Massachusetts Department of Transportation Rail Plan

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Massachusetts Department of Transportation

Massachusetts State Rail Plan

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All report documents can be accessed on the MassDOT web site at:

http://www.mass.gov/massdot/freightandrailplan

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Preface

Introduction

Rail is a critical part of the Massachusetts transportation system for passenger and goods movement. The Massachusetts freight rail system consists 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 Massachusetts Bay Transportation Authority (MBTA) is one of the largest commuter rail systems in the country, providing access to jobs and highway congestion relief in the metropolitan Boston area. Passenger rail served by Amtrak provides inter-city travel options with growing ridership and new investment to improve service. The 2010 Massachusetts State Rail Plan (Rail Plan) is the Commonwealth's 20-year plan for the state's rail system (through 2030) and describes a set of strategies and initiatives aimed at enhancing rail transportation so that it can effectively fulfill its critical role in the state's multimodal transportation network.

Reform Legislation – the Creation of MassDOT

On June 26, 2009, Governor Patrick signed legislation creating the Massachusetts Department of Transportation (MassDOT). The MassDOT enabling legislation, *An Act Modernizing the Transportation Systems of the Commonwealth of Massachusetts* (Chapter 25 of the Acts of 2009), created a unified transportation department for the Commonwealth, merging existing transportation agencies and functions into a single authority with agency characteristics.

Although it functions as an agency of the Commonwealth with a Secretary and Chief Executive Officer appointed by, and directly responsible to, the Governor, MassDOT is governed by a five-member Board of Directors. MassDOT is composed of four operating divisions – the Highway Division, the Rail and Transit Division, the Aeronautics Division, and the Registry of Motor Vehicles Division – and the Office of Planning and Programming, comprised of the enterprise services of the department (e.g., General Counsel, Planning, Human Resources, Information Technology, and Fiscal).

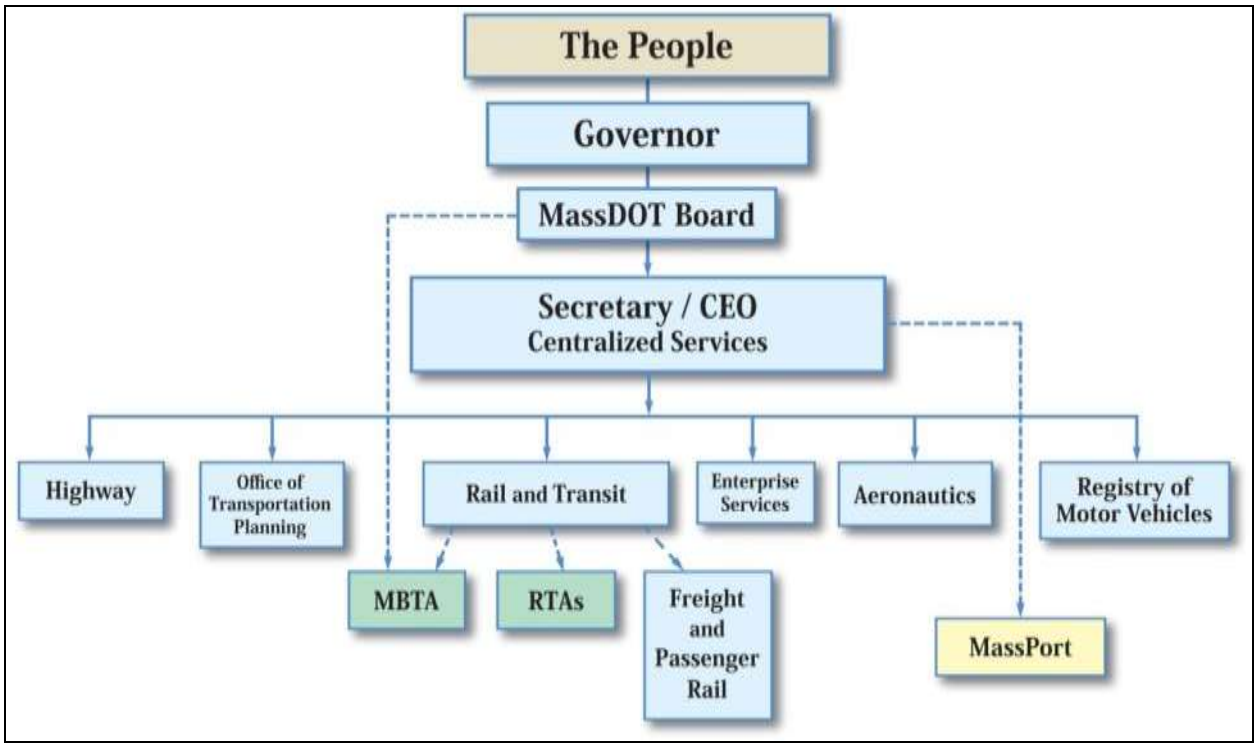
The **Highway Division** is responsible for managing the state highway system. The Division was created by merging the Massachusetts Highway Department, the Massachusetts Turnpike Authority, the Tobin Bridge (formerly owned by Massport), and certain defined transportation assets previously owned by the Department of Conservation and Recreation (all motor vehicle bridges and eight named parkways).

The **Rail & Transit Division** is responsible for managing the state rail system and for overseeing the Commonwealth's fifteen Regional Transit Authorities (RTAs) and the Massachusetts Bay Transportation Authority (MBTA). However, the MBTA and RTAs maintain their status as independent authorities. By statute, the MassDOT Board of Directors functions as the MBTA Board of Directors and, by practice, the Rail and Transit Administrator serves as the MBTA General Manager.

The **Aeronautics Division** is responsible for coordinating aviation policy in the Commonwealth and overseeing the state's public use general aviation airports, private use landing areas, and seaplane bases. The Division also certifies airports and heliports, licenses airport managers, and conducts annual airport inspections.

Under MassDOT, the Registry of Motor Vehicles has transitioned into the **Registry of Motor Vehicles Division**. The Division continues to be responsible for vehicle operator licensing, vehicle and aircraft registration, and for overseeing commercial and non-commercial vehicle inspection stations.

Figure 1: MassDOT Organization Chart



Under the new MassDOT structure, the Rail & Transit Division is responsible for the development, promotion, preservation and improvement of a safe, efficient and convenient rail system for the movement of passengers and freight in the Commonwealth. Chapter 161C of the 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, as a means of encouraging economic development and preserving the quality of life its residents enjoy.

MassDOT Strategic Goals – As part of the reorganization MassDOT has developed a set of strategic goals that form the core of the new organization. They are listed below.

1. **Safety** – Manage the nation's safest transportation system to minimize injuries whenever, wherever, and to whomever possible.
2. **Build and Preserve** – Build a quality transportation system and maintain it in a good state of repair.
3. **Stewardship** – Operate the transportation system in a manner that embraces our stewardship of the Commonwealth's natural, cultural, and historic resources.
4. **Customer Service –** Deliver superb service that both anticipates and responds to customer needs.
5. **Efficiency** – Invest public funds and other resources wisely, while fostering economic development.

GreenDOT Initiative

On June 2, 2010, Secretary Mullan signed the GreenDOT Policy Directive, MassDOT's comprehensive environmental responsibility and sustainability initiative that is designed to make the Commonwealth a national leader in "greening" the state transportation system. The initiative outlines a vision to promote sustainability in the transportation sector through all activities from strategic planning to construction and system operations. GreenDOT will be driven by three primary goals:

- Reduce greenhouse gas (GHG) emissions;
- Promote the healthy transportation options of walking, bicycling, and public transit; and
- Support smart growth development.

MassDOT will pursue the GreenDOT Vision and achieve the three GreenDOT goals by making sustainability an integral part of every MassDOT employee's job, and by integrating these objectives into our organizational vision and mission. MassDOT staff:

- Will address short- and long-term greenhouse gas emissions at every stage of design, construction, and operation of our transportation system in order to minimize climate disruption and its effects on the environment and on our customers.
- Will consider the needs of all our customers, regardless of mode choice or ability, in the design and operation of MassDOT transportation facilities. We will be guided by the MassDOT Complete Streets design philosophy articulated in the Highway Division Project Development and Design Guide and the principles of safe and full access to and within transit, rail, and other transportation facilities.
- Will distribute staff resources and define department objectives in a manner that ensures adequate attention to all customers and modes.
- Will design, build and operate our transportation system so that it supports smart growth development; this in turn will facilitate travel by the healthy transportation modes of walking, bicycling, and public transit; improve air quality; preserve the environment; and enhance quality of life for all of our customers.
- Will measure our performance toward the GreenDOT goals with a robust set of performance measures that evaluate sustainability and service to our customers – the users of our transportation facilities.

Investments in the Commonwealth's Rail System

As the Rail Plan has been developed, the climate for rail investment has changed drastically in Massachusetts and throughout the United States. The past three years have been transformative for the Massachusetts rail system that has received more than $500 million in new investment through competitive grants, public funds and private investment. These investments represent the most significant improvement in the Commonwealth's rail system as a whole in decades. Massachusetts' passenger rail system has been enhanced through a series of competitive federal grants, stimulus funding through the American Recovery and Reinvestment Act (ARRA) and other sources that have provided upgrades to rail lines operated by both the MBTA and Amtrak. The *South Coast Rail* project has made significant progress through planning and environmental permitting and reconstruction of three critical rail bridges will begin in October 2010. The freight rail system has benefited from new investment, most notably through the innovative public-private partnership with CSX Transportation to improve vertical clearances on their rail lines between the New York State line and Westborough and the Pan Am/Norfolk Southern partnership to improve the Patriot Corridor across northern Massachusetts.

High Speed and Intercity Passenger Rail (HSIPR) Program

Massachusetts and our partner states have coordinated efforts to present the *Vision for the New England High Speed and Intercity Rail Network*. This Vision for the rail system will help provide a foundation for economic competitiveness and promote livable communities through a network of High-Speed and Intercity Passenger Rail routes connecting every major city in New England with its smaller cities and rural areas and beyond to the rest of the United States and internationally to Montreal. The fast and frequent rail service provided by this integrated rail and transportation network will encourage people to leave their cars behind, promote energy efficiency and environmental quality while further enhancing movement of freight throughout the region. The following projects are key components of this Vision.

Knowledge Corridor – The Federal Railroad Administration awarded MassDOT $70 million in the first round of the competitive HSIPR Program to rehabilitate 49 miles of track and construct two stations for the Vermonter train service in Western Massachusetts. This project is complemented by others in Connecticut and Vermont that will improve service on the entire New Haven - St Albans corridor. Pan Am Southern will rehabilitate the line for passenger operation with oversight provided by the MBTA Design and Construction Department. Service is expected to begin in October 2012.

