail Congestion and Competing Demands

Much of the freight rail system operates on corridors that also have passenger rail (i.e., commuter and/or intercity rail) which creates challenges for scheduling and dispatch, safety, and the need for suitable switching and signal equipment. Congested shared use corridors can require significant investment to accommodate both freight and passenger rail needs in an optimal fashion.

The corridor improvements have been focused on mainline capacity and increasing through put at yards and interchange points with other rail lines. Mainline capacity improvements have been combinations of: improving existing track; adding more multiple track sections for passing sidings and/or increasing the number of main tracks; improving signal and control systems; and addressing specific system restraints such as bridges with reduced capacity or conflicts with other infrastructure including highway grade crossings in urban areas.

²⁴ "National Rail Freight Infrastructure Capacity and Investment Study"

2.2.6 Highway & Airport Congestion Trends

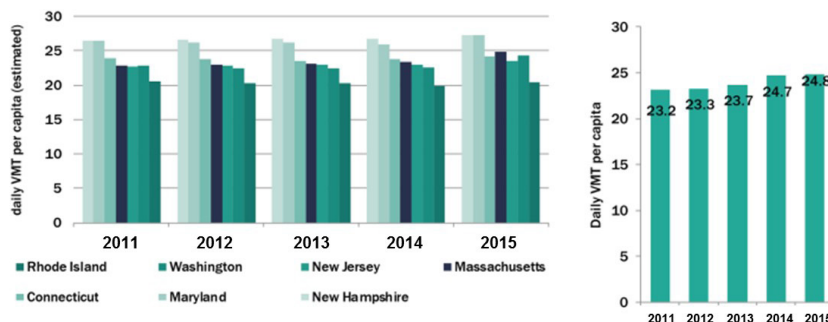
Massachusetts currently has the fastest growing population of any state in the Northeast United States. The population of the State grew by almost 250,000 residents between 2010 and 2015, nearly a 4 percent growth rate. This compares with a 1 percent growth rate in New Hampshire and less than 1 percent in all other New England states over the same period. Growth has impacted both highways and airport travel capacity.

Highway Congestion

With increasing population growth, vehicle miles traveled (VMT) on Massachusetts' roadways has grown since 2010. This follows the general trend of population growth occurring in the state's largest urban areas. Vehicle miles traveled per capita is also increasing slightly, growing from 23.2 miles per person in 2011 to 24.8 miles per person in 2015, as shown in Figure 2-17. The State's VMT per capita remains similar to other peer states. Other than some key interchanges, the State has no major plans to expand capacity where it would require substantial capital investments on highway infrastructure.

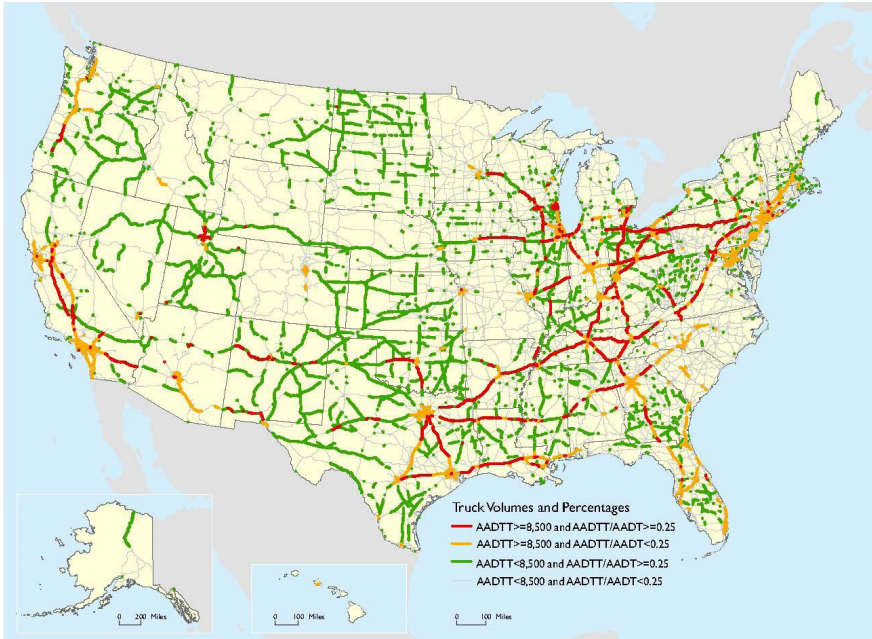
The highway system is also expected to be constrained. The ability to expand the nation's highways and improve the operating efficiencies of the existing highway network is considered to be limited. Thus, for many in the transportation industry, the ability to increase the mode share of rail is seen as a potential means to respond to the future demand for freight movement. The value of comparing the current and future rail and highway congestion is two-fold. The first is to highlight that without a proactive approach to providing improved transportation options, highway congestion will escalate to levels where truck freight movement becomes less time-competitive, and thus rail and intermodal shipping opportunities will increasingly look towards.

Figure 2-17: Vehicle Miles Traveled Per Capita in Massachusetts Compared to Peer States (2010-2015)



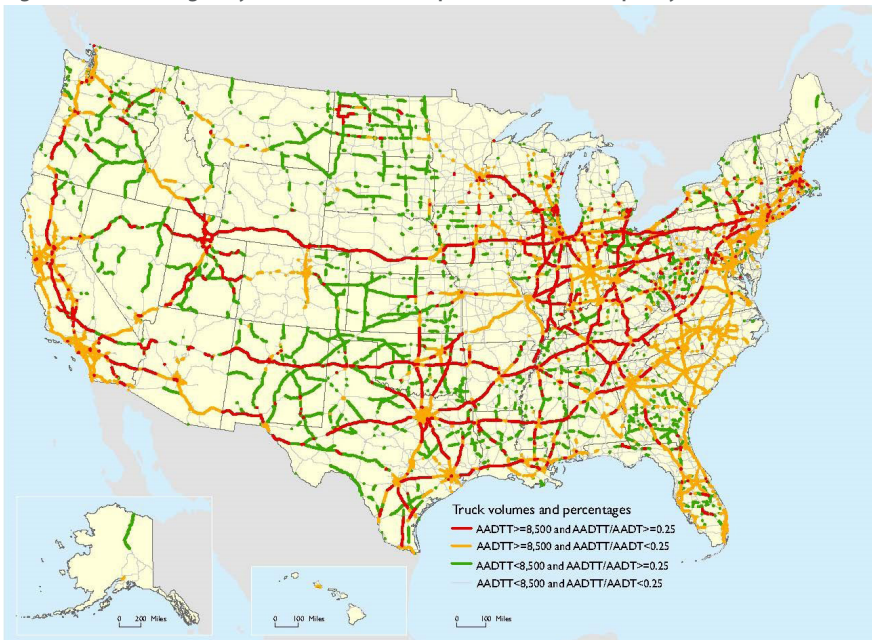
Source: MassDOT FY17 Tracker

Figure 2-18: Highway Truck Volumes Compared to Current Capacity



Source: BTS (2017). <https://www.bts.gov/bts-publications/freight-facts-and-figures/freight-facts-figures-2017-chapter-3-freight>

Figure 2-19: 2040 Highway Truck Volumes Compared to Current Capacity



Source: BTS (2017). <https://www.bts.gov/bts-publications/freight-facts-and-figures/freight-facts-figures-2017-chapter-3-freight>

The second is that, from a Massachusetts perspective, there is capacity in the eastern and northeast states for movement by rail now. This available capacity is expected to be an opportunity for the future and suggests that it is of benefit to Massachusetts and the northeast to maximize freight movement by rail by providing a competitive rail shipping environment. Figure 2-18 displays the most recent BTS statistics on highway truck volumes compared to current capacity, and Figure 2-19 illustrates the expected 2040 highway volumes compared to the current capacity. While in the Northeast truck volumes will grow at a lesser pace than some of other parts of the country, considering the national movement of freight – long-distance trucking may become less desirable over time if capacity were not to markedly increase. Rail shipping would grow to be more time-competitive than it is today for long-distance shipping if highway volumes and congestion continues to increase.

The potential for highway capacity constraints illustrated in Figures 2-18 and 2-19 has been the subject of numerous federal studies over the past decade. FHWA identifies that operational performance has declined despite the historic investment in highway infrastructure and improving conditions on many roads and bridges. Severe congestion in major metropolitan areas is expected to worsen in metropolitan areas, particularly in regions of the country that are growing quickest economically, in terms of jobs and population growth patterns.

Table 2-15: Massachusetts Freight Tonnage Moved at Airports

MASSACHUSETTS FREIGHT TONNAGE MOVED AT AIRPORTS					
AIRPORT	2010	2011	2012	2013	2014
Logan International	13,561,814	14,180,730	14,293,695	14,810,153	15,507,561
Nantucket Memorial	201,390	169,352	179,128	183,557	170,361
Barnstable Municipal-Boardman/Polando Field	124,560	100,596	95,717	87,648	85,184
Worcester Regional	-	-	-	8,007	57,818
Martha's Vineyard	43,904	49,095	50,484	56,313	52,362
New Bedford Regional	12,363	11,152	12,256	10,604	8,159
Provincetown Municipal	11,450	10,967	11,580	-	-
Lawrence G Hanscom Field	7,952	10,893	11,097	11,288	10,410

Source: Federal Aviation Administration

Airport Congestion

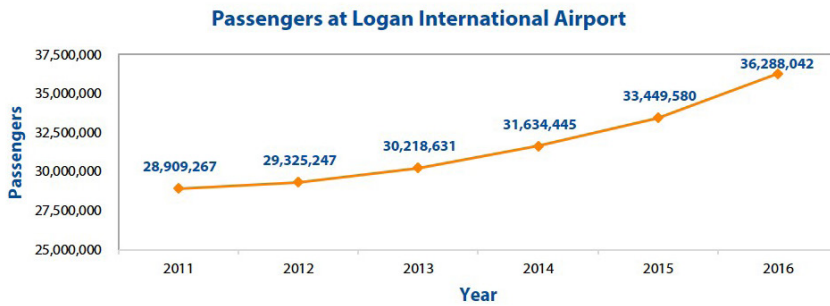
The system of airports across Massachusetts and New England provide an alternative transportation mode that is typically complimentary to rail in the overall transportation system. For the movement of freight, shippers typically move cargo by air when it is time sensitive and does not weigh much. This is in direct contrast to railroad shipping, which moves heavy commodities that are not time sensitive. Therefore, railroads and airports serve different needs in the movement of freight.

Statewide, Massachusetts has 39 public-use airports, with Logan International Airport by far the largest in terms of passenger and freight traffic. Other major passenger and freight airports in the State include Nantucket Memorial Airport, Hanscom Field, Barnstable Municipal Field, Martha’s Vineyard Airport, and Worcester Regional Airport. Table 2-15 shows the freight tonnage moved at each of the Massachusetts airports. The vast majority of freight tonnage is moved at Logan International airport, with other Massachusetts airports moving much less cargo by weight.

Logan Airport in Boston, Massachusetts is by far the largest airport in Massachusetts, but there are several other commercial airports in use in New England including T.F. Green near Providence, Rhode Island; Manchester-Boston Regional Airport in Manchester, New Hampshire; and Bradley International Airport in Windsor Locks, Connecticut. Of these airports, three of the four (Logan, T.F. Green, and Bradley) are in communities that are also served by intercity passenger rail. For some of these airport customers, they may use rail to undertake air travel.

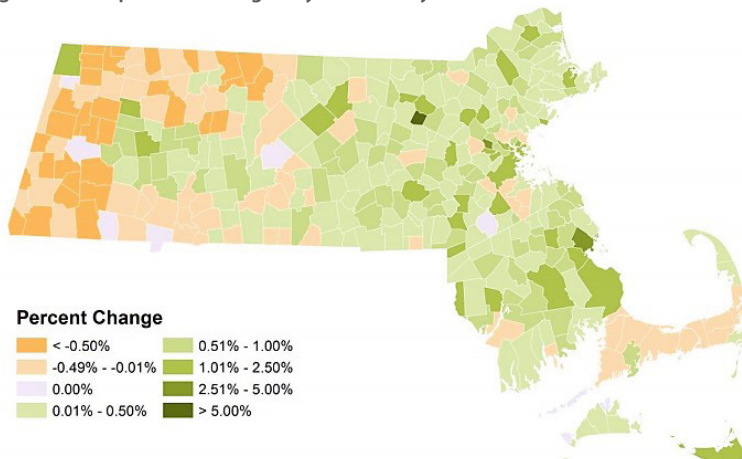
Generally, congestion at Massachusetts airports is not a problem, with most facilities capable of handling existing and future growth. However, Logan Airport is expected to grow in terms of passenger volume and aircraft movements, and robust passenger rail service can help to free up capacity. Logan International Airport is among the 20 busiest airports in North America for passenger volume and aircraft movements. In the coming years, due to the addition of numerous international destinations across Europe, Asia, and Latin America and increased service from domestic carriers to U.S. destinations, Logan can refocus its market more towards long-distance flights, and away from air routes that can be served by rail. Air travel is preferable for longer trips, while rail service is often preferable for intercity trips, and that can help reduce the demand at Logan Airport. For instance, Acela trains from Boston to New York City reduce the need for short haul flights from Logan Airport to JFK and La Guardia Airports, freeing up additional capacity at Logan for airlines to feature long-distance routes to customers.

Figure 2-20: Passengers at Logan International Airport (2010-2016)



Source: Massport Boston Logan Airport Statistics

Figure 2-21: Population Change July 2015 to July 2016



UMass Donahue Institute Population Estimates Program. Source data: Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2016. U.S. Census Bureau Population Division. May 25, 2017.

Source: UMass Donahue Institute Population Estimates Program. Source data: U.S. Census Bureau (05/25/2017) <http://www.massbenchmarks.org/statedata/data/mdc2016/UMDI%20Summary%20US%20Census%202016%20MA%20MCD%20Population%20Estimates.pdf>

Over the coming years, MassPort, the owner and operator of Logan International Airport, plans to expand the passenger facilities, cargo facilities, and improve ground transportation options at the airport to deal with some of the capacity constraints.

2.2.7 Land Use Trends

The majority of the Massachusetts population is concentrated in the eastern part of the Commonwealth. As of 2016, the communities with the fastest population growth are concentrated in the urban core around Boston, including the Cities of Boston, Cambridge, and Quincy. Additionally, population growth is occurring in suburban areas, with low-density residential development occurring along the Interstate 495 corridor. This trend of Massachusetts population growth can be seen in Figure 2-21, which illustrates the growth rate from 2012 to 2017. It should also be noted that most of the western part of Massachusetts and Cape Cod have experienced very little to no population growth. These population trends have implications for how land is used and developed over time and where rail demand will be strongest.

These changes to population and land use across Massachusetts impact the State’s rail system in the following ways:

- Rail service is providing more people with opportunities for access to jobs (especially jobs in Boston) as populations grow.
- Land prices are causing freight rail companies to see greater viability outside of the Boston area due to lower costs overall, and the benefits of using intermodal transfer facilities outside of congested urban centers.
- As populations grow across the State and more land near railroads and railyards is used for residential development, conflicts between these land uses are occurring. Population growth in the urban core has transformed formerly industrial land into large commercial and residential developments. These industrial land conversions to other uses in urban core locations refocuses future industrial developments with rail access towards more profitable locations.

Land use trends are important to study because as the population shifts in areas around the State, demand for passenger rail will shift as well. This will need to be taken into account when planning rail investments.

2.3 Rail Service Needs and Opportunities

Section 2.3 describes the service needs and opportunities for both passenger and freight rail systems in the State. While broken into passenger rail and freight rail sections, needs and opportunities frequently overlap between both passenger and freight systems.

2.3.1 Passenger Rail

This section presents information on the constraints, issues and bottlenecks of the Massachusetts passenger rail system, particularly with regard to inter-city service. These include congestion and capacity issues in some areas, shared use challenges with freight rail, the need for improved layover facilities and train stations, and funding constraints.

Congestion

Congestion on Massachusetts’ roadways and airports has grown substantially in the past several decades, leading to demands for improved commuter and intercity travel options. MassDOT’s acquisition of rail lines in the Commonwealth, and the agency’s focus on state-of-good-repair, provides an opportunity to continue to improve the rail system to a point where adding capacity is viable.

Capacity

Approximately 2.6 million riders in Massachusetts use Amtrak each year to travel to their destinations resulting in cars being taken off the road, which has contributed to increasing demands for using the rail network. Amtrak has projected significant ridership increases, which it plans to accommodate with additional and higher speed service, greater passenger accommodation, and increasing inter-city connectivity. However, additional trains, particularly on lines shared with freight and commuter rail, results in capacity issues and potential delays on the rail network. Other operators on the tracks that Amtrak uses is a significant cause of Amtrak delay.

South Station is a key rail bottleneck that will need to be addressed in order to add capacity on the NEC or to add commuter rail service that terminates at South Station.

Infrastructure

Rail safety and security is contingent on its infrastructure. Safety hazards can be caused by deferred maintenance of rail components and human error in railroad operations and inspections. MassDOT has made significant investment in rail in recent years and should maximize use of those investments to enhance safety.

MassDOT is committed to maintaining a state-of-good-repair through a variety of investments at grade crossings, in track improvements and along right-of-way, among other rail facilities. MassDOT works with Amtrak to assure a focus on state-of-good-repair.

Prior Rail Investments

MassDOT and MBTA own 56 percent of the total rail transportation network in Massachusetts, including the Massachusetts portion of the NEC. In addition, investment in passenger stations, transfer stations, and other rail facilities have been made across the Commonwealth. This high percentage of rail ownership provides a tremendous opportunity for MassDOT to maximize the use of their rail investments to better meet the needs of riders and freight businesses within Massachusetts.

2.3.2 Freight Rail Needs

Opportunities related to freight rail in Massachusetts include improved infrastructure and operations that will provide more reliable freight operations and improved service. Efficient and cost-effective freight rail is an important element of economic competitiveness for the State. Although current low fuel prices make trucking more competitive, the long-term projection is for fuel prices to rise. In addition, there is a national shortage of truck drivers. In 2014, there were an estimated 38,000 drivers; the demand for truck drivers is projected to grow to more than 175,000 drivers by 2024. This will lead to an increase in trucking costs, as the supply of drivers is expected to fall well below the demand.²⁵ The combination of fuel prices and labor costs will make freight rail an increasingly important mode in the State.

Nationally, freight rail is gaining in prominence due to the public benefits generated as a result of lower shipping costs, greater energy efficiency, reduced greenhouse gas emissions, fewer air emissions, and benefits to the highway system in terms of congestion relief, safety, and pavement damage. A summary of key issues and opportunities related to freight rail includes:

Coverage

Massachusetts has generally strong rail network coverage that reaches most areas in the State. The Commonwealth's rail network represents about 25 percent of the entire network in New England, although it carries more than 40 percent of all freight rail moving through New England.

Congestion

Freight shipped by rail rather than truck can reduce highway traffic congestion, emissions, and pavement impacts.

Weight Restrictions

Much of the rail system is not designed and/or permitted for the rail industry standard weight of 286,000 pounds, requiring "loading by exception" for Massachusetts and limiting the accessibility to these routes and more cost-effective shipping practices for bulk products. Investment in rail infrastructure in order to accommodate a higher weight limit standard of 286,000 pounds can reduce shipping costs in Massachusetts for many rail customers.

25 Truck Driver Shortage Analysis, 2015 American Trucking Association

Rail Access

Many shippers do not use rail because they do not have good access to rail. Improving rail access for existing and potential customers along existing rail lines may increase opportunities to ship by rail. Additionally, maintaining land adjacent to rail lines for industrial or commercial use supports access to rail for existing and future Commonwealth businesses.

Shared Use, Rail Congestion and Competing Demands

Much of the freight rail system operates on corridors that also have passenger rail (i.e., commuter and/or intercity rail) which creates challenges for scheduling and dispatch, safety, and the need for suitable switching and signal equipment. Improving shared use corridors by extending sidings or constructing double-tracking would reduce the operational conflicts between passenger and freight rail services.

Chapter 3:

Passenger Rail Improvements and Investments Considered for State's Rail Service and Investment Program

Successful passenger rail transportation supports the State's economic vitality, reduces the need for increased investments in highway expansion, contributes to congestion relief, provides redundancy in the transportation system, and is a more energy efficient and cleaner transportation alternative than many other modes of transportation. The entire rail system relies on an extensive network of capital assets, with some components dating from the mid-19th century. Therefore, the system requires constant maintenance and improvement to ensure the continuation of reliable and resilient passenger services. In order to ensure that rail continues to serve Commonwealth residents and visitors, achieving a state-of-good-repair (SGR) is critical. Once MassDOT and partner agencies achieve a state-of-good-repair across assets, MassDOT supports improved passenger rail service in a manner that best leverages existing

assets and available resources and maximizes benefits to the Commonwealth and its residents.

The previous two chapters provided an overview of MassDOT's rail assets, MassDOT's role in and goals for rail transportation, the trends impacting the demand for rail, and challenges and opportunities for rail investment. This chapter highlights:

- MassDOT's short-term passenger rail priorities and process for identifying short term passenger investments
- The process for identifying potential long term passenger investments for consideration in this Plan
- A summary of the inter-city rail project ideas that were considered for inclusion in the State's Rail Service and Investment Program for Passenger and Freight rail described in Chapter 5.

Passenger rail service in the Commonwealth of Massachusetts offers travel alternatives and essential mobility to the public. High speed, intercity, commuter and tourist rail services are all available in the State, providing Massachusetts’ residents and the nation’s travelers with safe, convenient, reliable, and energy efficient transportation. Intercity rail service through Amtrak has increased to more than 3.0 million riders¹ in Massachusetts, ridership has increased nearly 15 percent in the last 5 years.

¹ Amtrak Fact Sheet, Fiscal Year 2016, State of Massachusetts, Amtrak

3.1 Near-term Strategy and Projects

3.1.1 Near-term Project Identification: CIP Development

Near-term projects for inclusion in the rail plan were identified in the 2018-2022 MassDOT Capital Investment Plan (CIP), which establishes the state funding process for the state transportation networks and sets priorities for funding programs.

The CIP is structured around priorities first, then programs within each priority, and then projects. First priority for funding are projects that improve the reliability of the transportation network, second priority are projects that modernize the system or increase capacity of the existing network, and the third priority expands access to the system. Programs are groupings of similar investment types, and the projects are identified ways to address the needs in those investment types.

The majority of CIP funding under the Baker/Polito Administration has been for reliability programs that help the transportation system reach a state-of-good-repair. For the Rail Division, 52 percent of overall spending is on reliability. Passenger rail comprises much of the expansion funding, given that the Rail Division is advancing intercity passenger rail projects across Massachusetts, particularly through the Knowledge Corridor pilot rail service and South Coast Rail.

Within these asset programs, the Commonwealth’s near-term goals for passenger rail included in this plan are to:

- Attain a state-of-good-repair across all rail asset programs
- Partner with Connecticut for improved service between New Haven and Springfield
- Move towards full implementation of South Coast Rail with the Stoughton Electric Route by first implementing a Phase I approach through Middleborough.

Individual investments for each program were selected from a “universe of projects,” which MassDOT developed initially for the 2017-2021 CIP. MassDOT staff established the “universe of projects” based on all known project ideas and public outreach during 2015 and 2016.

Near-term Project Highlight: South Coast Rail

While committed to the full build, known as the Stoughton Electric Route, MassDOT determined it could provide earlier service to the region by extending an existing rail service through Middleborough, as Phase 1. With a new station at Pilgrim Junction in Middleborough, Phase 1 optimizes operations, provides the shortest travel time from Fall River and New Bedford, provides a one-seat ride for the majority of passengers, supports a connection for potential future Cape shuttle service, and allows the existing station to serve seasonal Cape Flyer service.

MassDOT has allocated \$165 million in the 2018-2022 CIP towards upgrading its existing freight lines to advance Phase 1 implementation of South Coast Rail. The early action bridges and grade crossings, as well as the ongoing state-of-good repair efforts support the preservation of the corridor and enable freight operations to continue as MassDOT identifies full funding for the project.

Near-term Project Highlight: New Haven to Springfield Passenger Service

The Connecticut Department of Transportation (CTDOT)'s New Haven – Hartford – Springfield Line project will increase passenger service in the corridor when completed in 2018. CTDOT 's new CTRail service will add seven round trips between New Haven and Hartford with three round trips to Springfield. Three new Amtrak trips will be added to the existing six round trips. The combined CTRail/Amtrak service will provide 12-roundtrips each weekday between New Haven and Springfield Union Station in 2018. The services will enable commuters to access job locations in Springfield, Hartford, and New Haven and also transfer for continued service on the Northeast Corridor (NEC) to destinations in southwest Connecticut and New York City via the New Haven Line. This service can offer Massachusetts several benefits: economic growth in Springfield; access to Connecticut job markets; better connections to New York City; and an opportunity for additional services running north on the Knowledge Corridor to Greenfield. Although Connecticut is advancing this initiative, long-term service and maintenance agreements need to be finalized between Connecticut and Massachusetts.

3.2 Long-term Projects

3.2.1 Long-term Intercity Rail Project Identification

The Federal Railroad Administration (FRA) requires the identification of both short- and longer-term projects for inclusion in the State Rail Plan. Longer-term projects for consideration were identified through a consultative process that considered projects included in the universe discussed in section 3.1, projects previously studied by MassDOT and partner agencies and feedback from elected officials, regional MPOs, other state agencies, civic associations, and members of the public. The purpose of this process was to have an inclusive method for developing a final investment strategy that will best address the established goals for rail in the Commonwealth and needs of the larger New England region, as highlighted in Chapter 2 of this Plan.

State-of-good-repair will remain the priority, as asset management practices will inform most of the necessary maintenance and state-of-good-repair investments. The focus of the long-term project identification was on initiatives that would fall under Priority 2 and 3 of the CIP, namely, investments that will modernize the system, increase capacity, or expand access.

A draft list of proposed projects was shared with Metropolitan Planning Organizations (MPOs) and refined based on their feedback. A list of inter-city passenger rail project ideas that were considered for inclusion in the State’s Rail Service and Investment Program for Passenger and Freight Rail outlined in Chapter 5 are shown in alphabetical order in Table 3-1. Other proposals are the subject of current studies (i.e. the Berkshire Flyer) and cannot be evaluated for long-term utility until that ongoing work is complete. These studies are described in Section 3.2.5. The following sections describe these proposals in more detail along with high-level potential benefits and challenges associated with each based on available information. The full process for the evaluation of for each of the below projects, and decisions regarding next steps for each proposal can be found in Chapter 5.

3.2.2 Project Descriptions

Boston to Montreal via Springfield

The Northern New England Intercity Rail Initiative (NNEIRI) was a feasibility and planning study that examined the opportunities and impacts of adding more frequent and higher speed east-west and north-south intercity passenger rail service to Montreal via Springfield from Boston and/or New Haven. According to the NNEIRI study, there is low demand for this service, due in part to the length of the trip although there is greater demand for some segments than for the whole route. As with other proposed long-term projects that contain an east-west service component in Massachusetts, South Station Expansion, extensive coordination with freight railroads, and additional track and station work between Boston and Worcester would be necessary in order to provide passenger service into Boston. Low demand, coupled with high operating costs and shared use challenges, impact the cost-effectiveness of providing this proposed passenger rail service to Montreal.

Table 3-1: Projects Considered for Long-term Rail Plan

PROJECTS CONSIDERED FOR LONG-TERM RAIL PLAN			
PROJECT	ROUTE/LINE/STATION	DIRECTION	REGION
Boston to Montreal via Springfield Passenger Rail Service	Inland Route	NS / EW	Western/Vermont
Housatonic Line Passenger Rail Service	Berkshire Line	NS	Berkshires
New Haven to Springfield Passenger Rail Service	NHHS ¹	NS	Western
Palmer Station		-	Western
Springfield/Pittsfield to Boston Passenger Rail Service	Inland Route	EW	Western (primary), Central and Boston (secondary)
Springfield to Greenfield Passenger Rail Service	Knowledge Corridor	NS	Western
South Station Expansion	South Station	-	South Shore/North East Corridor
South Coast Rail Stoughton Electric	South Coast	NS	South Shore
Tower 1 Upgrade	South Station	-	South Shore/North East Corridor
Worcester to Providence Privately Operated Commuter Rail Service	P&W Mainline	NS	Central

¹ New Haven Hartford Springfield (NHHS)

Housatonic Line Passenger Service

The Housatonic Rail Line runs between Pittsfield in Western Massachusetts and Danbury, Connecticut. Significant additional investment would be necessary to run passenger service along the corridor.

Adding intercity passenger rail service in the Berkshires along the Housatonic Line was viewed as a way to provide a rail connection between Pittsfield and Danbury, Connecticut with connecting service into New York City. However, Connecticut is not prioritizing any investments to facilitate this service and the high-cost to both Massachusetts and Connecticut, if the line were to be upgraded to passenger standards, poses a challenge.

Palmer Station

Proposed infrastructure improvements along the Inland Route, the Springfield to Boston rail corridor, contemplated the construction of a new station in the Town of Palmer for Amtrak's Lake Shore Limited service and potential Inland Route service. The station would be located on the CSX line and serve the existing once daily round-trip Amtrak service and any proposed future Inland route service. The future intercity passenger service through this station was studied as part of the NNEIRI Study and reconsidered in the Central Corridor study.

Privately Operated Commuter Rail Service between Worcester and Providence

This private-sector long-term initiative aims to accommodate privately operated commuter rail service between Worcester and Providence, Rhode Island. Boston Surface Railway Company (BSRC) secured station rights in Worcester and entered into a long term lease-to-own for the historic train station in Woonsocket, Rhode Island. However, further negotiations with the host railroad company, Genesee & Wyoming Railroads (owner of P&W Railroad), are required to advance this project. The potential benefits associated with this project include modal diversion and emissions reduction as the new service option could draw users from alternative routes or competing modes of transportation. Shifting commuters from car to rail could result in a reduction in emissions and other environmental impacts, however, the level of benefit would heavily depend on the ridership projections for this proposed service between Worcester and Providence.