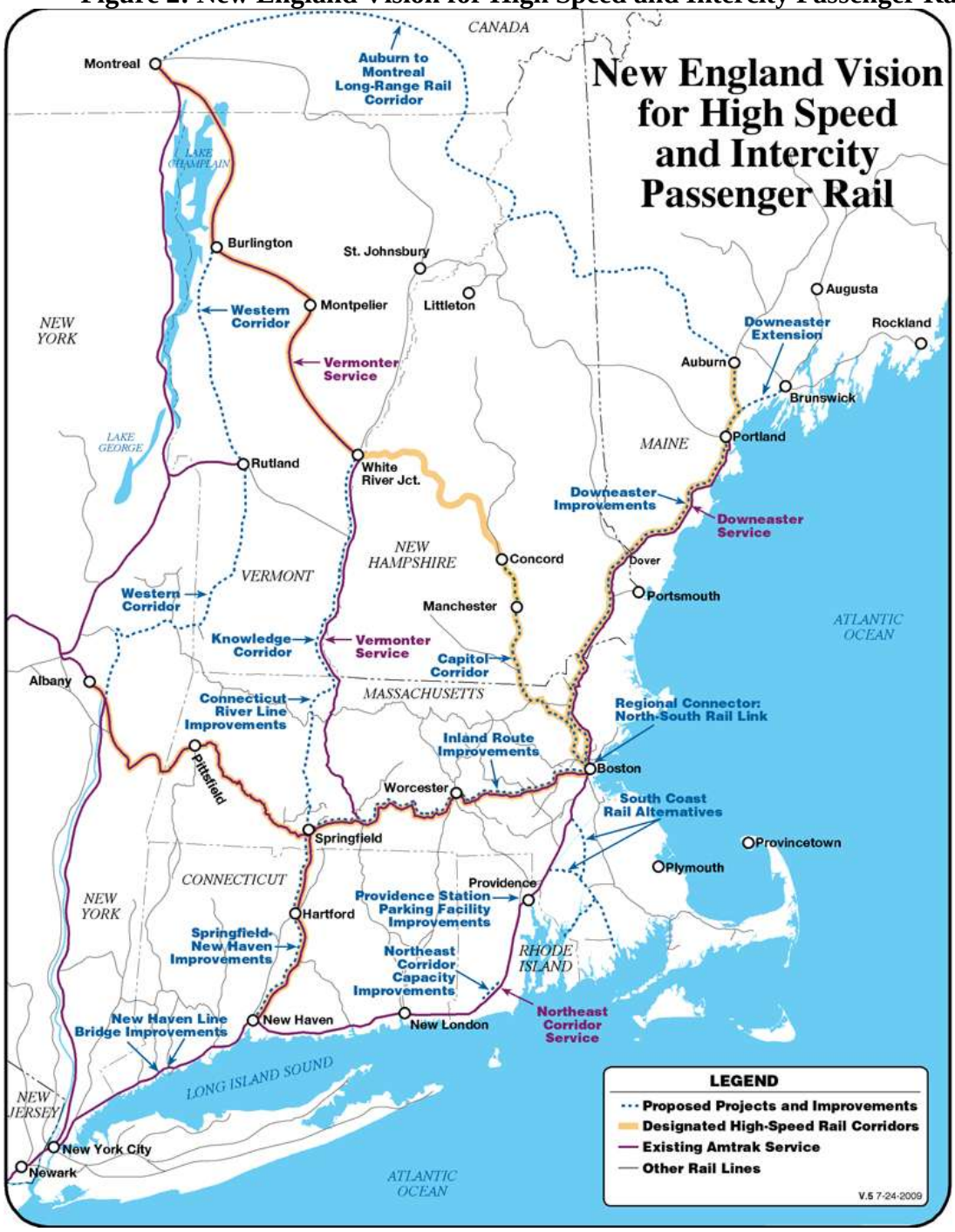
Northeast Corridor – As the nation's first High Speed Rail line, the Northeast Corridor is a critical element to the transportation and economic health of the New England and Mid-Atlantic states. Massachusetts and the other corridor states are committed to complete the necessary environmental and planning documents to allow significant investment in the corridor for Amtrak and commuter trains. The recently completed Northeast Corridor Master Plan indentifies more than $50 billion in rail projects on the corridor whose completion will advance the Northeast Governors' goal of doubling the number of riders on the corridor by 2030.

Inland Route/Knowledge Corridor Montreal Study – Massachusetts and Vermont are using Federal Railroad Administration Planning grants to study development of High Speed and Intercity Passenger service along two routes from Boston to New Haven via Springfield and from Boston to Montreal. This study will identify a set of improvements necessary to operate high-speed passenger rail service along the route. The preferred improvements will be determined based on identified corridor constraints, economic development opportunities and estimated ridership. Completing this plan will then allow the identified improvement projects to compete for future rounds of federal funding.

The Expansion of South Station will provide new tracks to accommodate additional passenger service on Amtrak and MBTA trains. This project is a priority for future rounds of HSIPR funding for Massachusetts. MassDOT has submitted an application for HSIPR funds to conduct the necessary Preliminary Engineering and Environmental work as a foundation for a future request for construction funds.

Downeaster – Another priority for future rounds of HSIPR funding would be improvements to the Downeaster route to reduce travel times between Portland and Boston. This project would involve close partnership with the Northern New England Passenger Rail Authority (NNEPRA). A major component of the improvements necessary in Massachusetts is rehabilitation of the Merrimack River Bridge in Haverhill that is a critical element of the region's transportation system.

Figure 2: New England Vision for High Speed and Intercity Passenger Rail

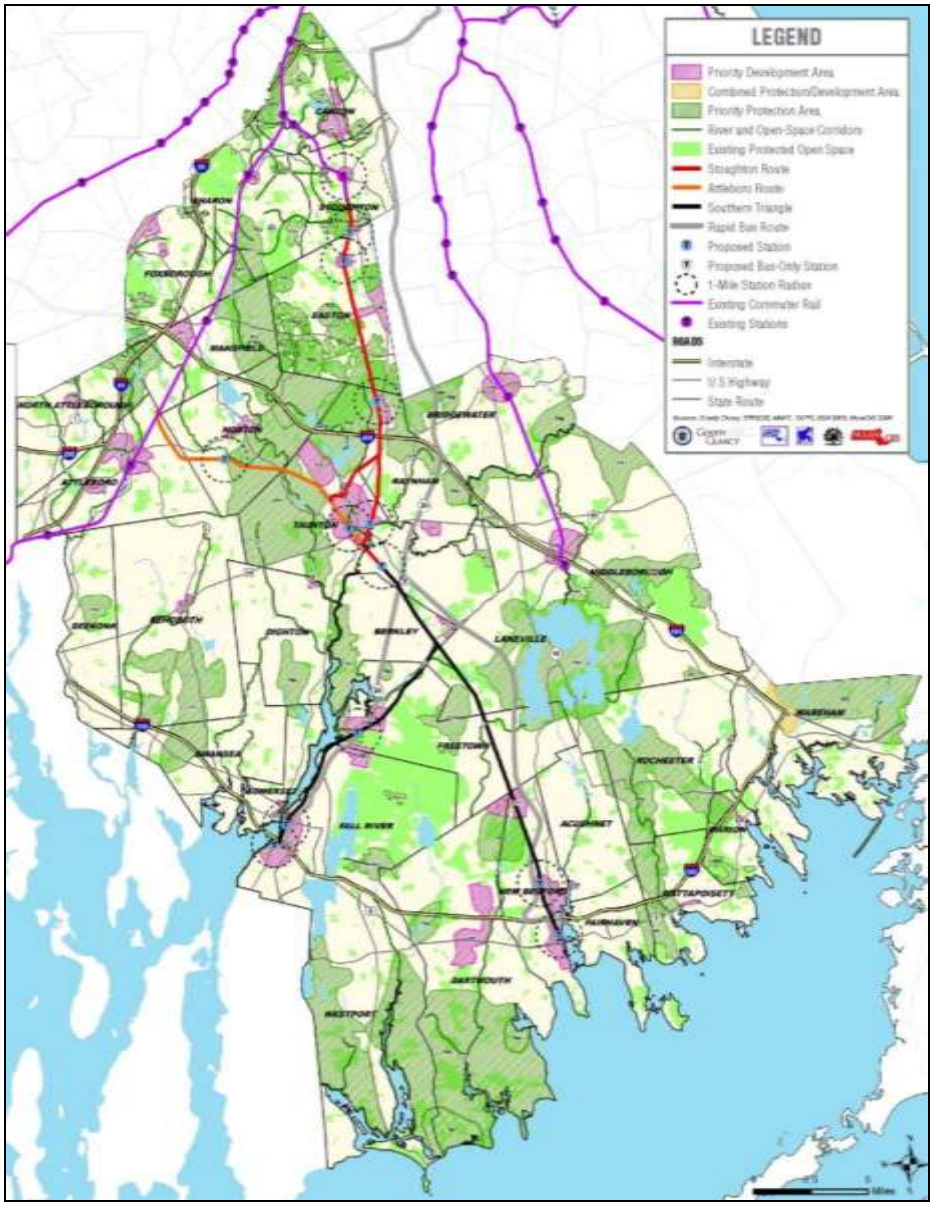


Commuter Rail Projects

South Coast Rail - The Army Corps of Engineers is expected to release the Draft Environmental Impact Statement for the South Coast Rail Project this fall. We expect the document will stop just short of identifying the preferred alternative. MassDOT has also completed the *South Coast Rail Economic Development and Land Use Corridor Plan*, which projects $500 million in new annual economic activity. Its Smart Growth framework and civic engagement process recently won the president's award for outstanding planning from the Massachusetts Chapter of the American Planning Association.

Massachusetts was awarded TIGER Discretionary funds to reconstruct three structurally-deficient bridges immediately north of the planned Whale's Tooth Station in New Bedford for the South Coast Rail project. The bridge work will cost $20 million and is the first step in the groundbreaking "Fast Track New Bedford" project that will help revitalize New Bedford's waterfront and initiate construction of a key component of South Coast Rail.

Figure 3: South Coast Rail



Fitchburg Line Improvements – MassDOT and the MBTA are investing just under $200 million for improvements along the Fitchburg Commuter Rail Line, including interlocking work, double-tracking, and other improvements. The funds include $10.2 million in ARRA funds for the first stage of the Fitchburg Commuter Rail Improvement Project; an additional $39 million in ARRA funding for double-tracking; and $150 million in New Starts funding from the Federal Transit Administration to support installation of new switches and signals, to renovate two stations and to reconstruct the existing track on the state's oldest commuter rail line.

Haverhill Line Improvements - The MBTA will use $17.4 million in ARRA funds to install double-tracking and improve the train control systems between Lawrence and

Andover. This project will improve reliability and on-time performance for the Haverhill commuter rail line, Amtrak's Downeaster trains as well as freight rail operations.

Extension of MBTA service to T. F. Green Airport – This fall, the MBTA Providence Line service will be 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 provides capital funds to the MBTA in exchange for operating service in and to the state. The MBTA uses these capital funds to purchase equipment and make improvements to facilities in Massachusetts.

New Commuter Rail Equipment – The MBTA is in the process of acquiring twenty new locomotives and seventy five Bi-Level passenger cars to replace existing equipment which is nearing the end of its useful life. The MBTA has placed an order for the new locomotives and the contract includes options for the purchase of an additional twenty locomotives. The first locomotives are expected to be in service within 36 months and the first new passenger cars are expected in 2011 with the last cars being completed by the end of 2014.

Positive Train Control – In October 2008, a new Federal rail safety law was passed, that required the installation by 2015 of positive train control (PTC) safety systems on most of the U.S. rail network, including most of the MBTA commuter rail network. PTC is a sophisticated safety overlay to existing railroad signaling systems with the goal of avoiding four specific events: train to train collisions, over speed derailments, incursions into established work zones, and the movement through a switch left in the wrong position.