Boston to Western Massachusetts Passenger Service

The public outreach for this Plan indicated that there is interest in increased passenger rail service between Boston and Western Massachusetts. A description of the two main types of services that were suggested from an earlier study is presented below, followed by a discussion of some of the challenges associated with these two alternatives.

NNEIRI Alternative: The NNEIRI study evaluated a range of options as part of an assessment of alternative ways to provide intercity passenger service between Boston, New Haven, and Montreal. The multi-state partnership identified a preferred service alternative for a New Haven to Boston via Springfield route with up to 79 mph speeds, 4 round trips per day, and stops at Palmer, Worcester, and Framingham. An alternative looking at more frequent service and speeds up to 90 mph was analyzed, but was not selected as a preferred alternative due to an inability to consistently achieve 90 mph speeds within the constraints of track geometry. A 60 mph speed option with fewer trips per day was also considered and it offered a reduction in costs over the other alternatives; however, low projected ridership would be realized.

Higher Speed Peak Period Alternative: A proposal to add higher speed rail service between Boston and Springfield, Massachusetts has been discussed by some stakeholders. This alternative would have both faster trip times and peak hour frequencies consistent with commuter service. The NNEIRI study recognized the existence of constraints on peak hour service and did not examine commuter service specifically. It did consider service with speeds of 110 and 125 mph. The primary benefit associated with higher speed passenger service would be improved travel time. However, NNEIRI concluded that “there are no segments on the corridor where 125 mph service is feasible”, and that between Boston and Springfield there is only “a short section” where 110 mph is feasible with the existing track geometry.² Those changes to the existing track geometry were not evaluated further; they would have involved not only additional costs but also purchasing additional right-of-way.

Constraining Circumstances: There are three circumstances that were recognized at the time of the study for the Boston-Springfield corridor. The NNEIRI study acknowledged but did not address these constraining circumstances specifically:

- **West of Worcester Ownership and Capacity:** The railroad from Worcester to Springfield, Pittsfield, and Albany is owned and operated by CSX and used for freight service. It is the only line in Massachusetts capable of handling 315,000 lb. cars and one of the few that can handle 286,000 lb. cars. It has three active freight terminals where truck cargo can be received and dispatched, in addition to several interchange points where short line railroads serving other sections of the State can access the National Freight Network. This line has achieved great success at supporting the freight needs of businesses and according to CSX has reached capacity with the existing level for freight movements. Due to the successful partnership between MassDOT and CSX, Worcester has become the hub for intermodal business in New England. If Massachusetts were to propose adding passenger service to this line, CSX would insist that it not compromise present or future freight rail operations. Massachusetts would share and support that goal, even if it did not agree with CSX’s specific demands to implement it. According to CSX, between Worcester and Springfield, the current freight volume, traffic characteristics and projected growth preclude the planning and implementation of an expanded intercity operation on the CSX existing track and right-of-way. CSX did not materially participate in the NNEIRI planning process.
- **South Station Capacity:** South Station is effectively at capacity for peak hour service. MassDOT is pursuing a plan to expand South Station, but until that plan is realized it will be very difficult to accommodate additional peak hour trains there. The NNEIRI study recognized this factor and stated that the expansion of South Station was a precondition to any of the peak hour intra-Massachusetts services that it examined.
- **Worcester to Boston Capacity:** The peak hour track capacity between Worcester and Boston that was assumed when the NNEIRI study was undertaken is currently consumed by MBTA service that has been added since the NNEIRI study was finalized. The preliminary findings from the Worcester Triple Tracking study currently underway indicate that any increase in peak service between Worcester and Boston would require five upgraded stations, in addition to a third track. Given service levels at the time of the NNEIRI study, these requirements were not accounted for in the estimated project costs and the projected schedule did not reflect these limitations.

Springfield to Greenfield Passenger Rail Service

The Knowledge Corridor, also known as the Connecticut River Line, is an intercity rail corridor between Springfield Union Station and East Northfield, Massachusetts. In the near-term, MassDOT has allocated nearly \$45 million in improvements to the Knowledge Corridor, including new stations, a major station modernization, and track improvements, and is exploring the feasibility of a passenger rail pilot program on the corridor.

If the near-term pilot moves forward and were to be successful, added intercity rail service from Springfield to Greenfield could be considered. Permanent passenger rail service could be achieved as an extension of the CT Rail Hartford Line creating continuous service from New Haven, Connecticut to Greenfield. This service would improve access for the institutions and residents of this fairly rural corridor and would leverage the investment that the Commonwealth has already made in the Knowledge Corridor.

Key supporters of the north-south passenger rail service initiative include the Pioneer Valley Planning Commission (PVPC) and the Franklin Regional Council of Governments (FRCOG). The reconstruction and reactivation of passenger rail service along the Knowledge Corridor was identified as a primary goal in the 2014 and 2017 PVPC Comprehensive Economic Development Strategy (CEDs).

South Station Expansion

The purpose of the South Station Expansion (SSX) project is to expand terminal capacity and related layover capacity in order to meet future high-speed, intercity, and commuter rail service needs. The expansion of South Station would enable growth in passenger rail along the NEC and within the Commonwealth of Massachusetts. The project would facilitate improvements in corridor operations and regional mobility, passenger experience and comfort, and quality of life. Locally, the project would allow for Dorchester Avenue to be reopened for public use and enjoyment for the first time in decades.

The SSX project would expand the South Station Rail Terminal, adding seven new tracks and four platforms for a total of 20 tracks and 11 platforms while substantially expanding the passenger capacity and experience at the station. MassDOT received clearance from the Massachusetts Environmental Policy Act (MEPA) in 2016 and the Finding of No Significant Impact (FONSI) from Federal Railroad Authority was released in November 2017.

NEC FUTURE - In order for South Station to accommodate the 2040 service levels in the NEC FUTURE Preferred Alternative, additional infrastructure improvements beyond those proposed in this SSX project would need to occur at South Station as well as throughout the NEC. The SSX project will not preclude the improvements proposed by the NEC FUTURE program; rather, the SSX project includes investments that can later be leveraged by MassDOT and FRA to initiate the additional improvements proposed by the NEC FUTURE program to accommodate service levels beyond 2035. The selected alternative FRA identified in the Tier 1 Record of Decision for the NEC FUTURE program (see www.necfuture.com for the NEC FUTURE Record of Decision) will be implemented incrementally and in coordination with the SSX project.

Stoughton Electric

MassDOT will continue to advance design on the Stoughton Electric preferred alternatives as described in the 2013 Final Environmental Impact Statement/ Report (FEISIR). At full capacity, the full-build will provide forty daily trips, half are between Fall River and Boston and half are between New Bedford and Boston. Full Build service includes a total of ten new stations (North Easton, Easton Village, Raynham Place, Taunton, East Taunton, Freetown, Fall River Depot, Battleship Cove, King's Highway and Whale's Tooth) and two reconstructed stations (Canton Center and Stoughton).

Tower 1 Upgrade

Part of MassDOT's High Speed grant for evaluating the expansion of South Station is exploring ways to make Tower 1 improvements that are not reliant on the purchase of the postal service facility. Tower 1 is located immediately south of the South Station passenger terminal where all MBTA and Amtrak lines converge into South Station. This project would benefit both inter-city and commuter rail passengers by improving speed and reliability. It will benefit Amtrak and the MBTA by reducing pressure on operations at South Station. The track portion of improvements will require purchase and relocation of the neighboring postal service facility to obtain full benefit.

The Tower 1 interlocking is one of a series of interlockings that process train service into and out of South Station. The existing configuration of these interlockings limits the capacity of the terminal area.

This project could be advanced as an early action item from the South Station project. It would not preclude future expansion and would be designed to facilitate the accommodation of additional future rail service to South Station.

3.2.3 Long-term MBTA Strategies

Long-term MBTA Commuter Rail investment ideas are being considered in separate planning processes from the State Rail Plan.

MBTA Commuter Rail Vision

The MBTA Commuter Rail Vision is an initiative intended to identify the most cost effective strategies for leveraging the MBTA's extensive rail network to increase ridership and better meet the transportation and economic growth needs of the Greater Boston region. The MBTA Commuter Rail Vision will help to facilitate a broader conversation about the future of the rail network to inform the development of the next operating contract for the MBTA's rail system.

Focus40

Focus40 is the MBTA-wide 25 year capital plan for the MBTA. While the Rail Vision will be highlighting near and long-term strategies to address preferred service models that come out of the planning process, there are some investments in commuter rail that are not dependent on the outcome of the Rail Vision, such as infill stations, double or triple tracking, and parking facilities. Focus40 will be the source for those investment proposals. More information on Focus40 can be found at www.mbtafocus40.com.

3.2.4 Long-Term Prioritization Process

With so many potential projects and finite funding to support infrastructure investment over and above MassDOT's commitment to state-of-good-repair, it was essential to develop a process to prioritize which multimodal transportation projects should be pursued. A similar process was developed for both passenger and freight projects. A detailed explanation of the screening process and the projects selected for advancement based on this process are included in Chapter 5.

3.2.5 Studies in Development

There are several rail projects currently being studied by MassDOT for their feasibility, costs, benefits, and other considerations. These studies are not being evaluated separately as part of this plan. Instead, the findings from these studies will inform future courses of action. These planning studies include:

Berkshire Flyer

The Berkshire Flyer Passenger Rail initiative between the Massachusetts region of the Berkshires and New York City is a study looking at the feasibility and benefits of direct passenger rail service from Pittsfield to New York City via New York's rail system during peak tourist season. This project would provide an alternative mode of transportation for travelers from New York interested in accessing the Berkshires and potentially residents of Massachusetts looking to travel to New York. Interest exists for improving access to the Berkshires. The travel options that the study is considering could help support economic vitality in the region during the summer months and perhaps establish travel patterns that would help reverse population decline for the region. A high level analysis is being conducted through MassDOT's Office of Transportation Planning. The study's findings are anticipated for release in March of 2018.

North-South Rail Link Feasibility Reassessment

The North South Rail Link is a proposed pair of 1.5 mile-long tunnels that would connect the MBTA's North Station and South Station. The purpose of the feasibility reassessment is to identify whether the project is still feasible given recent development and whether the costs may be commensurate with the benefits for the project.

Chapter 4:

Proposed Freight Rail Improvements and Investments

The freight rail transportation system in the Commonwealth of Massachusetts, comprised of private- and publicly-owned rail lines, supports the state and regional economies, provides redundancy for the movement of freight, and helps relieve roadway congestion. The Massachusetts rail system annually carries a volume of freight equivalent to approximately 850,000 trucks trips¹ and, from an environmental perspective, freight railroads are, on average, four times more fuel efficient than trucks.² In fact, every ton-mile of freight moved by rail instead of truck reduces greenhouse gas emissions by 75 percent.³ Additional benefits associated with reduced truck travel include reduced pavement and bridge maintenance costs resulting from less wear and tear on the roads.

The freight rail system in Massachusetts was originally created in the mid to late 1800's with rail line expansion and development

¹ Association of American Railroads, "Environmental Benefits of Moving Freight by Rail," April 2016

² Association of American Railroads, "Freight Railroads Help Reduce Greenhouse Gas Emissions," August 2015.

³ Association of American Railroads, "Freight Railroads Help Reduce Greenhouse Gas Emissions," August 2015.

occurring through the early 1900s. It is not uncommon to see railroad infrastructure (such as bridges, retaining walls, and culverts) that were built more than 100 years ago. Due to age and continued use, there are many freight rail system assets that are in need of repair. In addition, much of the system was built at a time where there were differing demands and requirements. The shortcomings of today's system include physical constraints of yard infrastructure and connectivity, congestion, vertical clearances, and allowed weight on rail.

As roadway congestion continues to increase in the Northeast, opportunities are likely to emerge for expanded freight rail use. Ensuring that the freight rail system is maintained in a state-of-good-repair is critical if Massachusetts wishes to remain economically competitive for a wide range of industries. The near-term strategy and long-term vision is to focus efforts on achieving and maintaining the system in a state-of-good-repair. As that occurs, MassDOT's policy supports rail system expansion, modernization, and capacity enhancement to accommodate growth in freight demand.

4.1 Near-term Strategy and Key Project Proposals

Near-term freight projects for inclusion in the rail plan were also identified primarily through the 2018-2022 Capital Investment Plan (CIP). The CIP determines the State’s funding process for transportation networks and sets priorities for funding programs. First priority are projects that improve reliability, followed by projects that modernize the system or increase capacity, and finally those that enhance access to the system.

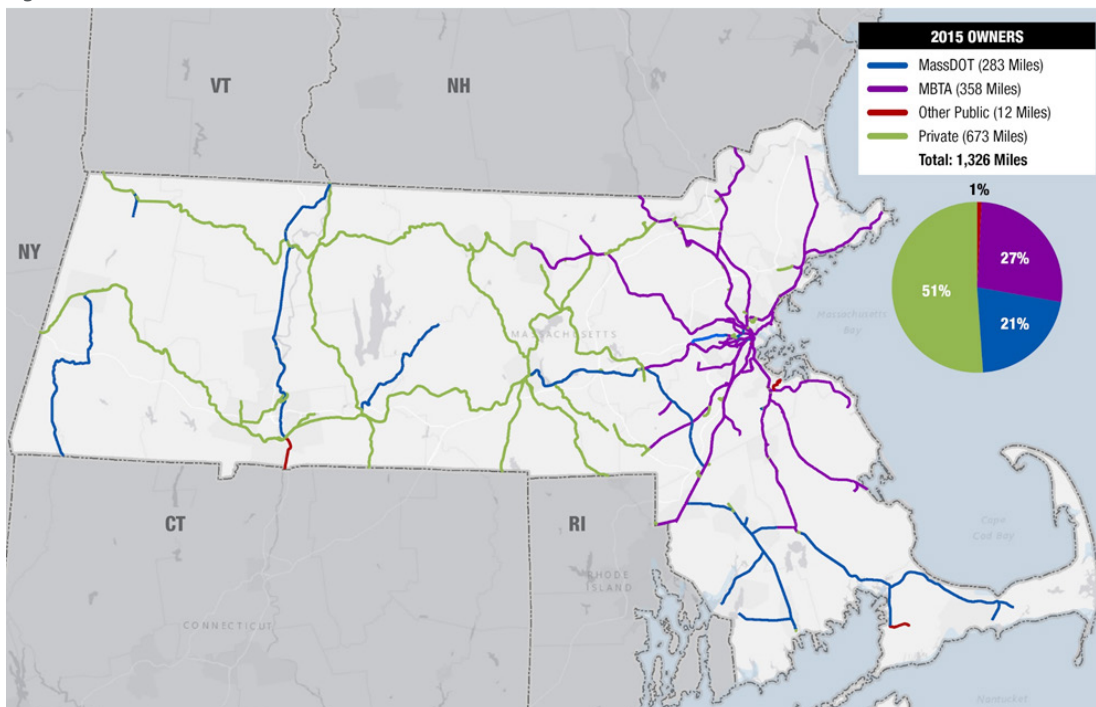
The following near-term program needs with key projects are proposed by the Commonwealth of Massachusetts as top priorities for freight service in the 2018-2022 CIP and are highlighted below and discussed in more detail in Chapter 5:

Within these programs, MassDOT’s near-term top priorities for freight improvements include upgrading key lines, namely MassDOT’s lines in Southeast Massachusetts and the New England Central Railroad (NECR) corridor in Western Massachusetts to accommodate a weight of 286K, which is a proposal strongly advocated by freight shippers and can have a wider public benefit by making it more efficient to use freight rail instead of shipping by truck.

Lower weight limits on rail require the use of older rail cars that are being phased out, and that come at higher cost for shipping product by rail. Weight limits lower than 286k make rail shipping less attractive and less used, leading to higher truck freight movement that generates higher rates of regional traffic congestion.

In addition, MassDOT hopes to leverage private financing to help expand rail access as part of the Industrial Rail Access Program (IRAP). Both of these efforts will be discussed in more detail in Chapter 5.

Figure 4-1: 2015 Rail Owners



4.2 Long-term Freight Rail Project Proposals

4.2.1 Long-term Freight Strategy

Similar to the process laid out in Chapter 3 for passenger rail projects, a list of long-term freight rail project was assembled for consideration. The projects included in the long-term freight rail project list were identified through discussion with MassDOT, partnering agencies and the general public. In addition, freight specific outreach initiatives were developed to elicit feedback from private freight railroads in Massachusetts including an emailed questionnaire and survey and two freight focus groups.

Freight project proposals identified through the State Rail Plan outreach process are shown in alphabetical order in Table 4-1. The following sections describe these proposals in more detail along with high level potential benefits and challenges associated with these projects. Although all of these ideas have some merit, with limited resources, only those projects that appeared to have the greatest benefit, feasibility, and ability to leverage existing assets and outside resources were ultimately recommended for further action (either implementation or study) in the long-term program outlined in Chapter 5.

4.2.2 Long-term Freight Rail Projects

Extend New Bedford Secondary to New Bedford Airport

This is a publicly proposed project to build a freight rail spur from the New Bedford Secondary Line to the New Bedford Airport. This added service would support intermodal connections between freight rail and cargo transported via air. Mass Coastal Railroad and CSX operated trains over the New Bedford Secondary Line. There is limited information about the benefits, cost, or feasibility of this project.

Fall River Secondary Extension to Rhode Island

This project is a continuation of the Fall River Secondary Line that aims to restore freight service on the Fall River Secondary all the way to the Rhode Island Border thus improving freight rail access to businesses in the region and abutting industrial properties along the existing railroad right-of-way. A rail extension to the Rhode Island border will provide the opportunity to lessen the cost of the City of Fall River's waste disposal by allowing the City's waste treatment plant to be served by rail.

New Bedford Marine Commerce Terminal Rail Spur

The New Bedford Marine Commerce Terminal (NBMCTRS) rail spur is a component of the ongoing Waterfront Redevelopment Plan for the Eversource-Sprague site in New Bedford. The NBMCT, also known as South Terminal, is an integral part of the New Bedford Waterfront Redevelopment. The South Terminal currently contains the marine commerce terminal, historic brick mills, and is home to a robust fishing center and other related industries. The South Terminal expansion proposal included in the Waterfront Redevelopment Plan, supports long-term water-dependent industries and cargo expansion, provides a future anchor for South Terminal focus area, and provides potential water-related space for freezing and processing.¹

¹ New Bedford Waterfront Redevelopment Plan – Public Meeting #1 Sides 17-18 (February 2, 2016)

Table 4-1: Long-term Freight Rail Project List

LONG-TERM FREIGHT RAIL PROJECT LIST		
PROJECT	LINE	REGION
Extend New Bedford Secondary to New Bedford Airport	New Bedford Secondary	Southeastern
Fall River Secondary Extension	Fall River Secondary	Southeastern
New Bedford Marine Commerce Terminal Rail Spur	New Bedford Secondary	Southeastern
Otis Industrial Track	Falmouth Secondary	Southeastern
Priority 286K Network not Previously Completed	Multiple	Multiple
Ware River Secondary	Ware River Secondary	Central

Otis Industrial Track

The Otis Industrial Track is a spur off of the Falmouth Secondary Rail Line into the Joint Base Cape Cod (JBCC) and the recently re-opened transfer facility. This section of track could be an important investment because the JBCC uses it for the movement of military equipment. MassDevelopment may work with JBCC to fund the rehabilitation of the line. The proposed long-term infrastructure improvements to the Otis Industrial Track aim to replace ties, rail, ballast, surface, and trans load equipment in an effort to keep the track in operational service. The benefits associated with this project include improved access for the JBCC.

Priority 286K Network Not Previously Completed

Building off of planned weight-on-rail upgrades, this priority item entails completing identified 286K improvements not accomplished in the near-term rail priorities. The State is identifying funding opportunities with railroads and leveraging funding to modernize the freight rail system. A broader network of rail that can accommodate 286K rail can generate improved shipper efficiency, reduced transportation costs to local businesses that use rail for shipping product, and increased options to move cargo.

MassDOT’s Rail Division seeks to use additional funds as they become available to complete 286K weight limit upgrades where it provides the greatest benefit to freight interests and the general public. One already identified source is the roughly \$2 million per year coming from the newly created National Highway Freight Program that can be used for non-highway freight projects.

Ware River Secondary

The Ware River Secondary project includes securing public rights and access to a 1.2 mile segment that connects the Ware River Secondary to the CSX Main Line. In addition to access rights the project would include improvements to the Palmer Yard located along the Ware River Secondary. These improvements would support and continue the work included in the CIP. Palmer Yard is typically used for interchanges between the New England Central Railroad (NECR) and the Massachusetts Central Railroad (MCRR). Continued maintenance and improvements to the yard track and other repairs would support expanded freight service in the region, and more effectively use existing rail assets.

4.2.3 Long-term Prioritization Process

With so many potential projects and limited funding to support infrastructure investment, it became important to develop a process to choose and prioritize which multimodal transportation projects should be pursued and in what manner. A similar process was developed for both passenger and freight projects, so a detailed explanation of the screening process is included in Chapter 5.

Chapter 5:

The State's Rail Service and Investment Program

5.1 Vision

Over the last decade, MassDOT has made significant investment in the acquisition of railroad right-of-way (ROW) to maximize the public benefit of these assets. MassDOT is focused on maintaining these assets in a state-of-good-repair and making additional investments that will maximize the public benefit of this portfolio. The goal of this investment plan is for it to be a cost effective, economic driver that will build on past investment choices and facilitate benefits that can be achieved in all regions of the state. The Commonwealth's vision for its rail system can be summarized as follows:

- **Long-term Reliability & Resiliency:** Maintain and improve the rail system in Massachusetts to enable efficient and dependable passenger and freight rail operations.
- **Modernize:** Improve existing systems to meet industry standards and federal regulations to facilitate proper operations for both freight and passenger rail services.
- **Optimize:** Pursue opportunities to leverage prior investment to maximize utilization
 - Maximize return on prior investments
 - Leverage partnership opportunities
- **Regional Balance:** Pursue strategies that balance the costs and benefits of rail throughout the Commonwealth.

5.2 Program Development

For the Massachusetts State Rail Plan, Federal Railroad Administration (FRA) requires the identification of both near- and long-term projects for inclusion in the state rail plan. The near- and long-term passenger and freight rail projects considered for this plan were identified and described in Chapters 3 and 4. In the sections below, the processes developed to identify key priorities for passenger and freight rail among the proposed projects described in Chapters 3 and 4 are described. Top priorities that best align with the needs and opportunities laid out in Chapter 2 are highlighted and recommendations are provided.

5.3 State Rail Plan Near-Term Program

5.3.1 Prioritization Process

Most near-term projects were prioritized through the Capital Investment Plan (CIP) development process for the 2018-2022 CIP released in the summer of 2017.

For the CIP process, program amounts were sized based on the balancing of rail needs with other capital priorities across MassDOT. Modernization and Capacity projects were selected using the evaluation process recommended by the independent Project Selection Advisory Council (PSAC). For the 2018-2022 CIP update, the scoring system included the following evaluation criteria: system preservation, mobility, cost effectiveness, economic impact, safety, social equity & fairness, environmental and health impacts and policy support. Modernization and expansion projects were then selected for funding based on their associated scores within each program as well as other qualitative criteria used in the process, such as project readiness.

Priority 1 Reliability investments were prioritized using an inventory of past projects, condition reports, and established state of good repair needs for the MassDOT Rail & Transit Division

MassDOT's Rail & Transit Division is developing an asset management system that will incorporate the data sources that MassDOT now maintains and use them to both inform the annual CIP project scoring process and

help balance needs within program areas (e.g. grade crossings, bridges, track and right of way reliability).

The CIP is a financially constrained five year list of projects that is updated every year. Additional funding can become available and result in additional projects being incorporated in subsequent CIPs. Therefore, this Rail Plan will highlight funded projects as well as those that are anticipated to receive funding in the 2019-2023 CIP.

5.3.2 Near-term Investment Highlights

The following near-term initiatives were identified in the 2018 CIP:

System Wide Near-term Priorities **Attain a State-of-Good-Repair across All Rail Assets**

As the State's rail infrastructure faces the challenges of aging and outdated elements, MassDOT's ability to maintain critical transportation infrastructure in a state-of-good-repair becomes more of a top priority. SGR is defined by the U.S. Department of Transportation FAST Act as "a condition in which physical assets, both individually and as a system, are (A) performing at a level at least equal to that called for in their as-built or as-modified design specification during any period when the life cycle cost of maintaining the assets is lower than the cost of replacing them; and (B) sustained through regular maintenance and replacement programs."¹

¹ Federal Railroad Administration, U.S. Department of Transportation, Benefit-Cost Analysis Guidance for Rail Projects, June 2016 (page 30).

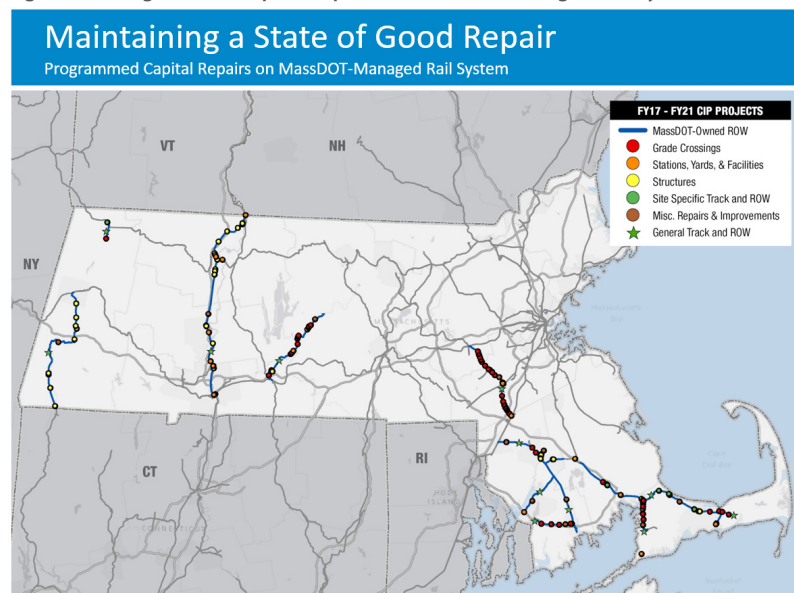
Because of MassDOT’s significant investments in rail infrastructure over the past several years, it is necessary that these assets be maintained in order to provide benefits to the State. In general, the benefits associated with SGR include improved service quality reliability, reduced long-term maintenance and repair costs, and enhanced safety.

As highlighted in this chapter and in previous chapters, MassDOT’s first priority across all assets is improving reliability through strategic asset management. The programed capital repairs on MassDOT’s managed rail system are highlighted in Figure 5-1.

Improved Safety of at-Grade Crossings locations

Improving safety, especially associated with highway and rail at-grade crossings, is a key priority for the Commonwealth of Massachusetts. Near-term projects that help to improve the safety of at-grade crossing locations have been prioritized. According to the Bureau of Transportation Statistics, State Transportation Statistics 2015, higher auto vehicle miles traveled and frequent train service generates potential risk at the State’s 1,434 at-grade crossings. Between 2010 and 2016, there have been 100 grade crossing improvement projects funded by the Section 130 program (Figure 5-3). Section 130 funds are distributed to states by formula from Federal Highway Administration (FHWA) apportionments.

Figure 5-1: Programed Capital Repairs on MassDOT Managed Rail System



The Section 130 provides funding for the elimination of hazards at railway-highway crossings. Since the program’s inception in 1987 through 2014, despite an overall increase in vehicle miles traveled on roadways and an increase in passenger and freight rail traffic, fatalities have decreased by 57 percent at grade-crossing locations where safety hazards have been eliminated.²

Passenger Rail Near-term Priorities Expand Rail to Enhance Access

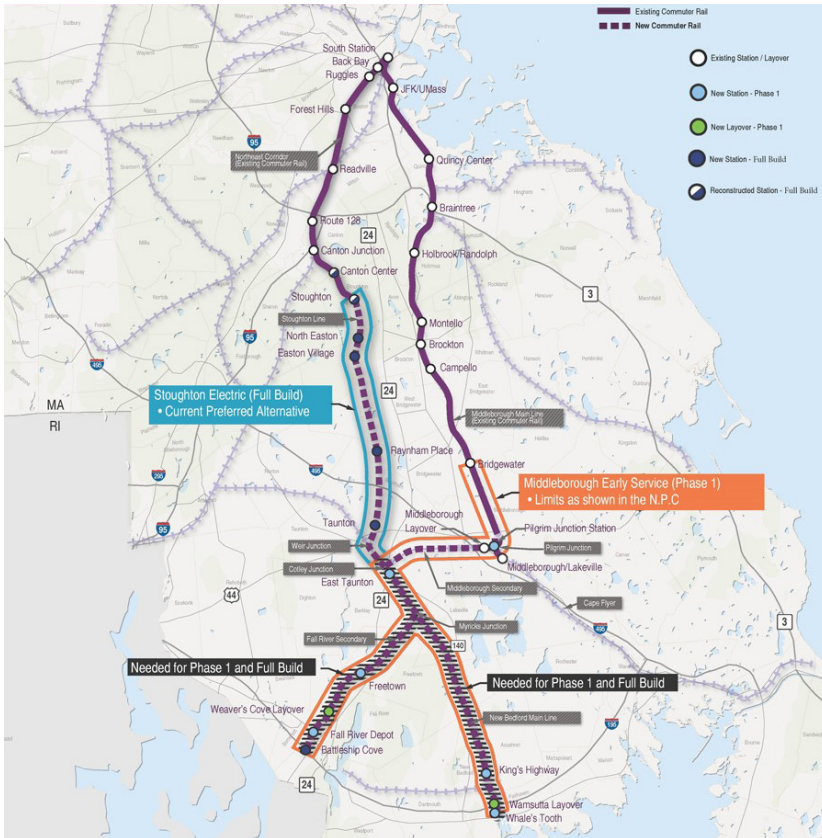
South Coast Rail

In March 2017, the Massachusetts Department of Transportation (MassDOT) announced a new method for advancing the South Coast Rail (SCR) project, which would bring commuter rail to the South Coast. While committed to the full build, known as the Stoughton Electric Route, MassDOT determined it could provide earlier service to the region by extending an existing rail service through Middleborough, as Phase 1.