Although PTC installation would improve safety, the cost of nationwide PTC installation is expected to be as much as $10 billion. There are significant questions of how the system would be funded and implemented by the railroads and public agencies such as the MBTA. Further, there remains a national debate on the reliability of and maturity of the technology for all forms of mainline freight trains and high-density environments. The MBTA submitted the required implementation plan in April 2010 as required in the Federal law.

Berkshire Line Improvements – MassDOT recently reached an agreement with the Housatonic Railroad to continue the MassDOT supported passenger easement that enables the operation of tourist passenger trains operated by the Berkshire Scenic Railroad between the towns of Lenox and Stockbridge in Berkshire County. The continuance of this easement supports tourism in the area and provides infrastructure improvements for the freight rail system in the Berkshires.

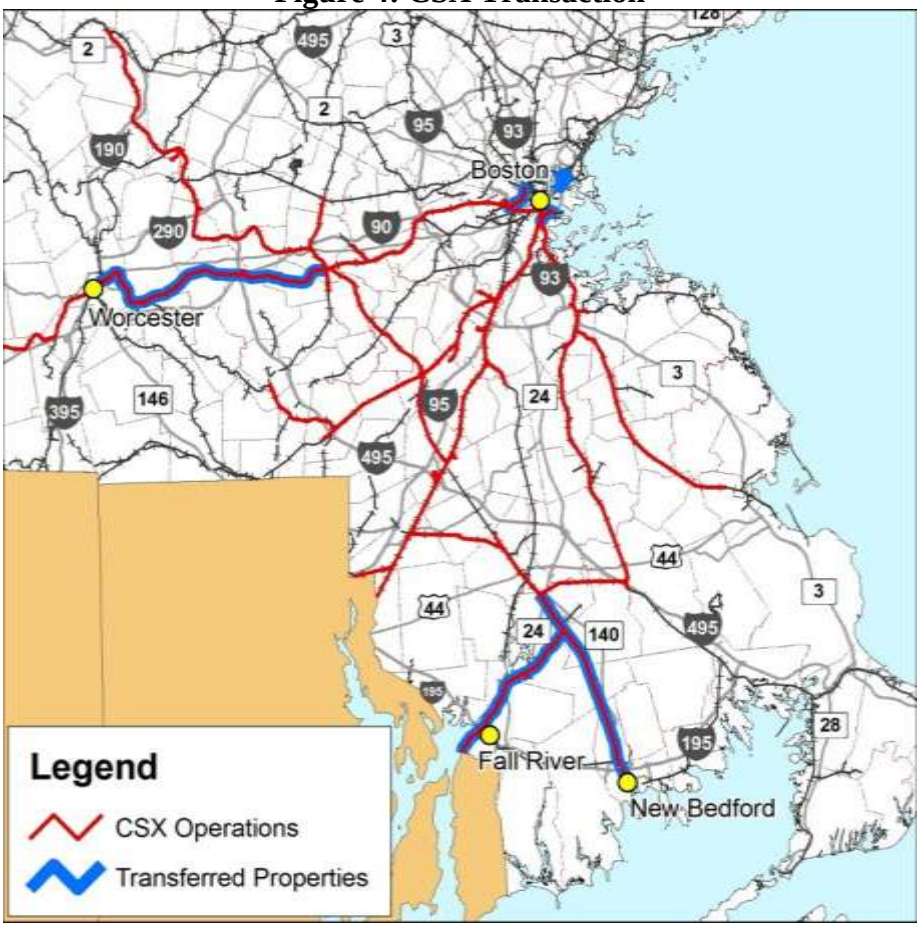
CSX Transaction – On September 23, 2009, the Commonwealth of Massachusetts finalized the terms of a comprehensive multiyear rail transportation agreement with CSX Transportation (CSX). Through this agreement, MassDOT will acquire CSX owned rail lines in Massachusetts in two phases (for a cost totaling $100M) in order to improve transportation services in the Commonwealth.

On June 11, 2010, the Commonwealth and CSX completed the first closing of the transaction during 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 that extends from Beacon Park Yard through Cambridge to East Boston.

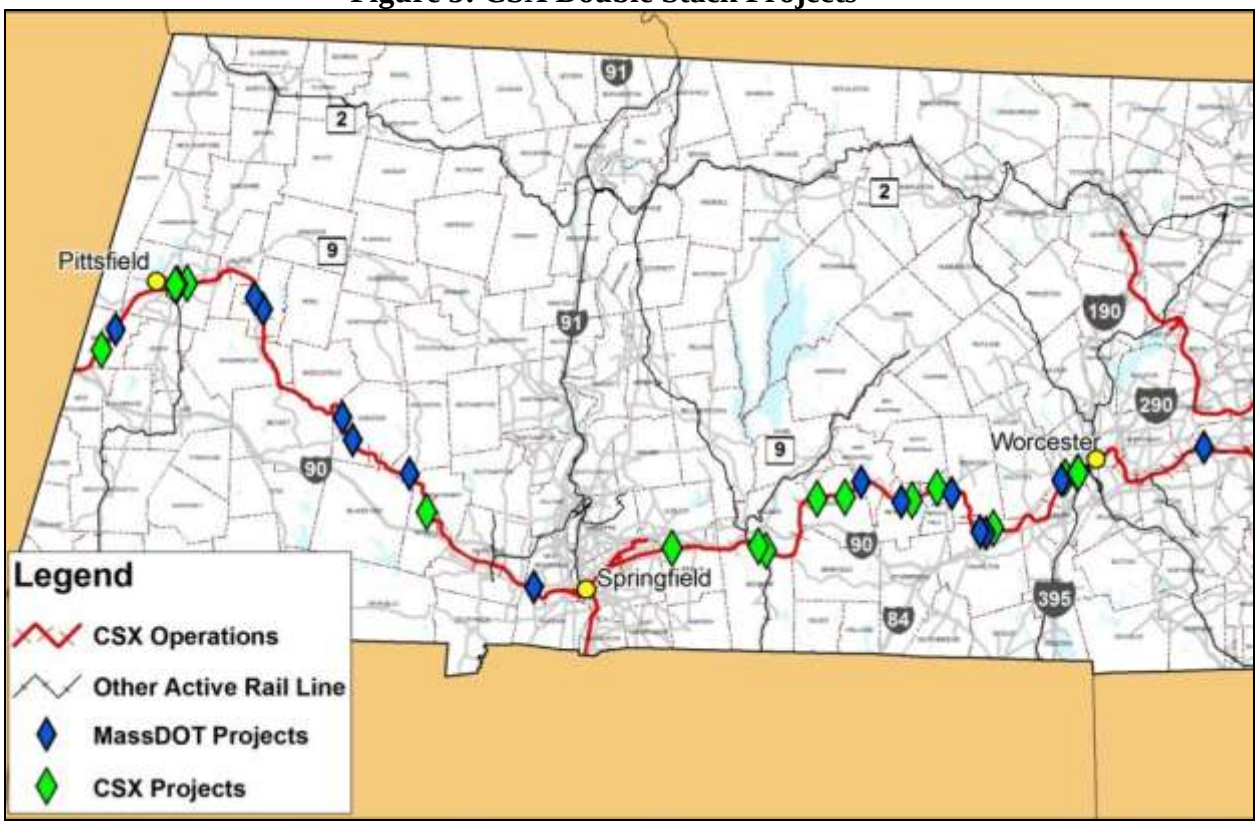
Through the second closing, scheduled for September 2012, MassDOT gains ownership of the entire Boston Line from Worcester to Boston. This allows MassDOT and MBTA to have control and priority over rail schedules in this key commuter and intercity passenger rail corridor with planned expansions of passenger service including potential service via the Grand Junction Branch to North Station.

Figure 4: CSX Transaction



CSX Double Stack Initiative and Intermodal Investment - As an element of the CSX transaction, MassDOT and CSX are providing full double stack access to Massachusetts by improving the clearance on 31 bridges along the CSX line. This full double stack access will provide efficiencies and cost savings in the movement of goods to and from Massachusetts that will be shared with businesses and consumers. In addition, CSX will be making a $100 million plus investment in intermodal facilities in Worcester, West Springfield and Westborough.

Figure 5: CSX Double Stack Projects



Pan Am Southern – On May 15, 2008, Norfolk Southern and Pan Am Railways announced the formation of a joint venture called Pan Am Southern (PAS), which will conduct freight rail operations and invest in rail infrastructure across parts of Massachusetts. The new entity was approved by the US Surface Transportation Board early in 2009 and PAS began operations in the spring. This joint venture will significantly enhance rail competition in New England with the addition of another Class 1 freight railroad operating in the Commonwealth.

An important element of the joint venture is the rehabilitation of the Pan Am Southern Main Line between Ayer and Mechanicville, NY. The partnership commitments include rehabilitation of 138 miles of track, replacement ties, and adding just over 35 miles of new rail. The $47.5 million improvement that began in 2009, to be completed in 2010, is one of the largest new private investments in the Commonwealth's rail system in decades. Additionally, a new intermodal and auto terminal will be constructed in Mechanicville, NY, and expansions and improvements will be made to the auto and intermodal facilities in Ayer.

Long-Term Recommendations

Freight rail infrastructure provides a critical foundation for the Commonwealth's economic competitiveness – nationally and globally. As stated before, our freight rail infrastructure comprises both publicly and privately owned and operated investments. Continuing globalization, major public and public-private infrastructure initiatives in competing states,

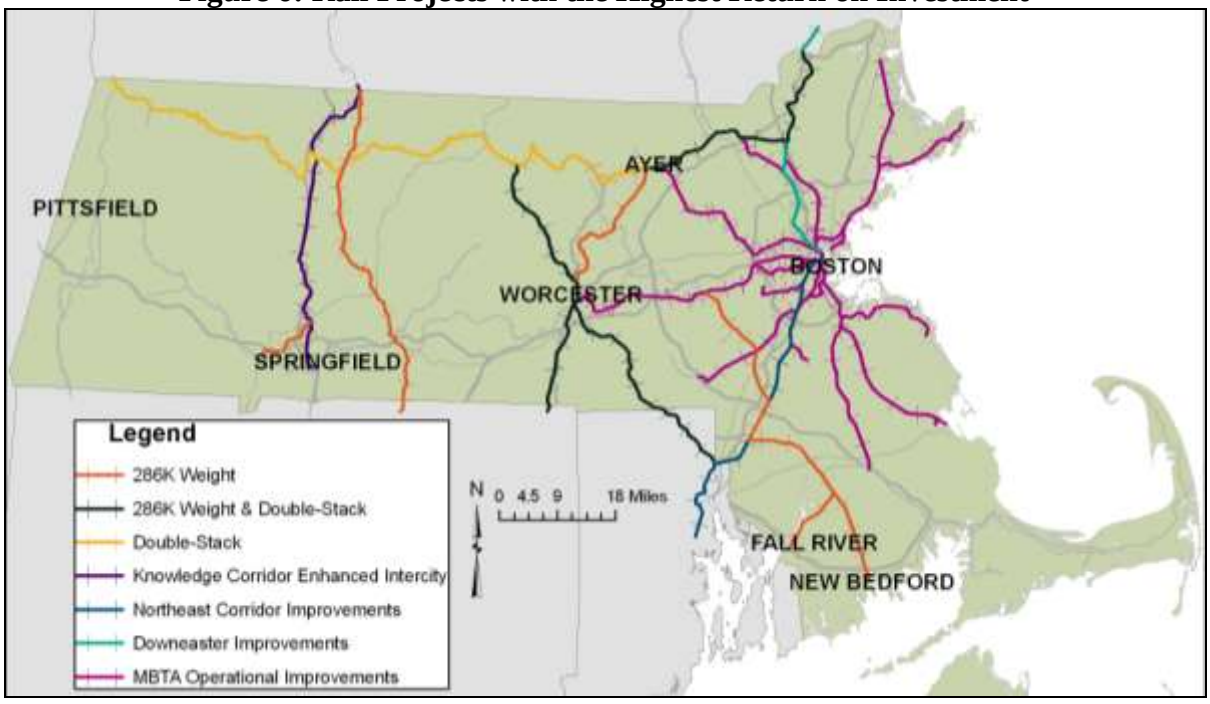
and rapid structural changes in industrial and consumer sectors necessitate careful re-examination of the competitiveness and productivity of Massachusetts' rail infrastructure.