This alternative is being fully evaluated in the Draft Supplemental Environmental Impact Report (DSEIR), which MassDOT will submit for full public review early in 2018.

² U.S. DOT FHWA, Railway-Highway Crossings (Section 130) Program: <https://safety.fhwa.dot.gov/hsip/xings/>

Figure 5-2: South Coast Rail



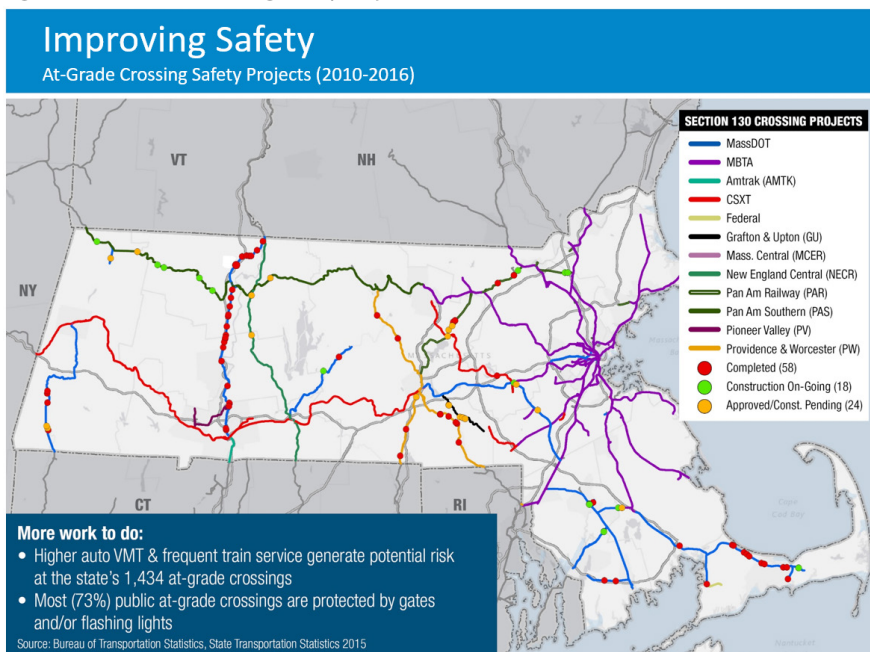
MassDOT has allocated \$165 million in the 2018-2022 CIP towards upgrading the existing freight lines to advance a Phase I implementation of South Coast Rail and is working to identify additional funding in the 2019 CIP. Early action bridges and grade crossings, as well as the ongoing state-of-good repair efforts support the preservation of the corridor and enable freight operations to continue as MassDOT identifies full funding for Phase I and advances full implementation of Sloughton Electric.

Maximize use of Rail Investments

Knowledge Corridor & Springfield Union Station

Located along Interstate 91 within the Connecticut River Valley, the Knowledge Corridor includes a cluster of relatively high-density communities between Springfield and White River Junction, VT. The Knowledge Corridor is an important cultural and economic region within the Commonwealth, consisting of many important cultural, educational, business, and medical facilities. Significant levels of rail investment have been made along the corridor by MassDOT and other agencies.

Figure 5-3: At-Grade Crossing Safety Projects (2010-2016)



In the near-term, MassDOT has funded over \$70 million of the overall \$120 million in improvements to infrastructure and equipment for the Knowledge Corridor to complete the improvements for the Restore Vermonter project that will also support future intercity service along the corridor. The infrastructure and equipment improvements will maintain the corridor in a state-of-good-repair and could allow MassDOT to explore the feasibility of a pilot intercity rail service between Springfield and Greenfield. Such a service would better connect residents in the region to each other and the Connecticut job markets. It would also provide easier day-trip access to New York City.

A substantial portion of the western Massachusetts population is located in the Hartford-Springfield metropolitan area. MassDOT has made a commitment to passenger rail access in western Massachusetts and has invested substantially in rail infrastructure in the region, including the recently completed overhaul of Springfield Union Station. This commitment to intercity rail has enabled the State to gradually expand and improve services. Additionally, MassDOT supports Connecticut DOT's efforts to begin new passenger rail service that will begin operating between New Haven, Connecticut and Springfield, known as the Connecticut Hartford Line, in 2018.

Streamline Rail Management

Several of the lines now owned by MassDOT were acquired primarily to meet MBTA needs — either active service or resiliency. With the advent of South Coast Rail (phase 1 in 2022 in advance of Full Build), a pilot service for Foxboro and continued Patriots service on the Framingham line, and the possibility of commuter rail service to Buzzards Bay, a framework should be established to transition management of some of the MassDOT owned rail assets to the MBTA as the primary beneficial user.

Freight Rail Near-term Priorities **Expand Rail to Enhance Access**

Fall River Secondary Extension to Gold Medal

The Gold Medal Bakery Co., located in Fall River is a prominent business in Southeastern Massachusetts that distributes consumable products (flour, bread, etc.). Currently, Gold Medal Bakery does not have direct freight rail access. Extending the Fall River Secondary rail line would provide them on-site rail access, and benefits associated with improved rail connections include reduced shipper cost savings, reduced roadway congestion and reduced environment impacts.

Industrial Rail Access Program

Industrial Rail Access Program (IRAP) is MassDOT's competitive, public/private partnership (P3) grant program with the purpose of increasing access to rail freight service and preserving or stimulating economic development through the generation of new or expanded rail service. This program was created by the Legislature in 2012, and provides financial assistance to support investment in industry-based rail infrastructure. The private sector provides a minimum of 40 percent of IRAP project cost. The maximum IRAP grant award cannot exceed \$500,000.

Since 2013, \$18.7 million of public/private funds have been invested in the Commonwealth rail system through IRAP projects. Each year the Commonwealth receives 1.5 to 2 times the value of this investment in public benefits. The \$1.4 million investment in IRAP projects in 2014 resulted in approximately \$450,000 worth of emissions reductions, \$600,000 worth of safety benefits, \$125,000 worth of reduced roadway maintenance and congestion, and \$2 million worth of shipper cost savings.³

3 MassDOT Board Presentation, MassDOT Rail & Transit Division, March, 2017

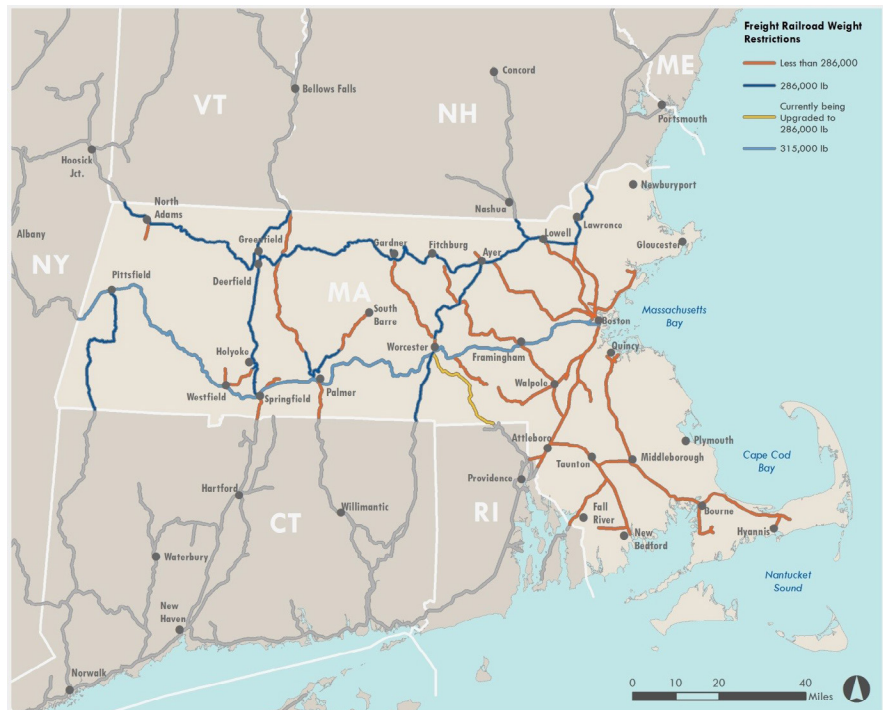
Expand Capacity

286K Weight on Freight Rail

The current U.S. standard is that a rail line is rated for rail cars weighing up to 286,000 pounds, known as the 286K standard. Weight ratings are based on bridge and culvert strength and condition, as well as on the weight of the track itself. Figure 5-4 shows the weight restrictions of rail lines in the Commonwealth.

Prioritizing investment in 286K standard rail in Massachusetts is consistent with the immediate strategies identified in the most recent Massachusetts Freight Plan. Freight railroads provide a cost effective, safe, and energy efficient option for Massachusetts shippers and receivers and is an important link to the national freight network. The current 263K weight restriction along many freight rail lines creates inefficiencies for shipments moving through Massachusetts. The need and desire to upgrade the current weight capacity in Massachusetts to the U.S. standard was echoed during freight outreach initiatives for this rail plan.

Figure 5-4: Freight Railroad Weight Restrictions



Near-term priorities include updating rail corridors in the Southeast Massachusetts and New England Central Railroad (NECR) corridors in Massachusetts to accommodate 286k weight on rail. This expanded rail capacity would enable local freight carriers to improve freight shipments to and through significant portions of Massachusetts. In general, the improvements made along these corridors will result in more cargo capacity per railcar, thus leading to fewer railcars, trains, crews, and gallons of fuel consumed.

The NECR 286K initiative would leverage private, Federal, and state resources to upgrade the weight limit on approximately 32 miles of the NECR line in Western Massachusetts. This project would improve freight rail movement to and through Massachusetts. The NECR line runs between Vermont and Connecticut via Palmer and will allow for critical connections with Class I freight lines. NECR and MassDOT are jointly pursuing federal funding to upgrade the line and improve the competitiveness of businesses in this rural section of Massachusetts.

The Southeastern Massachusetts (SE Mass) 286K initiative consists of track and tie replacements and bridge and culvert upgrades along six segments of rail, covering nearly 80 miles of track in Southeastern Massachusetts. Six rail corridor segments were packaged together and previously included in a FASTLANE federal grant application. The six segments considered in this initiative are portions of the Framingham Secondary, Northeast Corridor, Middleboro Subdivision, Dean Street Industrial Track, Fall River Secondary, and New Bedford Secondary. As 286K improvements are highlighted in the MassDOT Freight Plan, MassDOT can pursue Federal Highway Administration freight funding to support this effort.

Both 286k projects would support numerous businesses whose rail transportation costs have been elevated due to the current weight restrictions along the line. These weight capacity constraints raise the costs of conducting business. In addition, the 286k upgrades would improve overall mobility in the area by providing a transportation choice to freight shippers who might otherwise utilize trucking, potentially contributing to roadway congestion.

5.3.3 Full Near-term Investment Program

For a full description and cost allocation for near-term MassDOT funded MBTA, inter-city passenger rail, and freight rail investments that are funded in the FY2018-2022 CIP, please see Appendix A. MBTA commuter rail investments are also included in Appendix B.

The near-term priority projects discussed in the previous section are presented in Figure 5-5 as well as both the Tier 1 and Tier 2 long-term projects discussed in the subsequent section.

Figure 5-5: Near-term priority and Tier 1 and Tier 2 long-term projects



5.4 State Rail Plan Long-term Program

5.4.1 Prioritization Process

To help identify freight and passenger rail priorities for the longer term that will build off near-term priorities, a list of projects was assembled for consideration and assessed against the State Rail Plan goals. The list was developed through discussions between MassDOT and partnering agencies, a review of completed and ongoing studies, and input from elected officials, regional MPOs, civic associations, and members of the public.

With so many potential projects and finite funding, it was essential to develop a process to choose and prioritize which transportation projects should be pursued and when they should move ahead. The top priority long-term projects identified through this process are prominent candidates for being funded following the implementation of near-term rail priorities in Massachusetts.

The following evaluation criteria were used to initially screen the passenger and freight rail projects. The criteria reflect the goals of the plan and the long-term vision for rail in the Commonwealth.

Screening Criteria:

- Enhances Mobility
- Improves Safety & Security
- Maximize use of Existing Right-of-Way
- Supports Economic Growth
- Environmental Benefits
- Improves Intermodal Connectivity

Additional Considerations:

- Order of Magnitude Cost and Feasibility
- Geographic diversity
- Amount of available information

Following the initial benefit assessment, MassDOT considered order of magnitude cost and feasibility as well as geographic diversity and the information available on the project in order to determine priority and subsequent course of action for each project.

Projects included in this prioritization effort are considered long-term and therefore range from conceptual ideas to more fully developed proposals with prior planning studies. For that reason, the cost and feasibility of each project were evaluated at a high level if information were available. Projects with limited information were identified as such.

The prioritized projects were grouped into three tiers, which can be seen in Table 5-1 and Table 5-2.

- **Tier 1 – Priority for Implementation:** Included in Tier 1 are projects that most clearly support the long-term vision of the State. Tier 1 projects have the potential to promote mobility, improve intermodal connectivity and support economic vitality. These projects do not require further study and can advance through design and implementation.
- **Tier 2 – Warrant further study:** Projects that have been grouped into Tier 2 warrant further study (either by MassDOT or other stakeholders) of costs, feasibility, constructability, and net benefits. These projects require further understanding of the project definition (type of service, alignment, etc.) and the relationship between the magnitude of costs and benefits in order to fully understand whether the investment is worthwhile. These projects will be revisited in subsequent plans.