Rail Investment Projects

Massachusetts is committed to supporting and expanding the use of rail for passenger trips and goods movement. To accomplish this, the Commonwealth seeks to prioritize and help fund rail improvement projects with a strong anticipated public return on investment. The Rail Plan has identified a set of long-term rail investment projects based on the highest expected return on investment over the next 30 years. Specific funding strategies have not yet been identified for those projects, however, it is expected that MassDOT will work with the relevant private and public rail owners and stakeholders to determine the most feasible and implementable funding and operating plans.

The Rail Plan includes a series of rail investment scenarios that compared the overall costs and benefits of potential rail projects across the Commonwealth. Individual projects from each scenario that demonstrated strategic benefits paired with high return on investment (ROI) were selected to create a set of recommended projects. These multimodal projects enhance current rail service and capitalize on current infrastructure to facilitate network level efficiencies. Freight rail improvements include both 286k weight on rail capacity and double-stack clearance improvements. The high return projects are shown in the map below (Figure 6).

Figure 6: Rail Projects with the Highest Return on Investment



The freight rail projects with the highest estimated ROI include:

Project Name	Investment
Mechanicville, NY to Ayer	Double-stack
Ayer to New Hampshire State Line	Double-stack & 286k
Worcester to Ayer	286k
NECR (Vermont S.L.to Connecticut S.L.)	286k
PVRR (Westfield to Holyoke)	286k
P&W (Worcester Connections)	Double-stack & 286k
Framingham to Taunton (CSX)	286k
Taunton to New Bedford & Fall River (MC)	286k

Please note that throughout this Rail Plan, "double-stack improvements" refer to 2nd generation double-stack improvements with vertical clearance of at least 20'8".

The passenger rail projects with the highest estimated ROI include:

- Providing enhanced level service on the realigned *Vermonter* route, with a capital cost of $32.5 million for improvements to accommodate additional trains and faster speeds.
- The improvements to the Northeast Corridor at a capital cost of $1.3 billion for the expanded service, as well as infrastructure improvements at South Station and along the right of way in Massachusetts.
- The Downeaster improvements, including the improvement of the Merrimack River Bridge, double tracking, and enhanced service at a capital cost of $110 million.
- The improvements to the North Side of the MBTA Commuter Rail, including additional service along each line, infrastructure improvements and parking improvements at a capital cost of $321.9 million.

Policy and Land Use Recommendations

Findings within the companion *State Freight Plan* identify major trends in the Massachusetts economy, including the growth of services and knowledge-based economic activity, and a related shift in manufacturing from traditional industrial and consumer production to specialized production of high-value, low-weight commodities. All of these trends have resulted in pressure to convert industrial land to residential and commercial office/retail uses. As part of the *State Freight Plan,* a comprehensive evaluation of land use conditions, current policies, and intensive consultation of public and private stakeholders throughout the state was produced. This effort has produced the following recommendations for financing capital improvements and land use development policy proposals.

Industrial Rail Access Program (IRAP) – An IRAP is a program that utilizes public, private and railroad funds to facilitate rail use. An IRAP would provide funding assistance for the construction or improvement of railroad tracks and facilities to serve industrial or commercial sites where freight rail service is currently needed or anticipated in the future. These are typically rail spurs or sidings to provide direct access to rail corridors. The funding program can allow financial assistance to localities, businesses and/or industries seeking to

provide freight rail service between the site of an existing or proposed commercial facility and common carrier railroad tracks.

MassDOT recommends that Massachusetts create an IRAP as a way to enhance industrial development opportunities and encourage freight shipment by rail to help reduce roadway congestion and emissions. The program is a logical extension of existing Massachusetts programs to complement economic development such as the Public Works Economic Development (PWED) and the Massachusetts Opportunity Relocation Expansion (MORE) programs.

IRAP programs in Maine, New York and other nearby states currently place Massachusetts at a competitive disadvantage for locating industrial companies on rail-served sites. They are typically funded at modest levels (less than $5 million/year) and require significant matching funds from the private sector. Massachusetts' current Freight Rail Funding Program is similar in many ways to an IRAP program except that the program's enabling legislation restricts private companies from using public funds for improvements. In addition, the program has many existing financial obligations, and limited bond cap space. By allowing private companies to use public funds through a new IRAP program these funds could be greater utilized for improvements to privately-owned rail in Massachusetts, thus boosting economic development opportunities and encouraging use of the rail system. Program requirements should include a competitive grant process with at least 50 percent matching funds (some combination of shipper and carrier funding), and projects should demonstrate quantitative and qualitative economic benefits such as job creation and retention, and increased state/local tax revenue from the benefiting businesses with mitigation for any impacts on passenger rail services.

Freight-Intensive Land Use Development and Preservation – Many parcels of the size, location, amenities and access characteristics suitable for rail freight operations are currently threatened by development that would preclude their use for that purpose. For one, many of these parcels are simply being converted or rezoned to non-industrial use. Others are being reduced to a size that is not adequate for freight uses due to "encroachment" of adjacent uses. Still others are being isolated by development that blocks access to the freight transportation network. Similar problems occur on waterfront parcels in or near ports, although these areas often enjoy greater regulatory protections (such as Designated Port Areas and Chapter 91 regulations) than rail-accessible parcels.

Planning for freight-oriented land use and recognition of the essential role that freight and logistics support plays in a modern and sustainable 21st century economy are largely discounted at the local level, and have often been undervalued at the broader state and regional levels. Current Chapter 40 programs do not include explicit considerations for the range of freight activity required to support and sustain these development trends.

A successful program to emulate for freight-intensive land use preservation is the existing MGL Chapter 40L, Agricultural Incentive Areas. MassDOT recommends that legislation be adopted to allow for an "Industrial Incentive Area" statute. The new statute would keep land use responsibility at the local level, giving the state and municipalities the option to designate

industrial land suitable for freight-intensive uses as an "Industrial Incentive Area." Once the statute has been adopted and the parcel designation has been approved by a 2/3 vote of the municipal legislative body, sale or conversion to non-industrial use would require notice from the owner, and the municipality (or state) would have a first option to purchase the property at its appraised full market value. Like Chapter 40L, the rationale is that designation of a parcel as an incentive area allows land to remain in a desirable land use under private ownership, but allows the public sector to acquire a parcel before its use is changed.

A policy on freight-intensive land uses should be adopted by the Commonwealth to accompany this program. The policy should articulate the common interest in preserving land for freight-intensive uses and developing parcels in a manner that does not foreclose rail and highway access. The policy and its criteria would be used to:

- Develop a statewide inventory to identify major parcels of strategic statewide importance suitable for intermodal centers, distribution/assembly centers, or freight villages, as well as in evaluating local industrial-incentive areas (described below) that are proposed by municipalities.
- Explicitly include freight-intensive uses as eligible elements of Chapter 43D Priority Development Sites, and as qualifying uses under the Growth District Initiative. (The Interagency Permitting Board under Chapter 43D could make a simple revision to its guidelines to address freight-intensive use.) Maintaining rail access would become a requirement for such parcels under both programs.

This policy could be considered in MEPA review in a manner similar to the Commonwealth's ten sustainable development principles and would be instrumental in pre-review under MEPA. This aspect of the policy should be articulated through development guidelines for parcels with rail access. The guidelines could also be adopted by local planning boards as part of their subdivision regulations where applicable.

Massachusetts State Rail Plan Contents

The Massachusetts State Rail Plan (the Rail Plan) was prepared for the Massachusetts Department of Transportation (MassDOT) to provide an understanding of freight and passenger rail issues and opportunities through the year 2030 and provide policy guidelines for rail related initiatives. This plan consists of the following sections:

- **Chapter 1: Introduction** – provides the purpose, vision, goals, and objectives of the Rail Plan. This chapter of the Rail Plan fulfills the requirements of Passenger Rail Infrastructure and Investment Act (PRIIA), Section 22703.

- **Chapter 2: Overview of Approach and Methodology** – outlines the approach and methodologies used in the development of the Rail Plan, including the

implementation of the public and participation process. Section 22704 of PRIIA is fulfilled through this chapter of the Rail Plan.

- **Chapter 3: Rail Trends and Issues –** provides a general analysis of the rail system in Massachusetts, which includes the national and regional context of freight and passenger rail, the evaluation criteria used to evaluate freight rail projects, the use of the rail system in Massachusetts, and the concerns associated with energy and the environment. This chapter of the Rail Plan satisfies the requirements outlined in Sections 22705.a.1 and 22705.a.4 of PRIIA.

- **Chapter 4: Freight Rail System Inventory**– provides an inventory of Massachusetts' freight rail system, which includes a description of the existing system, the constraints, issues and bottlenecks within the state and opportunities to improve freight rail in Massachusetts. The system description includes a statewide summary, a description of ownership, a review of major freight rail lines and facilities operating within the state and an identification of freight rail facilities. This chapter of the Rail Plan fulfills the requirements outlined in Sections 22705.a.1, 22705.a.2, 22705.a.7 and 22705.a.8.

- **Chapter 5: Passenger Rail System Inventory** – provides an inventory of the passenger rail system in Massachusetts, which includes a description of the existing system, the constraints, issues and bottlenecks within the state and the passenger rail projects currently being proposed or planned in the Massachusetts and surrounding areas. The system description includes a statewide summary and a description of ownership. This chapter of the Rail Plan fulfills the requirements outlined in Sections 22705.a.1, 22705.a.2, 22705.a.7, 22705.a.8 and 22705.a.11 of PRIIA.

- **Chapter 6: Rail Safety and Security** – provides a summary of the federal and state roles, the safety and security issues common to both freight and passenger rail, as well as the issues specific to each, and a description of the policies and programs in place to ensure that rail safety and security concerns are addressed. Section 22705.a.9 of PRIIA is fulfilled through this chapter of the Rail Plan.

- **Chapter 7: Evaluation Criteria and Benefit-Cost Analysis Framework for Rail** – Presents the Commonwealth of Massachusetts' critical rail corridor evaluation criteria and screening and the project-specific evaluation criteria. It also provides the benefit-cost analysis framework used to assess the public and private return on investment of potential rail investment scenarios. The service objectives of commuter rail, intercity passenger rail and tourist railroads in Massachusetts are also addressed. This chapter of the Rail Plan fulfills Sections 22705.a.3 and 22705.a.10 of PRIIA.

- **Chapter 8: Long Range Service and Investment Analysis and Funding Opportunities –** provides scenarios that were developed, with significant stakeholder input, to address the goals of the rail system and reflect a combination of near-term and longer-term rail investment strategies. It also outlines current rail funding

programs in Massachusetts and federal funding opportunities. It also highlights efforts utilized by other states to provide innovative funding solutions for passenger and freight rail that could be applied in Massachusetts. This chapter fulfills the requirements from Section 22705.b of PRIIA.

- **Chapter 9: Investment and Policy Recommendations** – provides specific near-term and longer-term rail investment priorities for the state, including the identification of priority projects and corridors for freight and passenger rail. It also contains a set of policy recommendations related to land use development, rail funding, and planning initiatives for the state to consider. This chapter satisfies the requirements outlined in Section 22705.b of PRIIA.

Chapter 1 Introduction

The 2010 Massachusetts State Rail Plan (Rail Plan) is the Commonwealth's 20-year plan for the state's rail system (through 2030) and describes a set of strategies and initiatives aimed at enhancing rail transportation so that it can effectively fulfill its critical role in the state's multimodal transportation network.

Rail is a critical part of the Massachusetts transportation system for passenger and goods movement. The Massachusetts Bay Transportation Authority (MBTA) is one of the largest commuter rail systems in the country, providing access to jobs and highway congestion relief in the metropolitan Boston area. Passenger rail served by Amtrak provides inter-city travel options with growing ridership and new investment to improve service. The Massachusetts freight rail system consists 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 Rail Plan presents a description of the existing freight and passenger rail system in Massachusetts, and key issues and opportunities are introduced. Trends in usage, freight rail and passenger service needs, available funding programs, and a description of the benefits of rail to the economy and environment are all provided in the Rail Plan. MassDOT is releasing this draft document both to encourage public consideration of the issues that the working draft raises and to stimulate input from stakeholders and concerned residents.

The passenger and freight rail system in Massachusetts provides mobility for people and goods in an energy efficient manner that 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 many of the goods that they use each day. The existing rail infrastructure must be maintained in a state of good repair in order to provide safe, efficient rail service now and into the future. The state government must work with private and public rail operators to encourage the strategic investments that will continue to enable the freight and passenger rail system to enhance Massachusetts' transportation network.

The following sections explain the purpose of the Rail Plan, as well as the vision to help determine the resources that the Commonwealth will dedicate to rail planning. Goals have been developed to help achieve the vision, and objectives offer policies that will help meet these goals.

1.1 Purpose of the Massachusetts State Rail Plan

The 2010 Massachusetts Rail Plan is prepared by MassDOT for the following purposes:

- To set forth Commonwealth policy involving freight and passenger rail transportation, including commuter rail operations;
- To establish policies, priorities and strategies to enhance rail services in the Commonwealth that provide benefits to the public;
- To serve as the basis for federal and state rail investments within Massachusetts; and

- To 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.

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 all rail infrastructure and operations.

The most recent federal planning requirement that the Rail Plan will serve to fulfill is the Passenger Rail Investment and Improvement Act of 2008 (PRIIA), which was signed into law in October, 2008. PRIIA outlines 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 authorized in PRIIA. The Rail Plan is consistent with the federal planning guidelines contained in Title 49, Part 266 of the Code of Federal Regulations. These planning regulations require specification of the objectives of the State's Rail Service Assistance Program (see 49 CFR 266.15), although because this program is not currently funded, it is not included in the Rail Plan.

1.2 Vision of the Massachusetts State Rail Plan

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 the rail industry, various interest groups, residents, and businesses. The Massachusetts State Rail Plan considered information from existing plans, including The Commonwealth of Massachusetts Long Range Transportation Plan (2006) and the ongoing update of that plan, which establishes a long-range vision for transportation including rail. Other resources include:

- *State Rail Plan*, Executive Office of Transportation and Construction (EOTC) 1989
- *Identification of Massachusetts Freight Issues and Priorities*, MassHighway, 1999
- *Draft Regional Freight Study for the Boston Region,* Boston Metropolitan Planning Organization, 2007
- *Massachusetts Rail Trends and Opportunities, July 2007, Executive Office of Transportation & Public Works (EOTPW)*
- *Program for Mass Transportation*, Massachusetts Bay Transportation Authority (MBTA)
- *MBTA Capital Investment Program* (updated annually)
- *Commonwealth of Massachusetts Long-Range Transportation Plan,* Executive Office of Transportation (EOT), 2006
- *Transportation Finance in Massachusetts: An Unsustainable System*, Findings of the Massachusetts Transportation Finance Commission, March 2007

- *Transportation Finance in Massachusetts: Building a Sustainable Transportation Financing System*, Recommendations of the Massachusetts Transportation Finance Commission, September 2007
- *South Coast Rail: A Plan for Action*, EOTPW 2007
- *Port Strategic Plan*, Massachusetts Port Authority (Massport), ongoing
- Regional Transportation Plans for Massachusetts' Regional Planning Agencies
- Massachusetts *State Freight Plan* (ongoing), 2008-09
- I-95 Corridor Coalition – Northeast Rail Operations Study,Phase 1

MassDOT's vision for passenger and freight rail service in Massachusetts is to:

> *Develop an efficient intercity passenger and freight rail system that is the logical mode of choice for travelers and shippers, connects travelers and businesses to the national and global transportation network, encourages sustainable economic growth throughout the state, and enables Massachusetts to compete in the rapidly changing global economy.*

The future success of passenger and freight rail transportation in the Commonwealth can only be achieved through a concerted effort to increase investment in rail infrastructure and services from both the public and private sectors. Massachusetts has made considerable investments in the passenger and freight rail system. In order to keep making progress, leadership is required at the federal level to develop effective policy and adequate funding for rail transportation.

1.3 Goals and Objectives of the Massachusetts State Rail Plan

The goals and objectives designed to fulfill the rail vision were developed in collaboration with many stakeholders, including rail industry representatives, state, local, MPO partners, various interest groups, and residents. A complete discussion of the public and stakeholder participation process is provided in Chapter 2.

Development of goals that can be linked to performance measures and evaluation criteria is crucial to the success of the Rail Plan and the fulfillment of its vision. These goals divide the rail vision for the state into discrete elements that the Commonwealth will work to accomplish through the implementation of specific policies and actions.

Over the past decade, there have been a number of significant changes in the transportation system serving Massachusetts and the Northeast. Issues related to the environment, globalization, technology, travel demand, and security have all risen to the surface in discussions of transportation.

A continued concern with the environment and the recognition that climate change must be addressed has affected public views and political sentiment regarding transportation and its impacts. This realization, along with higher energy costs, has contributed to changes in travel patterns. Most notable is the increase in public transportation ridership levels, including commuter rail and intercity passenger rail.

On the freight side, railroads are recognized as the most energy efficient choice for moving goods by land. According to the American Association of State Highway and Transportation Officials (AASHTO), if one percent of long-haul freight that is currently transported by truck was transported by rail, fuel savings would be approximately 110 million gallons per year and annual greenhouse gas emissions would fall by approximately 1.2 million tons.[1]

The movement of goods and information is also being transformed by the converging forces of globalization, a dramatic growth in trade volume, and rapid technological innovation. Not only are greater volumes of goods moving within new global and regional trading blocs, but the timing and routing of goods movement is changing.

With a dynamic population, particularly in the Boston metropolitan area, there has been an increase in freight movement and commuter rail service demand in Massachusetts. According to the US Census Bureau, the state's estimated 2007 population is approximately 6,450,000 and is up 1.6 percent since the year 2000. As the population grows in number and age, enabling the utilization of alternative transportation modes will become a higher priority.

Safety and security issues are also an important element of the state's transportation system and the Rail Plan. Personal travel in New England, as well as the nation, has clearly changed following the response to the terrorist attacks on September 11, 2001. The security of the transportation system is paramount, and the need for redundancy is considered good public policy.

Technological advances and other security measures will continue to play an important role in the management and operation of all transportation facilities and services in Massachusetts. Because the railroads in Massachusetts are faced with major capacity issues as well as an aging infrastructure, the reliability and safety of the state's transportation network is at risk of compromise. Chapter 6 discusses safety and security of the Commonwealth's rail system.

Goal #1: Maintain the Commonwealth's rail system. Maintaining the rail system infrastructure assets in a state of good repair is essential to meeting the mobility demands of today and the future. In addition, the preservation of essential local rail corridors to retain the availability of future rail service must also be considered. Maintaining existing rail right of way (ROW), which may be used in future transportation networks, is another element of the preservation effort.

Associated Objectives:

State of Good Repair

- Perform recommended maintenance and rehabilitation on passenger rail car equipment and maintain appropriate equipment replacement schedule;

[1] Freight Railroads & Greenhouse Gas Emissions, June 2008.

- Maintain passenger and freight rail infrastructure including track, switches, and roadbed, drainage and culverts, undergrade bridges, railroad tunnels, train signal and communication systems in good condition;
- Improve the physical plant and equipment of railroads in order to increase the use of rail service and reduce operating and maintenance expenses; and
- Provide for passenger station facilities that are compliant with the Americans with Disabilities Act (ADA).

System Preservation

- Keep the operation of freight railroad lines in the private sector, with service provided either by established railroad companies or by qualified short line operators;
- Preserve active and abandoned railroad ROWs having strong potential for future transportation or other public use, where such preservation is consistent with the goals of the local communities contiguous to the lines;
- In cases where a railroad has demonstrated conclusively that it should be permitted to abandon a railroad line segment, the railroad position should be supported and railroad users should be assisted in efforts to meet the competitive challenges posed by the abandonment; and
- State should continue the policy of purchasing rail corridor ROW with potential for future use.

Goal #2: Expand the rail system and its capacity to accommodate growth in freight and passenger demand.

Associated Objectives:

- Increase freight rail market share;
- Increase intercity passenger rail ridership;
- Provide an efficient balance of commuter, regional, intercity and high-speed passenger rail;
- Provide 286,000 lb. rail carload capacity for priority freight rail corridors;
- Provide improved vertical and horizontal rail carload clearance for priority freight rail corridors;
- Expand parking capacity where required to support increased passenger rail ridership; and
- Evaluate and develop new or additional passenger services where viable.

Goal #3: Provide a rail system that is environmentally and financially sustainable.

Associated Objectives:

- Structure fares and pricing to maximize ridership, while sustaining the financial viability of passenger rail service in Massachusetts;
- Reduce emissions and enhance energy efficiency through expanded use of rail;
- Ensure that local and regional planning efforts link transportation and land use, leading to reduced sprawl and improved utilization of existing transportation systems; and

- Develop funding structures sufficient for state of good repair and system improvements that ensures that costs are fairly shared by all users.

Goal #4: Improve intermodal[2] connectivity for both passenger and freight rail facilities and coordination between rail system users.