Table 5-1: Long-Term Passenger Rail Projects - Tier 1

TIER 1 - PRIORITY FOR IMPLEMENTATION (LONG-TERM PASSENGER RAIL PROJECTS)							
	PROJECT TITLE	LINE	REGION	BENEFITS	FEASIBILITY		COST
Tier 1	New Haven to Springfield Service	NHHS	Western	High	High	Coordination with Amtrak/ Connecticut	\$
	Springfield to Greenfield Passenger Rail Service	Knowledge Corridor	Western	High	High	Dependent on pilot program, which is a near-term priority	\$
	South Station Expansion (SSX)	South Station	Eastern	High	Med	Purchasing and relocation of postal service facility and associated challenges	\$\$\$
	Improve Tower 1	South Station	Eastern	High	Med	Some improvements will require purchase of postal service facility to obtain full benefits, but signal and other components can be done as SSX early action items	\$\$
	South Coast Rail Stoughton Electric	Stoughton	South Coast	High	Med	Permitting challenges	\$\$\$\$

Table 5-2: Long-Term Freight Rail Projects - Tier 1

TIER 1 - PRIORITY FOR IMPLEMENTATION (LONG-TERM FREIGHT RAIL PROJECTS)							
	PROJECT TITLE	LINE	REGION	BENEFITS	FEASIBILITY		COST
Tier 1	Priority 286K network not previously completed	Varies	Varies	High	High	Dependent on near-term 286K projects completed	\$\$-\$
	Fall River Secondary Extension to Rhode Island Border	Fall River Secondary	Southeastern	Med	High	Dependent on near-term Fall River Extension Phase	\$
	Ware River Secondary Projects	Ware River Secondary	Central	Med	High	Dependent on leveraging existing investments and addressing challenges associated with acquiring track & ROW	\$

Table 5-3: Long-Term Passenger Rail Projects - Tier 2

TIER 2 - WARRANTS FURTHER STUDY (LONG-TERM PASSENGER RAIL PROJECTS)							
	PROJECT TITLE	LINE	REGION	BENEFITS	FEASIBILITY		COST
Tier 2	Western Massachusetts to Boston Passenger Rail Service Study	Inland Route	Western (primary)	TBD	TBD	Challenges associated with line ownership and freight conflicts; prerequisite investments.	TBD

Table 5-4: Long-Term Freight Rail Projects - Tier 2

TIER 2 - WARRANTS FURTHER STUDY (LONG-TERM FREIGHT RAIL PROJECTS)							
	PROJECT TITLE	LINE	REGION	BENEFITS	FEASIBILITY		COST
Tier 2	Otis Industrial Track Study	Falmouth Secondary	Southeastern	Med	High	N/A	\$-\$
	New Bedford Marine Commerce Terminal Rail Spur Study	New Bedford Secondary	Southeastern	High	Med	Challenges with establishing a new rail corridor in a urban area.	N/A Limited Info

Table 5-5: Long-Term Passenger Rail Projects - Tier 3

TIER 3 - NO ACTION RECOMMENDED AT THIS TIME (LONG-TERM PASSENGER RAIL PROJECTS)							
	PROJECT TITLE	LINE	REGION	BENEFITS	FEASIBILITY		COST
Tier 3	Privately Operated Commuter Rail Service between Worcester and Providence	P&W Mainline	Central	Med	Low	Interest by private sector initiator, but challenges associated with ridership and access agreements.	N/A Limited Info
	Palmer Station	Inland Route	Western	Low	Low	Limited market with little local planning to establish station context.	\$-\$
	Housatonic Passenger Rail Service	Berkshire Line	Berkshires	Low	Low	No current likelihood of service improvements in Connecticut.	\$\$\$
	Passenger Service to Montreal via Springfield	Inland Route	Western/Vermont	Low	Low	Challenges associated with line ownership/shared use and coordination with CSX. Low ridership and capacity on line.	\$\$\$\$

Table 5-6: Long-Term Freight Rail Projects - Tier 3

TIER 3 - NO ACTION RECOMMENDED AT THIS TIME (LONG-TERM FREIGHT RAIL PROJECTS)							
	PROJECT TITLE	LINE	REGION	BENEFITS	FEASIBILITY		COST
Tier 3	Extend New Bedford Secondary to New Bedford Airport	New Bedford Secondary	Southeastern	Low	N/A	No information available	N/A Limited Info

- Tier 3 – No action recommended at this time:** Projects included in Tier 3 are less consistent with the Vision for rail in the Commonwealth, have associated implementation challenges, are either complex and/or expensive, or have benefits not commensurate with the cost that are apparent through the screening in this exercise. These projects would require significant partner support or a change in circumstance for further consideration in subsequent plans.

5.4.2 Long-term Investment Program

MassDOT's long-term investment strategy includes the Tier 1 investments, and Tier 2 investments pending further study and acceptance in the next State Rail Plan. The following sections provide more information about these projects, why these projects were included in Tier 1 or Tier 2, and next steps.

Tier 1 Priorities for Implementation: Passenger **New Haven to Springfield Passenger Rail Service and Springfield to Greenfield Passenger Rail Service**

The Knowledge Corridor runs between Springfield Union Station and East Northfield, Massachusetts. MassDOT has currently allocated funds to improve infrastructure and equipment, which consists of improvements to existing stations, bridges and culverts, track and right-of-way, and yard facilities. MassDOT is interested in leveraging these prior investments along the Knowledge Corridor to expand associated economic benefits.

North-south passenger rail service in Western Massachusetts between Connecticut and Greenfield, via Springfield, is a priority for Massachusetts to pilot because it may increase rail service in an existing market and leverage past investments. Passenger service along the Knowledge Corridor could be implemented through a multi-phased plan. The first phase of the passenger service plan would be an initial pilot program, which would utilize follow the infrastructure improvements already done and slated for this corridor. MassDOT is exploring a pilot that would extend passenger rail service north to Greenfield as an adjunct of the new service that Connecticut will be bringing to Springfield in Spring 2018. The goal is to use this pilot program to define success and test service, market, and rationale for future long-term investment.

MassDOT will work with the Pioneer Valley Planning Commission and other stakeholders to identify performance targets for the pilot program in order to frame a more precise long-term strategy.

Expanded passenger service along the Knowledge Corridor may support transit oriented development (TOD) opportunities along the corridor. An example of such success is Northampton Station, which due to coordinated development around the station has led to a greater propensity of taking rail trips. This led to ridership that was greater than anticipated on existing service because of the close home, work, and retail destination proximity around the rail station. According to the National Association of Rail Passengers (NARP) statistics Northampton achieved a ridership level of 17,197 passengers in 2016, which was greater than the 10,220 projected in a Pioneer Valley Planning Commission 2009 study.

South Station Expansion/Tower 1 Improvements

The South Station Expansion (SSX) project intends to expand terminal capacity and related layover capacity in order to meet future high-speed, intercity, and commuter rail service needs. The expansion of South Station would enable growth in passenger rail along the Northeast Corridor (NEC) and within the Commonwealth of Massachusetts. The City of Boston has recently listed South Station Expansion as a priority in GoBoston 2030, a city-wide transportation plan released in 2017.

Part of MassDOT's evaluation the expansion of South Station is exploring ways to make Tower 1 improvements that are not reliant on the purchase of the postal service facility. Tower 1 is located immediately south of the South Station passenger terminal where all MBTA and Amtrak lines converge into South Station. This project would benefit both inter-city and commuter rail passengers by improving speed and reliability. This project could be advanced as an early action item from the South Station project. It would not preclude future expansion and would be designed to facilitate the accommodation of additional future rail service to South Station.

Stoughton Electric South Coast Rail

The Stoughton Electric route is the preferred alternatives as documented in the 2013 Final Environmental Impact Statement/ Report (FEISIR). At full capacity, the full-build will provide forty daily trips between Fall River/New Bedford and Boston. Long-term, this route depends on there being additional capacity at South Station to ensure its full effectiveness.

Tier 1 Priorities for Implementation: Freight

Priority 286K Network Build-out

The need to upgrade freight rail lines in Massachusetts to accommodate the current U.S. Standard Rail weight of 286K has been articulated by freight shippers and railroads in Massachusetts and is a priority for MassDOT in the near-term. Priority 286K networks identified in the near-term include the New England Central Railroad and Southeast Massachusetts corridors.

While MassDOT has identified two top priority corridors for upgrade to 286K, MassDOT understands the importance of broader implementation of such upgrades. Additional corridors for 286K upgrades will be assessed for their viability and ability to leverage private investment dollars.

Expanding the weight limits of rail in Massachusetts to meet the U.S. 286K standard would improve shipper efficiency through being able to take advantage of modern rail cars, and it would also strengthen freight corridor connections, helping businesses to be able to move product more efficiently from industrial sidings and intermodal yards to the larger national freight rail system. 286K investments along well-utilized rail corridors will further encourage economic development opportunities and foster expanded use the freight rail network to move product, particularly among those businesses where there is a need to move significant cargo more cost-effectively over large distances.

Fall River Secondary Extension to Rhode Island Border

As described in Chapter 4, funding is currently allocated through the CIP to make some improvements along the Fall River Secondary Line. Improvements include rehabilitation of the aging track, culverts, bridges and other elements. In addition, a top near-term freight rail priority for the State is to extend the Fall River Secondary to the Gold Medal Bakery, Co. in Fall River, as described earlier in this chapter.

In the longer term, continued maintenance along this line remains a priority as well as the full rail extension of the Fall River Secondary to the Rhode Island border, which would allow for a connection to the Fall River sewage facility. The City of Fall River is a supporter of this proposed project. In a letter of support for IRAP and MassWorks Infrastructure applications, the Mayor expressed that extending freight rail access will provide the City of Fall River with cost savings and environmental benefits associated with sewerage removal. The City experienced a \$1.5 million yearly increase in transportation and disposal costs associated with nine daily round-trip truck trips following the 2016 closure of the City's sewage sludge incinerator.⁴

⁴ City of Fall River Massachusetts – Office of the Mayor Letter of Support (August 30, 2017) – Track Repairs MP12 to MP14 Fall River Secondary Extension Project.

The rail extension would reduce operating costs by providing alternative, more cost effective transportation alternatives for sewage removal.

By maintaining and expanding the Fall River Secondary, freight businesses in Southeastern Massachusetts will benefit from reduced truck congestion as freight businesses utilize improved freight rail options and improved access to the larger freight network.

The Fall River Secondary Extension to Rhode Island can be considered for funding under future CIP updates as near-term projects are completed and funding becomes available for longer-term initiatives.

Ware River Secondary Projects

The Ware River Secondary project includes securing public rights and access to a 1.2 mile segment that connects the Ware River Secondary to the CSX Main Line. In addition to access rights the project could include improvements to the Palmer Yard located along the Ware River Secondary. As identified in chapter 4, these improvements would support and continue the work currently prioritized through the CIP. Palmer Yard is typically used for interchanges between the New England Central Railroad (NECR) and the Massachusetts Central Railroad (MCRR). Continued maintenance and improvements to the yard track and other repairs would support expanded freight service in the region, and more effectively use existing rail assets.

5.4.3 Long-term Tier 2 Investments for Further Study

Projects that were identified as Tier 2 investments warrant further study of preferred service models, costs, feasibility and net benefits. These projects will be revisited in subsequent plans. These studies are in addition to the important studies already being undertaken, including:

North South Rail Link — The North South Rail Link is a proposed pair of 1.5 mile-long tunnels that would connect the MBTA's North Station and South Station. The purpose of the feasibility reassessment is to identify whether the project is still feasible given recent development and whether the costs may be commensurate with the benefits for the project.

Berkshire Flyer — Pursuant to a 2017 legislative provision directing MassDOT to undertake a limited study evaluating the concept of a "Berkshire Flyer" service patterned after the Cape Flyer, a limited study is currently underway to identify a preferred alignment and service plan for a Berkshire Flyer service. Next steps for advancing a Berkshire Flyer service are dependent on the findings from this preliminary Berkshire Flyer study. The Working Group is to report its findings to the legislature in March 2018.

Patriot Corridor Double Stack Clearance Study — An initiative between MassDOT, Pan Am and Norfolk Southern to improve the Patriot Corridor. The Patriot Corridor runs between Albany, New York and Ayer, Massachusetts on the Pan Am Southern Rail line. The Patriot Corridor Double Stack Clearance Study has been federally funded and will be completed through the FY 2018-2022 CIP.

The following next steps are recommended for specific Tier 2 investments.

Tier 2 Priorities for Implementation: Passenger Boston to Western Massachusetts Passenger Rail Service

In the NNEIRI study, several service plan alternatives were considered for a route that included service between Boston and Springfield and one (79 mph with 4 trains daily) was identified as the preferred option. While higher speed options were considered, they were not studied in-depth due to perceived challenges.

Given the lack of consensus on the appropriate type of service to pursue from Western Massachusetts to Boston; the considerable unfunded investments needed prior to construction, including South Station Expansion and triple tracking between Worcester and Springfield; and the prior lack of substantial involvement of the owner of the line west of Worcester, this investment cannot be considered a Tier 1 priority for implementation.

To advance discussion of this concept in a meaningful way, a study, at the direction of MassDOT, will address more than ridership; it will take a hard look at issues related to constructability and operational impacts. It will examine safety needs (including Positive Train Control) associated with the expectation of higher speed trains going through settled areas (ex: Framingham), right of way acquisition (anticipated by the NNEIRI study, but not mapped to specific areas), constructability and community impacts (including impacts on existing stations and grade crossings), and the continuing need to protect freight rail capacity as well as MBTA commuter rail service on the Worcester line. The study might also look at a fare structure and the capacity that would be expected of an operator.

Tier 2 Priorities for Implementation: Freight New Bedford Marine Commerce Terminal Rail Spur

The New Bedford Marine Commerce Terminal Rail Spur (MCTRS) project aims to extend an existing New Bedford Secondary rail line 3,750 feet to a newly constructed marine facility. This extension project will simultaneously create opportunities for connection points to multiple large fish processing enterprises along the route. This project would support the local economy and also reduce reliance on trucks by creating access to alternative modes of transportation.

An initial analysis estimated costs at \$12 million for study, planning, design, permitting, and construction of the 3,750 feet spur from its current terminus to the NBMCTRS.

Further study is needed to identify a preferred path and whether soil contamination or rights-of-way issues overly complicate the project.

Otis Industrial Track

The Otis Industrial Track project involves enhancing the track spur off of the Joint Base Cape Cod (JBCC) and long-term improvements to replace ties, rail, ballast, surface, and transload equipment. The improvements would provide improved access and reliability of service for Cape Cod. This section of the track serves a defense purpose, in moving military equipment. Further study is still necessary to understand more about cost and feasibility.

5.4.4 Public and Private Economic Benefits

The public and private benefits that are anticipated from 4 and 20-year passenger rail investments include improving mobility, safety and security, and intermodal connectivity across the Commonwealth. The investments also aim to preserve railroad right-of-way, support economic growth, and limit environmental impact.

Public benefits of intercity passenger rail include reduction in the number of cars on the road, job creation, reduced energy consumption, and increased consumer spending. Some services — such as excursion trains — offer benefits that are relatively localized. Other services — such as the NEC — offer regional benefits that are much more widespread. Based on Amtrak’s economic contribution as calculated by the U.S. Department of Commerce, more than 825,000 highway trips are removed from Commonwealth highways due to intercity passenger rail (Amtrak) services. Amtrak operations directly account for 1,300 jobs in Massachusetts. Intercity passenger rail spending generated \$229 million in Massachusetts with \$21.5 million of that related to tourism activity supported by Amtrak.⁵ It is estimated that for every \$1 billion invested in rail 20,000 new jobs are created.

Monetized public benefits of freight rail on MassDOT-managed lines are approximately \$37.2 million in annual public benefits on safety, reduced environmental impact, congestion reduction, and lessened pavement maintenance expenditures based on analysis of MassDOT data and USDOT TIGER guidance related to the estimation of public benefits.

5.5 Relevant Ongoing Rail Studies and Reports

As mentioned in Chapter 1, there are several studies underway across Massachusetts that will inform future Rail Plan updates. The information that is being developed as part of these studies will aid in making decisions about project costs, feasibility, benefits, funding and integration into system-wide plans.