Associated Objectives:

- Improve integration between local transportation, intercity bus and other modes of intercity passenger transportation;
- Expand the capacity of and remove bottlenecks from commuter, regional, intercity passenger, and freight rail networks;
- Improve access to commuter and intercity passenger service via improved integration with other modes or through the construction of new stations;
- Facilitate seamless transfers of passengers between transport modes; and
- Increase rail share of intermodal freight traffic through improved highway-rail and water-rail intermodal connections.

Goal #5: Improve the rail system to support sustainable economic growth throughout the state and enable Massachusetts to compete in the rapidly changing global economy.

Associated Objectives:

- Develop state programs to encourage investment in rail system and to facilitate public-private partnerships;
- Develop strategic rail connections to facilitate efficient and effective interchange of rail cars between railroads;
- Improve rail access to and within ports, freight terminals, and intermodal freight facilities;
- Provide new or expanded intermodal facilities/inland ports across the state for the rapidly growing container segment of rail traffic;
- Provide adequate rail sidings, rail-truck transfer facilities, and "last mile" connections serving all rail terminals and shippers who need access to the rail network to facilitate economically competitive industry throughout Massachusetts;
- Encourage businesses to maintain or increase their use of rail service whenever this results in effective utilization of resources; and
- Preserve existing jobs and create new jobs, especially in areas of the Commonwealth experiencing chronic high unemployment rates.

Goal #6: Enhance the safety and security of the rail system. The railroad system in Massachusetts is vulnerable to trespassers and is difficult to secure. The Association of

[2] Intermodal is defined in this report as: for Freight, the use of multiple modes of transportation to deliver a shipment from origin to destination without re-handling freight within original shipping container, or the use of multiple modes of transportation that require re-handling of freight to transfer between modes. For Passengers, the use of multiple modes of transportation to move from origin to destination.

American Railroad's (AAR's) Security Task Force[3] has developed a plan to respond to terrorist threats. Massachusetts and the railroads should build upon the efforts of the industry group and identify key railroad yards, interchange points and major structures that may need to be secured from open public access.

Associated Objectives:

- Ensure that current security practices meets current Transportation Security Administration (TSA) standards;
- Eliminate or improve locations and situations that pose safety hazards to vehicles and pedestrians at rail-highway at-grade crossings;
- Reduce illegal trespassing to enhance security of rail ROW; and
- Ensure that the switching, signaling, and train dispatching systems are compliant with modern standards.

[3] The AAR has led this industry effort, and has worked cooperatively with the US Department of Homeland Security and TSA in development of response protocols that include local, state and federal agencies.

Chapter 2 Overview of Approach and Methodology

2.1 Data Collection and Analysis

The 2010 Massachusetts State Rail Plan was developed in a logical order based on existing conditions and future trends, identification of key issues and opportunities, and then analysis and prioritization of investment and policy strategies. The analysis required examination and integration of a number of data sources. Some of the most critical resources for the Rail Plan are summarized here, while the rest of the Rail Plan references and explains the full-range of data obtained and analyzed in the Rail Plan.

- **Economic conditions and trends** – this analysis incorporates data from a number of readily available data sources including the Massachusetts Executive Office of Labor and Workforce Development, the US Census Bureau, the Bureau of Labor Statistics, the Bureau of Economic Analysis, and the IMPLAN economic model for Massachusetts.
- **Trade flow analysis** – the major data sources to examine the movement of goods by tonnage and value were: a) 2007 Global Insight TRANSEARCH data for county-level goods movement by mode, weight, and commodity; b) Federal Highway Administration's Freight Analysis Framework (FAF) data; c) WISER import and export trade data; and d) port-specific data and forecasts obtained from Massport and other ports.
- **Modal assessments** – MassDOT provided critical information on infrastructure, operations, traffic volumes, truck routes, and other factors. We also gathered information directly from railroads, ports, and trucking and distribution organizations through a series of interviews and outreach.
- **Land use development** – the Massachusetts Alliance for Economic Development (MassEcon) provided data on available sites and buildings throughout the state, including rail-served sites using their SiteFinder database.
- **Performance measures and evaluation criteria** – the Rail Plan incorporated best practices from a number of existing rail planning studies to determine a set of metrics that are readily available for use to track performance over time, and help evaluate and prioritize investments.
- **Funding and financing** – data on funding and financing was gathered directly from sources such as MassDOT and the MBTA. In addition, the Rail Plan used information from published Federal Highway Administration (FHWA) and US Department of Transportation (DOT) financing studies and programs to document available funding mechanisms and the best practices from other states.
- **Economic benefit and cost analysis** – the Rail Plan assessed the full-range of economic impacts, benefits and costs of proposed improvement strategies using a customized Massachusetts version of the Transportation Economic Development Impact System (TREDIS) provided by the Economic Development Research Group.

2.2 Public and Stakeholder Participation Process

A public and stakeholder participation process of the Rail Plan had two primary goals: (1) to inform the public and key regional rail stakeholders about the purpose and content of the State Rail Plan; and (2) to receive input from the public and key regional rail stakeholders about issues and needs.

The importance of the input provided by the full-range of rail stakeholders was critical to identifying issues and assessing potential investment and policy strategies.

A variety of approaches were taken to reach out to the public to ensure transparency and inclusion. The outreach in the initial phases of the study targeted freight stakeholders and planners. Dozens of stakeholders were contacted to probe for information, identify challenges and opportunities and ask for feedback on potential strategies to improve the freight system within the Commonwealth.

To support the public and stakeholder participation process, a concerted effort was made to engage representatives from the thirteen Regional Planning Agencies in Massachusetts. Regional planners actively assisted in the Rail Plan's development by co-hosting regional public meetings, identifying stakeholders, disseminating news and notices of the study through regional contacts, mailing lists and newsletters and providing feedback on freight issues within their regions.

Specific efforts were made to meet with key agencies, organizations and freight and rail service providers and associations including: Massport and the Massachusetts Seaport Advisory Council, the Massachusetts Motor Transport Association, the MBTA, the Executive Office of Housing and Economic Development, MassEcon, MassDevelopment, and the Massachusetts Railroad Association and its members.

At the initiation of the study a **Working Group** consisting of the primary freight and rail sector stakeholders in Massachusetts was formed. Meetings of this group provided a forum for detailed involvement and feedback. All major findings and products have been developed under the guidance of the Working Group.

A series of **Focus Group** meetings were held at various stages of the plan's development to gather information and provide feedback on strategies. Participation in these meetings ranged from six to 40 attendees. Meetings were held with the following groups: Port Professionals Alliance (maritime), Boston Port Carriers (truck), and the Massachusetts Motor Transport Association. Additionally, a discussion on land use development in relation to freight infrastructure was held with regional planners, economic development officials, and key rail, marine and aviation stakeholders. Focus group meeting presentations are posted on the Rail Plan web site.

Two rounds of **public meetings** were held within four regions – west, central, northeast, and southeast sections – across the state. The initial meetings were held in the fall of 2008 at the conclusion of the data gathering phase of work. Press releases were written and distributed to dozens of newspapers announcing the public meetings. The second round of meetings was held in March 2010, again with meetings in each of the four regions of the state. The second round of meetings focused on the study draft findings and recommendations with emphasis on investment and policy strategies. Meetings were well attended with about 160 individuals participating in each round of these meetings. Public Meeting presentations and meeting notes are posted on the Rail Plan web site.

A **project website**, www.mass.gov/massdot/freightandrailplan/, was created to provide information on the development of the Massachusetts Freight and Rail Plans, access to study documents and reports, notice of meetings, and summaries of public meetings. The website also had a public comment section where people could voice opinions, read comments submitted by others and make direct contact with the study team.

In addition to the meetings described above, numerous one-on-one **interviews** were conducted with shippers, receivers, and carriers. These interviews provided critical private sector perspective on goods movement in Massachusetts, current issues or constraints, as well as future trends and opportunities. Given the limitations of published data, these interviews served to supplement the data analysis findings to better understand issues such as: a) true origin to destination shipping patterns and modal needs; b) realistic opportunities to divert freight from truck to other modes; and c) business and land use opportunities given current and potential policy programs and incentives. A more detailed summary of the findings from these interviews and focus group meetings can be found in the trade flow analysis contained in Chapter 4.

As described above, public meetings were held and much of the documentation developed for the Massachusetts State Rail Plan was jointly developed during the work effort for the companion freight plan. The public participation process was concluded with a formal public meeting on the rail plan held in September 2010 and a public comment period on the complete draft rail plan that was held separate from the Freight Plan. MassDOT received a diversity of public comments during the comment period, and they were incorporated as appropriate into the Rail Plan.

Chapter 3 Rail Trends and Issues

3.1 National and Regional Context

The railroad industry for the first 100 years of the industrial revolution was the unchallenged and dominant mode for freight transportation shipping and inter-city travel in North America. Since then, the railroad industry has faced three major challenges: 1) competition from cars, trucks and the emerging highway system; 2) regional economic transformations, which shifted manufacturing to different parts of the country; and 3) increasingly restrictive regulation that often stifled competition and innovation.

These three factors nearly brought the railroad industry into collapse in the 1970s. The impact to northeast states was so significant that the rail system was saved only through an unprecedented federal intervention. In 1976, the government created and financed the Consolidated Rail Corporation (Conrail) which took over bankrupt railroads in the northeastern United States. In 1987, with payments to the U.S. Treasury, Conrail returned to the private sector as a for-profit corporation. In 1998, Norfolk Southern Corporation and CSX Corporation acquired respective portions of Conrail through a joint stock purchase.

Additional major national rail developments that have impacted the Massachusetts rail system in the last 30 years include the creation of Amtrak, railroad deregulation, local freight rail assistance funding, the emergence of short line and regional railroads, heavy axle load railcars, and intermodal traffic. Each of these has shaped the current condition of the freight railroads.

Deregulation of the railroad industry by the federal government has had a substantive impact on the rail industry. The Staggers Act of 1980 and the Interstate Commerce Commission Termination Act of 1995 allowed railroads to more easily adjust services and rates, enter into service contracts, merge to create larger railroads, and sell off or abandon unprofitable routes. This permitted railroads to improve their competitive position with other modes of transportation. This has been a principle element in the revitalization of the railroad industry.

The growth and development of the short line and regional railroad industry emerged as regulatory relief allowed Class I railroads to rationalize their networks by selling off unprofitable routes. These new enterprising, innovative, and customer-oriented rail companies now number over 550 railroads, and have maintained and expanded local freight services.

Nationwide, the primary freight rail corridors are owned and operated by eight Class I freight railroads:

- Burlington Northern Santa Fe Railway (BNSF)
- CSX Transportation (CSX)
- Canadian National - Grand Trunk (CN)
- Canadian Pacific Railway (CPR)
- Norfolk Southern (NS)

- Union Pacific (UP)
- Kansas City Southern Railway
- Soo Line Railway (CP subsidiary)

Of the eight Class I railroads noted above, only CSX operates in Massachusetts, although Norfolk Southern recently entered into a partnership agreement with Pan Am Railway as a 50 percent owner of the new Pan Am Southern. Through haulage arrangements via the NECR, Class I carriers CP and CN access New England customers through Massachusetts and into Connecticut for commodities such as ethanol and intermodal shipments. Freight railroad categorization can vary, for example between the Association of American Railroads (AAR) and the Surface Transportation Board (STB), so certain statistics shown in this chapter such as numbers of railroads and track miles may also vary.

There is a wide variation in the size of railroads within the country. To identify the relative size of the railroads the terms Class I (one), Class II (two), Class III (three), regional, short line and terminal/switching railroad are used. The class of railroad comes from the Surface Transportation Board (STB) accounting regulations that group all rail carriers into three classes for purposes of accounting and reporting (49 CFR Part 1201 Subpart A). The class definitions are revenue-based and the threshold figures are adjusted annually for inflation using the base year of 1991

For 2007:

- **Class I:** Carriers with annual carrier operating revenues of $359.6 million or more
- **Class II:** Carriers with annual carrier operating revenues of less than $359.6 million but in excess of $28.7 million
- **Class III:** Carriers with annual carrier operating revenues of $28.7 million or less, and all switching and terminal companies regardless of operating revenues.

Within the railroad industry, Class II carriers are generally referred to as regional railroads and Class III carriers are referred to as short lines, This Plan will refer to railroads based on the STB class definitions.

Within Massachusetts, all railroads are Class II or Class III with the exception of CSX Transportation, which is a Class I railroad. To understand the structure of railroads within Massachusetts it is to helpful to examine the national context of railroads.

3.1.1 Freight Rail National Context

In recent years, the railroad industry has positioned itself to serve key links in a global supply chain. This includes handling the raw materials of energy and industry, as well as consumer goods required by an increasing knowledge and service based economy in the United States. The recent acquisition of the Burlington Northern and Santa Fe (BNSF) railroad – the largest railroad in the Untied States – by Berkshire Hathaway was described by Warren Buffet as

"an all-in wager on the economic future of the United States" with rail expected to play a critical role.

In addition, the public sector has renewed its attention on the railroad system as a means to address constraints in the larger national transportation system. Investments in the High Speed and Intercity Passenger Rail (HSIPR) program are providing direct capacity expansions in the passenger rail system and indirectly to the freight system. The American Recovery and Reinvestment Act (ARRA) passenger rail program and TIGER grants represent the largest federal investment in the rail system since the creation of Conrail. The current $11 billion in HSIPR funding and the TIGER program rail investments represent nearly half of the market capitalization of CSX or a quarter of the purchase price paid by Berkshire Hathaway for BNSF. This attention to the rail system at the federal and state level is expected to continue and be refined through the next reauthorization of the Federal Surface Transportation Program.

The majority of freight rail movements involve train moves over very long distances, usually hundreds of miles, often crossing multiple states. The rail system in the United States is fully integrated across North America from Mexico to Canada, connecting shippers with both national and global markets. It is unique in the industrialized world as it is primarily a private sector industry with individual railroads owning the infrastructure, rolling stock and providing the service to customers.

Deregulation of the freight railroad industry by the federal government allowed railroads to more readily adjust services and rates, enter into service contracts, abandon tracks, and sell off unprofitable routes. This permitted the freight railroads to improve their competitive position with other modes of transportation and to return to profitability. In turn, this provided for increased investment in track and equipment.

3.1.2 Freight Rail Regional Context

The economic freedoms provided by deregulation have allowed the larger railroads to sell their redundant main line and light density branch lines to regional and short line railroad companies. This has been a major factor in preserving rail services in Massachusetts and New England. These new or restructured smaller railroads can be successful through lowering of the cost of operation and by providing very customer focused service. In terms of mileage, short line and regional railroads now comprise approximately 60 percent of the active railroad route system in Massachusetts.[4]

The Massachusetts freight rail system is accurately characterized as a gateway to New England. With more than 38 percent of all New England freight rail traffic moving through Massachusetts to and from other areas in the United States, Massachusetts connects Maine, New Hampshire, Vermont, Connecticut, and Rhode Island to the national rail network. The ownership and structure of the Massachusetts Freight rail system is presented and further discussed in Chapter 4.

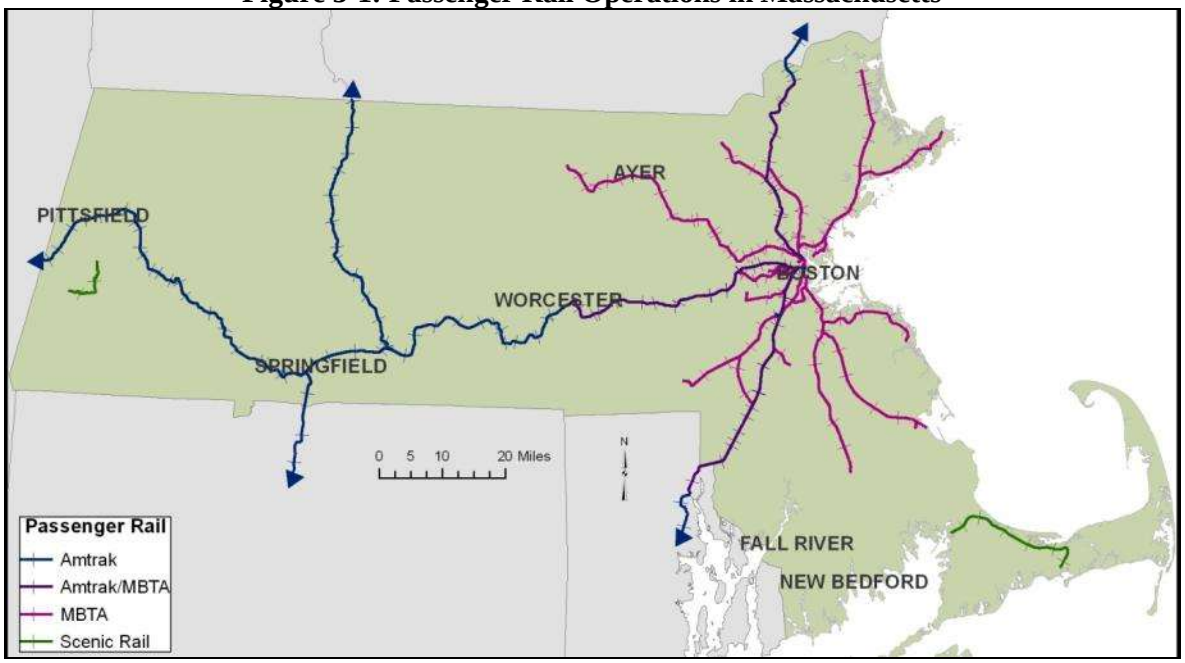
[4] On the national scale the Class I railroads dominate in all metrics – miles of road operated, tonnage and revenue. The Class I railroads combined handle approximately 90% of all freight rail.

The viability of Massachusetts rail transportation is strongly influenced by other regional concerns. It should not be evaluated in isolation. Most, if not all, of the benefits of the Commonwealth's rail network would be lost without connections to the national rail network and connections to neighboring states and regions.

3.1.3 Passenger Rail National and Regional Context

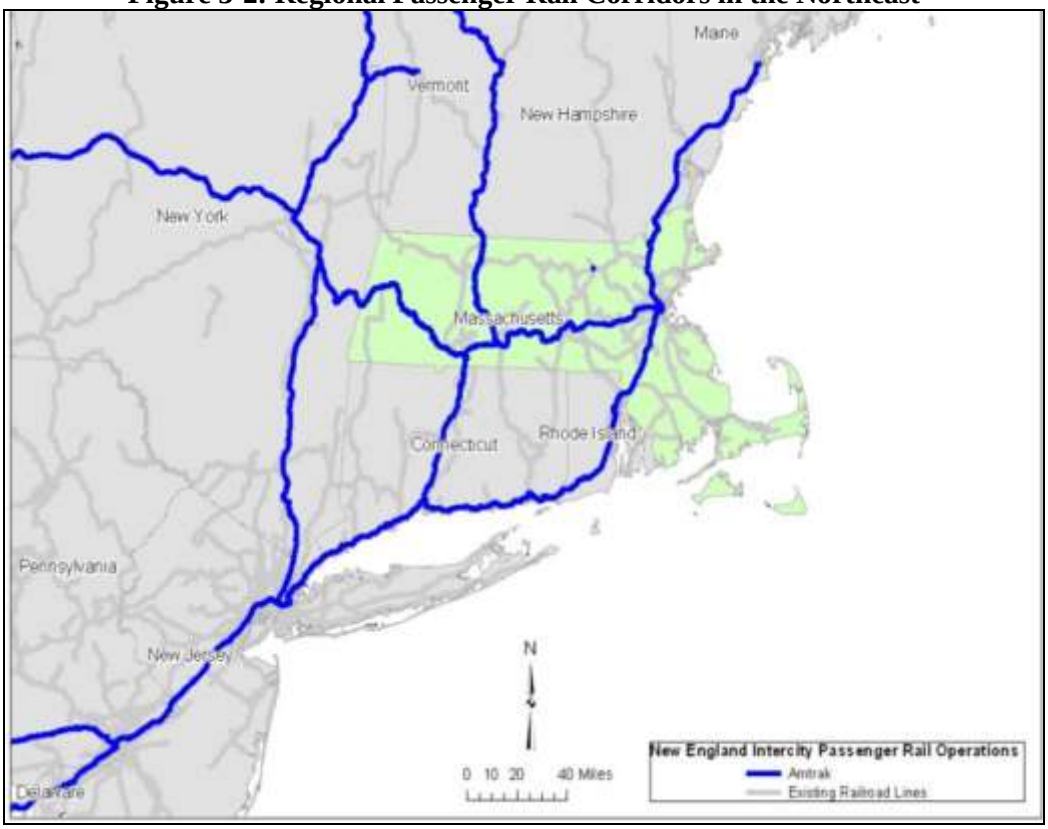
The Massachusetts passenger rail system (Figure 3-1) must be considered within its national and regional context. Passenger rail is not a stand-alone system, but rather an integral element of a network of transportation systems that connect to meet the mobility needs of residents and visitors alike. Massachusetts has long advocated for and invested in the passenger railroad network resulting in a mature commuter rail system and an intercity rail system that links the region to the national rail network. It is important to recognize that the state's passenger rail system is closely intertwined with the freight rail system as much of the passenger system travels on rail corridors owned by freight railroads. Amtrak is the primary intercity passenger rail service provider in the United States. Figure 3-2 illustrates the regional intercity passenger rail corridors in the northeast.

Figure 3-1: Passenger Rail Operations in Massachusetts



Source: MassGIS, 2009

Figure 3-2: Regional Passenger Rail Corridors in the Northeast



Source: MassGIS, with project team inputs

3.2 Benefits of Freight and Passenger Rail in Massachusetts

The freight and rail system in Massachusetts provides critical infrastructure and operations that benefit both businesses and residents. Efficient, cost-effective freight movement is an important element of economic competitiveness. Additionally, efficient and effective public transit provides roadway congestion relief and lower-cost transportation alternatives.

There are increasingly clear benefits to moving goods by rail versus alternative modes. Diverting freight to rail will reduce trucks on roadways, which will relieve highway congestion, reduce the number of highway crashes, and lessen pavement damage. Shippers also benefit from reduced shipment costs by switching to more efficient, less costly modes.

Longer-distance inbound, outbound, and through truck shipments represent 68 percent of all freight truck tonnage in Massachusetts and a potential opportunity for rail shipping. This is in contrast to local distribution activity and other short haul freight movements, typically less than 250 miles. These movements are generally better suited for truck and unlikely to use rail, long-haul trucking provides opportunity for diversion to rail.