- **MBTA Commuter Rail Vision** — An on-going initiative intended to identify the most cost effective strategies for leveraging the MBTA’s extensive rail network with the goals of increasing ridership and meeting the transportation and economic growth needs in the Greater Boston region. The MBTA Commuter Rail Vision will be used to facilitate a broader conversation about the future of the MBTA passenger rail network to inform the development of the next operating contract for the MBTA’s rail system.
- **Focus40** — A 25-year investment plan, which aims to position the MBTA to meet the needs of the evolving and dynamic nature of the Greater Boston region in 2040. In addition to infrastructure challenges that exist today, the long-term strategy recognizes the shifting demographics, changing climate, and evolving technologies that may play a role in the future.

5.6 Program Coordination

Developing a long-term plan for future rail transportation for the next 20 years is a process that involves many stakeholders, including public, federal, state and local entities, and private entities such as national rail carriers, various interest groups, residents, and businesses. Particularly for near-term projects across state lines, MassDOT coordinated extensively with partner states, most notably with Connecticut, on service development plans and long-term operating funding plans for New Haven to Springfield rail service. In addition, the Massachusetts State Rail Plan coordinated with existing and ongoing planning initiatives, including the MBTA Commuter Rail Vision, Focus40, and the MassDOT Freight Plan.

⁵ “Amtrak’s Economic Contribution”; U.S. Department of Commerce

This Rail Plan highlights funded projects, as well as those that are anticipated to receive funding in the 2019-2023 CIP. Most of the near-term projects identified in this plan were prioritized through the Capital Investment Plan (CIP) development process for the 2018-2022 CIP released in the summer of 2017. The CIP is a financially constrained five year list, whereas the State Rail Plan covers a longer time frame to identify both near-term and long-term priorities. As additional funding becomes available, identified priorities without funding can be incorporated into subsequent CIPs.

The long-term plan for rail in Massachusetts has been laid out to complement the long-term vision for transportation within the Commonwealth and within the region. Namely, it includes cooperation with the stakeholders who participated in the Northern New England Intercity Rail Initiative (NNEIRI), the Northeast Corridor FUTURE (NEC FUTURE) report, and other Amtrak and MBTA and MassDOT long-term planning initiatives.

Chapter 6 discusses State Rail Plan general outreach and coordination in more detail.

5.7 Financing Plan

The Commonwealth identifies the importance of the statewide rail system and has therefore allocated significant funding for passenger rail system capital improvements, operations and maintenance. Near-term funding, allocated for passenger rail in the Capital Improvement Plan, includes support for both system-wide programs and specific project or corridor programs. In the 2018-2022 CIP, MassDOT allocated \$468M for non-MBTA passenger and freight rail.

5.7.1 Funding and Financing Opportunities

Rail funding comes from a variety of sources, federal, state, local and private entities. Except for the section 130 funding that FHWA provides for grade crossing improvements, federal funding for intercity and freight rail projects are generally discretionary, awarded on a competitive basis, and no state is guaranteed federal funding. There also are federal low interest and guaranteed loan programs. This section of the Rail Plan presents the current financing mechanisms used by, and available to, MassDOT to support passenger rail improvements and expansion.

Commonwealth Revenue

Capital contributions for the railroad network from the State generally come from the Commonwealth Transportation Fund (CTF). General Obligation bonds are backed by the Commonwealth's revenues and provide a pool of funds that supports capital investments. Most of the Commonwealth's capital budget for passenger rail is generated through state revenues.

The Rail Enhancement Program (REP) provides for the issuance of either general obligation or special obligation bonds to fund capital expenditures within MBTA and for other rail improvements in the Commonwealth. This revenue source is intended to provide financing for significant rail improvement projects in the Commonwealth outside the MBTA's regular capital program. These bonds are to be repaid from the CTF. The rail bonds have helped to fund activities related to: the South Coast Rail Extension, Knowledge Corridor, and South Station Improvements.

Local Capital Funding

Local funding for rail improvements is an existing and potential source for rail capital in Massachusetts. Local capital funding sources can be from municipalities and regional economic development agencies, or other locally derived sources. Local funding identified has been primarily for station improvements and intermodal facilities. Municipal funding for station area improvements or intermodal facilities would primarily derive from municipality's general fund or a special taxing district. Additionally, municipal or regional economic development agencies could be utilized to fund station area and intermodal facilities improvements through direct funding or financing for a project.

Public Private Partnerships & Private Sector Funding

Public private partnerships are used in Massachusetts to finance and/or deliver rail projects more efficiently. Public private partnerships include both passenger and freight rail projects. In some cases, private carriers have collaborated with states to secure funding for selected projects. Additionally, freight companies frequently fund improvements to company-owned rail infrastructure, such as upgrades to track, sidings, and signal infrastructure. While funding is primarily aimed at maintaining the railroad right-of-way for freight purposes, it also can support passenger rail operations.

Federal Financing

Federal financing options include the Rail Rehabilitation and Improvement Financing (RRIF) and Transportation Infrastructure Finance and Innovation Act (TIFIA) programs that are available to support freight rail projects.

5.7.2 Federal Aid

MassDOT has several sources of federal funding that support freight and passenger rail investments. These funds are limited, which requires MassDOT's Rail and Transit Division to use other state sources of funding to meet rail needs across the State. The FAST Act does however provide a new block grant program, the National Highway Freight Program (NHFP), where a state may obligate up to 10-percent of these funds for improving the flow of freight into and out of intermodal facilities or rail facilities. In addition, there are several traditional sources of block grant funding that MassDOT receives that can be applied to rail investments, including the: Rail-Highway Grade Crossing (Section 130) Program, the Surface Transportation Block Grant (STBG) Program, and Congestion Mitigation and Air Quality Improvement (CMAQ) Program.

National Highway Freight Program (NHFP)

The FAST Act establishes for the first time a consistent, dedicated source of funds for states to obligate towards projects that contribute to the efficient movement of freight on the National Highway Freight Network (NHFN). To receive funds under the National Highway Freight Program, the State has developed a State Freight Plan, which will be released by the Spring of 2018. Eligible projects shall contribute to the efficient movement of freight on the National Highway Freight Network, but up to 10 percent of these funds may also go towards any surface transportation project to improve the flow of freight into and out of a freight intermodal or rail facility, including those that are privately operated. This provides MassDOT with approximately \$2 million of the \$20 million annually in NHFP funding to allocate towards high-priority rail and intermodal projects.

Railway-Highway Grade Crossing (Section 130) Program

The Section 130 program provides funds for the elimination of hazards at railway-highway crossings. \$230 to \$245 million in funding is set aside by the FAST Act on an annual basis, which is allocated to states from the Highway Safety Improvement Program (HSIP) apportionment.

Surface Transportation Block Grant (STBG) Program

The STBG promotes flexibility in states and local transportation decisions and provides flexible funding to best address state and local transportation needs. Estimated funding under the FAST Act ranges from \$11.5 to \$12.1 billion each year allocated to states under the authorization from 2016 through 2020.

Congestion Mitigation and Air Quality (CMAQ) Improvement

The CMAQ program was implemented to support surface transportation projects and other related efforts that contribute air quality improvements and provide congestion relief. The FAST Act allocates \$2.3 to \$2.5 billion in CMAQ funding each year allocated to states under the authorization from 2016 through 2020. There is limited ability to use this funding outside of Commuter Rail. Nationally, CMAQ funding has been used successfully to retrofit diesel locomotives.

5.7.3 Federal Competitive Discretionary Grants

In addition, leveraging federal funds allocated on a competitive basis through programs like the TIGER and INFRA discretionary grant programs may be an option for some of the projects prioritized through this plan.

Recent discretionary funding sources are provided through the FAST Act under the Infrastructure for Rebuilding America (INFRA) Grant Program and the authorization of \$2.2 billion over five years for three new competitive rail development grants, which may provide a potential source of funds, if: (1) Congress funds these programs in budget appropriations, and (2) Massachusetts projects are viewed as higher national priorities than others in the nation. Consolidated Rail Infrastructure and Safety Improvements, Federal-State Partnership for state-of-good-repair, and Restoration and Enhancement Grants are the three grant programs applicable to passenger rail and freight rail capital investment authorized through the FAST Act.

Consolidated Rail Infrastructure and Safety Improvements

This discretionary program provides funding to projects that improve the safety, efficiency, and reliability of passenger and freight rail systems. Eligible activities include capital, regional and corridor planning, environmental analysis, research, workforce development, and training projects.

The main eligible recipients include state DOTs, public agencies or authorities, intercity passenger rail carriers including Amtrak, Class II or III railroads, and rail suppliers in partnership with any of the previously mentioned entities.

A large range of rail capital projects meet the eligibility for funding in this program, including rail line relocations, positive train control and rail integrity inspection system investments, at-grade crossing improvements, and development planning for corridor service and environmental analyses.

\$68 million was made available nationally this 2017 fiscal year. The minimum non-federal funding match is 20 percent, although preference is given to projects that offer at least a 50 percent match. To receive funds, projects should demonstrate a net positive benefit-cost analysis. Twenty-five percent of funds are set-aside for projects in rural areas.

Federal-State Partnership for State-of-Good-Repair

This discretionary program funds projects that reduce the state-of-good-repair backlog on publically-owned or Amtrak-owned infrastructure, equipment, and facilities. States, an interstate compact, Amtrak, or local governments are eligible project applicants. Eligible activities under this competitive funding include capital projects that replace existing assets in-kind or that increase capacity or service levels; provide existing service while assets are brought into a state-of-good-repair; or bring existing assets into a state-of-good-repair. Projects given priority are those where Amtrak is not the sole applicant, multiple supporting entities exist, and the federal share of project costs does not exceed 50 percent. Enacted FY 2017 funding levels is \$25 million nationally.

Restoration and Enhancement Grants

This program provides competitive grants provide operating assistance to initiate, restore, or enhance intercity passenger rail transportation. Grants are limited to three years of operating assistance per route and may not be renewed. Eligible applicants include state entities, local governments, Amtrak, and rail carriers. Financial assistance may cover operation expenses, such as staffing, fuel, maintenance, and management costs. The enacted FY 2017 funding level is \$5 million nationally.

TIGER Grants

The Transportation Investment Generating Economy Recovery (TIGER) grant program is a discretionary multimodal program administered by USDOT that allocates grants on a competitive basis to projects that will have a significant impact on the nation, a region or a metropolitan area. The TIGER grant program is unique as a federal transportation funding source, in providing funding for a wide variety of transportation projects, include: road and bridge projects, public transportation projects, passenger and freight rail projects, port infrastructure investments, and intermodal projects. The 2017 budget authorization included \$500 million in funding for projects nationwide.

INFRA Grants

The Infrastructure for Rebuilding America (INFRA) grant program provides federal grant assistance to highway and freight projects of national or regional significance. Key program objectives include supporting economic vitality; leveraging of federal funding; innovation; and levels of performance and accountability. Up to \$500 million of the \$4.5 billion authorized from fiscal years 2016 to 2020 may be used for freight rail, water (including ports), and other intermodal projects that make significant improvements to freight movements on the National Highway Freight Network. Federal funds can only be used for project elements that provide public benefit. This program arose from the FAST Act legislation of 2015, and was formerly known as the FASTLANE Grant Program.

5.8 Next Steps

Massachusetts values the railroad system and considers it an important component of the State's Transportation network and a vital contributor to economic development across the Commonwealth. This State Rail Plan gives MassDOT an opportunity to establish policies, priorities and strategies to enhance rail in Massachusetts that provide benefits to the public.

As part of the State's transportation planning efforts, MassDOT reviews and updates the Capital Improvement Plan (CIP) on a yearly basis. Projects included in the CIP are used to help identify and prioritize near-term projects and initiatives. In order to better assess programs and projects, prioritization methods are being used more frequently and in a more consistent manner.

MassDOT also aims to take advantage of a new federal focus that emphasizes freight through the FAST Act by examining new opportunities to improve the freight rail network through planning tools like the State Rail Plan.

The Massachusetts State Rail Plan follows recent FRA guidance, and future rail plans will continue to comply with FRA requirements. FRA specifies that individual state rail plans must be updated at least every five years, and due to state update cycles varying, there is not a set schedule for when states will submit rail plans to FRA for review and acceptance. MassDOT intends to continue to review and evaluate the needs and priorities of the rail system in Massachusetts and plans to update the State Rail Plan in the future over four year increments to highlight accomplishments, incorporate policy changes, and identify new near-term investments identified through the CIP.

Appendix A:

Intercity and Freight Rail Projects

This section details investments and projects that will affect the sections of rail network publically owned by MassDOT and/or the MBTA. Short-term rail investments in the fiscal year 2018-2022 Capital Improvement Plan (CIP) for the MassDOT-owned and MBTA-owned lines are listed in Table A-1. The CIP does not distinguish investment as passenger-related or freight-related by statewide program or by corridor. Further detail on corridor programs is shown later in Appendix A in specifying the freight-related improvements being made

Statewide improvements identified through the CIP are primarily investments that improve reliability of the system. Two specific programs are the Section 130 and IRAP programs.

At-Grade Crossing Improvements

Ensuring that railway-highway grade crossings are up to current safety standards improves the reliability of the rail network. Improved reliability reduces delays along the freight corridors.

Industrial Rail Access Program (IRAP)

IRAP has created opportunities for smaller freight rail projects to advance that provide both public and private benefits within the Commonwealth. MassDOT has allocated \$15 million over the next 5 years to modernize and improve access to the freight rail system through the competitive IRAP process.

Table A-1: Statewide

STATEWIDE		
PROGRAM NAME AND CORRIDORS	TOTAL COST	CIP ALLOCATION (2018-2022)
State-wide		
Facility modernization	\$6,500,000	\$10,475,000
Facility reliability	\$625,000	\$500,000
Grade crossings	\$20,644,166	\$20,539,649
Industrial Rail Access Program	\$18,000,000	\$15,000,000
Track and Right-of-way Modernization	\$24,000,000	\$22,782,114
Track and Right-of-way Reliability	\$45,850,000	\$39,100,000
Vehicle Expansion	\$33,000,000	\$32,000,000
Vehicle Reliability	\$5,191,000	\$5,191,000
TOTAL	\$153,810,166	\$145,587,764

Table A-2: Knowledge Corridor Passenger Rail Programs in the CIP

KNOWLEDGE CORRIDOR PASSENGER RAIL PROGRAMS IN THE CIP			
PROJECT NAME	TOTAL COST	CIP ALLOCATION (2018-2022)	PURPOSE
MBTA Equipment Acquire and Rehab	\$33,000,000	\$32,000,000	Estimated cost to purchase and rehabilitate MBTA equipment for service on the Knowledge Corridor or on the commuter rail network.
Greenfield Station	\$1,000,000	\$1,000,000	Enables Greenfield Station to meet modern ADA requirements and provide an enhanced level of passenger support and comfort.
Northampton Station	\$5,000,000	\$4,500,000	Enables Northampton Station to meet modern ADA requirements and provide an enhanced level of passenger support and comfort.
Additional Yards & Rail Support Facilities	\$4,240,000	\$4,040,000	Enables the Knowledge Corridor to support passenger rail maintenance and support.
Bridge Repairs & Replacements	\$13,350,000	\$11,030,000	Safety/Capital Maintenance
Culvert Repairs & Improvements	\$3,800,000	\$2,970,000	Safety/Capital Maintenance
Track & ROW	\$23,210,000	\$21,650,000	Safety/Capital Maintenance
TOTAL	\$83,600,000	\$77,190,000	

Table A-3: Adams Branch Capital Program

ADAMS BRANCH CAPITAL PROGRAM				
PROJECT NAME	PURPOSE	PROGRAM	TOTAL COST	CIP ALLOCATION (2018-2022)
F and I Turnout for Ash Track	Reliability	Track and ROW reliability	\$293,760	\$193,760
Grade Crossing Repairs and Improvements	Reliability	Grade crossings	\$301,104	\$301,104
Maintenance, Equipment and Other	Reliability	Track and ROW reliability	\$528,768	\$440,640
Structures	Reliability	Bridges	\$3,323,521	\$1,220,320
Track and ROW	Reliability	Track and ROW reliability	\$301,105	\$301,105
TOTAL			\$4,748,258	\$2,456,929

Table A-4: Berkshire Line Capital Program

BERKSHIRE LINE CAPITAL PROGRAM				
PROJECT NAME	PURPOSE	PROGRAM	TOTAL COST	CIP ALLOCATION (2018-2022)
Bridge Repairs and Replacements (Contractual Obligation)	Reliability	Bridges	\$5,480,000	\$4,320,000
Culvert Repairs and Improvements (Contractual Obligation)	Reliability	Track and ROW reliability	\$1,590,000	\$1,300,000
Emergency Bridge Repairs (Contractual Obligation)	Reliability	Bridges	\$3,480,000	\$2,120,000
Grade Crossing Repairs and Improvements (Contractual Obligation)	Reliability	Grade crossings	\$1,750,000	\$1,750,000
Maintenance, Equipment and Other (Contractual Obligation)	Reliability	Track and ROW reliability	\$348,000	\$290,000
Track and ROW (Contractual Obligation)	Reliability	Track and ROW reliability	\$8,801,600	\$7,720,000
TOTAL			\$21,449,600	\$17,500,000

Table A-5: Cape Main Line Capital Program

CAPE MAIN LINE CAPITAL PROGRAM				
PROJECT NAME	PURPOSE	PROGRAM	TOTAL COST	CIP ALLOCATION (2018-2022)
Additional Yards and Rail Support Facilities	Reliability	Facility reliability	\$8,891,000	\$5,666,000
Bridge Repairs and Replacements	Reliability	Bridges	\$880,473	\$880,473
Cohasset Narrows Bridge	Reliability	Bridges	\$10,287,062	\$8,067,062
Culvert Repairs and Improvements	Reliability	Track and ROW reliability	\$1,029,224	\$689,224
Grade Crossing Repairs and Improvements	Reliability	Grade crossings	\$3,893,142	\$2,960,454
Hyannis Station Improvements (Security Fencing and Railing)	Reliability	Facility reliability	\$110,160	\$110,160
Hyannis Yard/Route 28 Rebuild (Rail Portion of Highway Proj.)	Reliability	Track and ROW reliability	\$2,203,200	\$2,203,200
Layover Power	Reliability	Facility modernization	\$-	\$-
Other - Additional Repairs and Improvements	Reliability	Track and ROW reliability	\$352,512	\$352,512
Rochester Facility (Renew License Agreement)	Reliability	Facility reliability	\$750,000	\$250,000
Siding Upgrades - Ties, Rail, Ballast (Tremont; Sagamore; Sandwich; W. Barnstable)	Reliability	Track and ROW reliability	\$1,468,800	\$1,468,800
Switches and Yard Track Work (Master Plan/North End)	Reliability	Track and ROW reliability	\$4,406,000	\$3,370,000
Track and ROW	Reliability	Track and ROW reliability	\$5,382,665	\$4,025,169
Various Track/right-of-way Improvements	Reliability	Track and ROW reliability	\$73,440	\$73,440
Wareham Station Improvements (Fencing and Misc.)	Reliability	Facility reliability	\$73,440	\$73,440
TOTAL			\$39,801,118	\$30,189,934

Table A-6: Dean Street Industrial Track Capital Program

DEAN STREET INDUSTRIAL TRACK CAPITAL PROGRAM			
PROJECT NAME	PURPOSE	TOTAL COST	CIP ALLOCATION (2018-2022)
Bridge Repairs and Replacements	Reliability	\$857,736	\$534,600
Culvert Repairs and Improvements	Reliability	\$146,880	\$146,880
Drainage System Repairs	Reliability	\$223,440	\$223,440
Track and ROW	Reliability	\$150,000	\$150,000
Various Track / ROW Improvements	Reliability	\$250,000	\$250,000
TOTAL		\$1,628,056	\$1,304,920

Table A 7: Fall River Secondary Capital Program

FALL RIVER SECONDARY CAPITAL PROGRAM				
PROJECT NAME	PURPOSE	PROGRAM	TOTAL COST	CIP ALLOCATION (2018-2022)
Bridge Repairs and Replacements (\$50,000 / Year)	Reliability	Bridges	\$367,200	\$293,760
Culvert Repairs and Improvements (2 Culverts)	Reliability	Track and ROW reliability	\$660,960	\$660,960
Grade Crossing and Surface Improvements	Reliability	Grade crossings	\$224,240	\$146,880
Other	Reliability	Track and ROW reliability	\$367,200	\$293,760
Track and ROW	Reliability	Track and ROW reliability	\$680,000	\$544,000
TOTAL			\$2,299,600	\$1,939,360

Table A-8: Falmouth Secondary Capital Program

FALMOUTH SECONDARY CAPITAL PROGRAM				
PROJECT NAME	PURPOSE	PROGRAM	TOTAL COST	CIP ALLOCATION (2018-2022)
Falmouth Depot	Modernization	Facility modernization	\$1,300,000	\$-
Grade Crossing Repairs and Improvements	Reliability	Grade crossings	\$426,256	\$250,000
Structures	Reliability	Bridges	\$1,495,975	\$967,815
Track and ROW	Reliability	Track and ROW reliability	\$926,262	\$926,262
Various Track / ROW Improvements	Reliability	Track and ROW reliability	\$110,160	\$110,160
TOTAL			\$4,258,653	\$2,254,237

Table A-9: Framingham Secondary Capital Program

FRAMINGHAM SECONDARY CAPITAL PROGRAM				
PROJECT NAME	PURPOSE	PROGRAM	TOTAL COST	CIP ALLOCATION (2018-2022)
Bridge Repairs and Replacements	Reliability	Bridges	\$4,493,400	\$3,759,000
Culvert Repairs and Improvements	Reliability	Track and ROW reliability	\$1,101,600	\$881,280
Dispatching	Reliability	Track and ROW reliability	\$375,000	\$300,000
Grade Crossing and Surface Improvements	Reliability	Grade crossings	\$1,780,440	\$1,780,440
Grade Crossing Signal Improvements	Reliability	Grade crossings	\$3,458,400	\$3,458,400
Inspection, Maintenance, Reg. Compliance	Reliability	Track and ROW reliability	\$3,125,000	\$2,500,000
Mansfield Yard and Walpole Yard Other	Reliability	Facility reliability	\$1,300,000	\$1,150,400
Mansfield Yard and Walpole Yard Switches and Track Work	Reliability	Track and ROW reliability	\$1,122,000	\$1,122,000
Other	Reliability	Track and ROW reliability	\$299,200	\$299,200
Support Property	Reliability	Facility reliability	\$1,087,500	\$400,000
Track and right-of-way	Reliability	Track and ROW reliability	\$8,777,500	\$8,777,500
Track and right-of-way - SGR (Class 1)	Reliability	Track and ROW reliability	\$5,357,479	\$2,663,000
Various Track/right-of-way Improvements	Reliability	Track and ROW reliability	\$299,200	\$299,200
Walpole Interlocking Modifications	Reliability	Track and ROW reliability	\$1,360,000	\$1,360,000
TOTAL			\$33,936,719	\$28,750,420

Table A-10: Knowledge Corridor Capital Program

KNOWLEDGE CORRIDOR CAPITAL PROGRAM			
PROJECT NAME	PURPOSE	TOTAL COST	CIP ALLOCATION (2018-2022)
Bridge Repairs and Replacements	Reliability	\$857,736	\$534,600
Culvert Repairs and Improvements	Reliability	\$146,880	\$146,880
Drainage System Repairs	Reliability	\$223,440	\$223,440
Track and ROW	Reliability	\$150,000	\$150,000
Various Track / ROW Improvements	Reliability	\$250,000	\$250,000
TOTAL		\$1,628,056	\$1,304,920

Table A-11: Middleboro Subdivision Capital Program

MIDDLEBORO SUBDIVISION CAPITAL PROGRAM				
PROJECT NAME	PURPOSE	PROGRAM	TOTAL COST	CIP ALLOCATION (2018-2022)
Bridge Repairs and Replacements	Reliability	Bridges	\$16,330,000	\$16,330,000
Bridge Repairs and Replacements (MP 15.95)	Reliability	Bridges	\$1,287,520	\$700,000
Culvert Repairs and Improvements	Reliability	Track and ROW reliability	\$1,321,920	\$1,101,600
Grade Crossing and Surface Improvements	Reliability	Grade crossings	\$1,395,200	\$1,146,400
Grade Crossing and Surface Improvements	Reliability	Grade crossings	\$359,040	\$359,040
Grade Crossing Signal Improvements	Reliability	Grade crossings	\$3,189,800	\$2,492,200
Inspection, Maintenance, Reg. Compliance	Reliability	Track and ROW reliability	\$3,125,000	\$2,500,000
Other	Reliability	Track and ROW reliability	\$448,800	\$448,800
Other Improvements (Fencing and Misc.)	Reliability	Track and ROW reliability	\$299,200	\$299,200
Support Property	Reliability	Facility reliability	\$375,000	\$375,000
Switches and Track Work	Reliability	Track and ROW reliability	\$1,401,000	\$840,000
Track and ROW	Reliability	Track and ROW reliability	\$10,967,428	\$8,658,494
Various Track/ROW Improvements	Reliability	Track and ROW reliability	\$448,800	\$448,800
TOTAL			\$40,948,708	\$35,699,534

Table A-12: New Bedford Secondary Capital Program

NEW BEDFORD SECONDARY CAPITAL PROGRAM				
PROJECT NAME	PURPOSE	PROGRAM	TOTAL COST	CIP ALLOCATION (2018-2022)
Bridge Repairs and Replacements	Reliability	Bridges	\$514,890	\$441,450
Culvert Repairs and Improvements	Reliability	Track and ROW reliability	\$925,344	\$837,216
Grade Crossing and Surface Improvements	Reliability	Grade crossings	\$224,240	\$146,880
Other	Reliability	Track and ROW reliability	\$73,440	\$73,440
Track and ROW	Reliability	Track and ROW reliability	\$694,000	\$594,000
TOTAL			\$2,431,914	\$2,092,986

Table A-13: South Dennis Secondary Capital Program

SOUTH DENNIS SECONDARY CAPITAL PROGRAM				
PROJECT NAME	PURPOSE	PROGRAM	TOTAL COST	CIP ALLOCATION (2018-2022)
Grade Crossing Repairs & Improvements	Reliability	Grade crossings	\$582,363	\$200,475
Structures	Reliability	Bridges	\$146,880	\$146,880
Track & ROW	Reliability	Track and ROW reliability	\$693,880	\$693,880
TOTAL			\$1,423,123	\$1,041,235

Table A-14: Ware River Secondary Capital Program

WARE RIVER SECONDARY CAPITAL PROGRAM				
PROJECT NAME	PURPOSE	PROGRAM	TOTAL COST	CIP ALLOCATION (2018-2022)
Bridge Repairs and Replacements	Reliability	Bridges	\$1,909,274	\$1,690,640
Culvert Repairs and Improvements	Reliability	Track and ROW reliability	\$1,350,808	\$914,520
Grade Crossing and Surface Improvements	Reliability	Grade crossings	\$362,147	\$345,256
Miscellaneous Repairs and Improvements	Reliability	Track and ROW reliability	\$440,640	\$440,640
Route 9/32 Bridge(s) (MP 11.97 South) - Track and Yard Work	Reliability	Track and ROW reliability	\$1,081,600	\$1,081,600
Track & ROW	Reliability	Track and ROW reliability	\$5,708,505	\$5,240,854
TOTAL			\$10,852,973	\$9,713,510

Table A-15: Watuppa Capital Program

WATUPPA CAPITAL PROGRAM				
PROJECT NAME	PURPOSE	PROGRAM	TOTAL COST	CIP ALLOCATION (2018-2022)
Bridge Inspections and Ratings	Reliability	Bridges	\$100,000	\$-
Culvert Inspection and Evaluation	Reliability	Track and ROW reliability	\$42,000	\$-
Culvert Repairs and Improvements	Reliability	Track and ROW reliability	\$587,520	\$587,520
Miscellaneous Crossing Surface Repairs	Reliability	Grade crossings	\$73,440	\$58,752
Track and right-of-way	Reliability	Track and ROW reliability	\$3,367,125	\$2,009,499
Various Track/right-of-way Improvements	Reliability	Track and ROW reliability	\$396,880	\$396,880
TOTAL			\$4,566,965	\$3,052,651

Appendix B:

MBTA Commuter Rail

The following section describes both system-wide funding programs and also specific corridor programs that are included in the Capital Improvement Plan (CIP) and planned for the near-term for the MBTA Commuter Rail System. Total budget allocated for the MBTA Commuter Rail in the CIP is over \$1.7 billion. Table B-1 summarizes the cost of these programs, as identified in the CIP.

Table B-1: Capital Improvement Program

CAPITAL IMPROVEMENT PROGRAM		
PROGRAM TYPE / BREAKDOWN OF CORRIDOR PROJECT ALLOCATIONS	TOTAL COST	CIP ALLOCATION (2018-2022)
System-wide		
Accessibility	\$53,132,595	\$51,501,642
Bridge & Tunnel	\$421,074,003	\$277,079,189
Capacity and System Improvements	\$20,000,000	\$20,000,000
Expansion Projects	\$326,962,468	\$50,244,154
Positive Train Control Implementation	\$462,672,616	\$453,386,628
Revenue Vehicles	\$690,028,072	\$150,888,365
System Upgrades/Other	\$146,426,746	\$116,426,746
Track, Signal, and Power	\$306,519,144	\$145,913,798
Stations	\$217,452,588	\$84,365,720
Facilities	\$75,732,509	\$46,884,390
TOTAL	\$2,574,234,422	\$1,396,690,633
Specific Corridor Programs		
Dorchester Branch	\$125,656,778	\$26,654,790
Eastern Route Main Line & Gloucester Branch	\$206,439,773	\$141,972,379
Fitchburg Main Line	\$146,517,778	\$3,290,278
Franklin Branch	\$47,868,613	\$28,995,474
MBTA Southside Core	\$49,970,000	\$45,561,997
Needham Branch	\$5,205,256	\$414,325
Providence/Stoughton Line	\$38,071,259	\$36,352,413
South Coast Rail Corridor	\$94,356,996	\$9,417,375
Western Route Main Line	\$90,241,748	\$48,529,465
Worcester Main Line	\$41,089,163	\$27,929,465
TOTAL	\$845,417,363	\$369,117,961