Increased passenger rail ridership provides significant benefits through reducing auto congestion, lessening emissions, and facilitating smart-growth development. Often freight transportation issues and potential solutions are inherently linked to passenger transportation. In Massachusetts, many rail corridors are owned by private freight railroads and then compensated by Amtrak or the MBTA for passenger rail operations over those lines. In most cases, there is also shared usage of tracks, which presents both a challenge in scheduling and bottlenecks. This shared trackage offers the opportunity for public-private partnerships. The benefits of both freight and passenger rail improvements are identified below in three categories: economic, transportation, and environmental.

Economic benefits include:

- Shipper cost savings or 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;
- Congestion relief benefits to freight trucking result from highways being improved or freight traffic volumes are diverted to other modes;
- Freight logistics benefits result from improved reliability of travel times and the supply chain logistics re-organization benefits for freight-dependent businesses; and
- Near-term jobs created during the infrastructure construction period, and long-term jobs created from the operation of the new infrastructure investment.

Transportation benefits include:

- Congestion relief benefits for autos result from passenger rail ridership increases due to improvements or freight traffic volumes are diverted to other modes;
- Highway maintenance cost reductions, as additional freight is diverted to rail; and

- Safety benefits resulting from fewer accidents due to reductions in truck and auto Vehicle Miles Traveled (VMT).

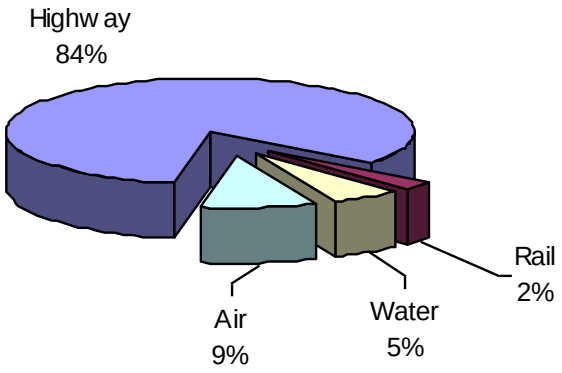
Environmental benefits include:

- Emissions benefits to the environment result as passenger rail ridership increases, reducing auto VMT, and as freight is shipped by more energy efficient modes that produce fewer emissions, including lower green house gases per ton mile;
- Fossil fuel consumption reduction benefits because freight rail is more fuel efficient than truck fuel usuage[5]. Transferring freight to rail will reduce fossil fuel consumption.

3.2.1 Energy Impacts

In 2007, the transportation industry consumed 28.5 percent of all energy used in the United States.[6] Energy consumed by rail transportation modes comprised only 2 percent of the nation's energy consumption, which amounts to approximately 670 trillion BTU (Figure 3-3). Freight railroads comprise 87 percent of the rail industry's energy consumption (Figure 3-4).

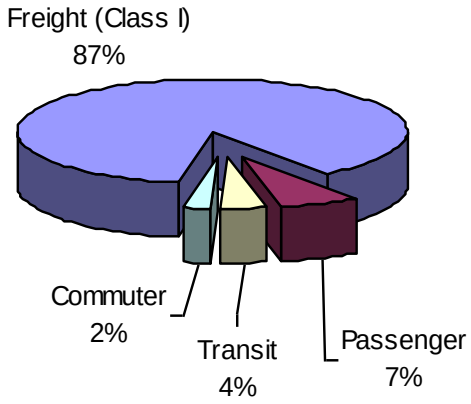
Figure 3-3: Energy Consumption by Transportation Mode



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

[6] United States Department of Energy, "Transportation Energy Data Book", Edition 27, 2007-2008.

Figure 3-4: Energy Consumption by Rail Mode



The energy efficiencies available through the better utilization of railroad in Massachusetts are significant. Intercity passenger rail service uses 20 percent less energy per passenger mile traveled than automobiles and 15 percent less than airline travel. [7]

For long haul distances, freight rail transportation is more energy efficient than trucking or shipping by air. According to private railroads, one gallon of fuel moved one ton of freight by rail 436 miles. Based on data from AASHTO, moving more freight by rail would do the following: [8]

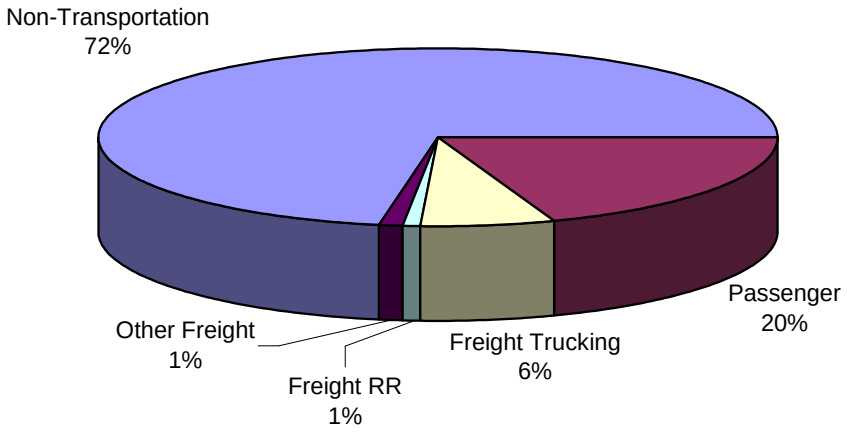
- If one percent of long-haul freight that currently moves by truck were moved by rail instead, fuel savings would be approximately 111 million gallons per year and annual greenhouse gas emissions would fall by 1.2 million tons.
- A single intermodal train can take up to 280 trucks off the highways. Depending on length and cargo, other (mixed freight) trains can take up to 500 trucks off our highways.
- Railroads enhance mobility and reduce the costs of maintaining existing roads and the pressure to build costly new roads.

US Greenhouse Gas (GHG) emissions by source in 2007 are shown in Figure 3-5. From a national perspective, the transportation industry accounted for 28 percent of the total US GHG emissions, as shown in Table 3-1. Approximately one third of GHG emissions in New England are produced by transportation combustion.[9] On this point, freight railroads already play a significant role through their fuel efficiency. Railroads, on average, are three or more 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

[7] United States Department of Energy, "Transportation Energy Data Book", Edition 27, 2007-2008 Table 2.12.
[8] Association of American Railroads (AAR), "Freight Railroads & Greenhouse Gas Emissions," July 2007.
[9] United States Department of Energy, "Transportation Energy Data Book", Edition 27, 2007-2008, Table ES-3.

freight moved by rail instead of truck reduces greenhouse gas emissions by two-thirds or more.[10]

Figure 3-5: US Greenhouse Gas Emissions by Source: 2007



* Passenger includes On-road Vehicles, aircraft, recreational boats, passenger rail

Source: EPA Greenhouse Gas Emissions and Sinks: 1990-2007.

Table 3-1: US Greenhouse Gas Emissions by Sector and Detail on Transportation

US Greenhouse Gas Emissions by Economic Sector				US Greenhouse Gas Emissions from Transportation		
Economic Sector	**$TgCO_2$ Eq.**	**% of Total**		**Economic Sector**	**$TgCO_2$ Eq.**	**% of Total**
Electrical Power Generation	2,445	34%		Trucking	411	23%
Transportation	1,995	28%		Freight Railroads	51	3%
Industry	1,386	19%		Waterbourne Freight	39	2%
Agriculture	503	7%		Pipelines	35	2%
Commercial	408	6%		Aircraft	23	1%
Residential	355	5%		Recreational Boats	17	1%
USTerritories	58	1%		Passenger railroads	6	0%
TOTAL:	7,150	100%		On Road Vehicles	1,241	68%
				TOTAL:	1,823	100%

Notes: Data are Teragrams of CO_2 Equivalents.
Totals for transportation do not match due to inconsistency in quantification.
Source: EPA, Inventory of US Greenhouse Gas Emissions and Sinks, 1990-2007 April 15, 2009, Tables ES-7, A-100 and A-101.

3.2.2 Environmental Concerns and Carbon Reduction Initiatives

The environmental impacts of transportation are being increasingly scrutinized as a mobile source of emissions and contributor to global climate change. Potential carbon pricing and

[10] Association of American Railroads (AAR), "Freight Railroads & Greenhouse Gas Emissions", July 2008.

associated regulatory changes are likely to impact industrial and energy production and also affect the freight industry. For example, coal is the largest source of energy production in the US and also one of the largest commodities in terms of rail trips throughout the country. Conversions to alternative energy sources could re-distribute and/or reduce freight transportation demand for energy-related goods.

Environmental considerations will likely impact modal shares as modes vary in terms of energy efficiency. In addition, conservation initiatives and technologies aimed at reducing fuel consumption, green house gases, and limiting climate change will affect transportation costs.

3.3 System Use

A complete assessment of rail infrastructure needs in Massachusetts requires a thorough examination of the commodities traveling within and through the Commonwealth via the rail system. This section of the report provides a detailed evaluation of current commodity flows traveling on the Commonwealth's rail infrastructure and major freight routes to provide insight into the rail system's performance. In addition, this section provides data and information gathered from key shippers within the state, as well as forecasts of future freight flows and demand.

This trade flow analysis covers *all* goods movement in Massachusetts and thus captures the following four major types of trade flows:

- **Inbound:** goods originating outside of Massachusetts with a destination in Massachusetts;
- **Outbound:** goods originating in Massachusetts with a destination outside of Massachusetts;
- **Internal**: goods that have both an origin and a destination in Massachusetts; and
- **Through:** goods that have both an origin and a destination outside of Massachusetts traveling through the state and along the state's infrastructure.

There are two primary data sources used in the trade flow analysis:

1) **Global Insight TRANSEARCH trade flow data.** This is a detailed, county-level data set purchased specifically for this plan. It covers all goods movement (inbound, outbound, internal, and through-trips) across all modes by tonnage for the year 2007. The data include information on commodity-specific trade flows that originate in and are destined for locations outside of Massachusetts. For the analysis, 2007 data were used to generate 2009 forecasts.

2) **Federal Highway Administration – Freight Analysis Framework (FAF).** The FAF data is publicly available with geographic coverage of states and major metropolitan areas. In most cases, county-level data are not available. The FAF historical data is also for 2007, and earlier forecasts for 2005 provide alternative

future freight flow demand scenarios. 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, however, and this is a key limitation of the data.

Finally, it is important to define what a trade flow means in terms of this data analysis. Each individual goods movement presented and aggregated below represents a single flow from an origin to a destination and, in almost every instance, it represents only one part of its overall, multi-step journey. As an example, a container of products arriving at the Port of Boston from an international destination, via a marine shipping company which is then distributed within Massachusetts could be counted multiple times within the data:

- First, the inbound container to the Port of Boston is a water-based commodity to the state;
- Second, the container may be drayed from the Port of Boston to a distribution facility; and
- Third, the products are then distributed to retailers within the state or nearby markets in other states via rail or truck.

Similar examples hold for other modes and types of shipments, as 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.

The remainder of the trade flow analysis is divided in the following sections.

- Overview of freight flows and mode share;
- Statewide commodity flow analysis;
- Modal freight flow assessment;
- County and regional analysis of freight flows;
- Summary of findings from shipper interviews and stakeholder input;
- Forecast of future freight demand; and
- Freight influences impacting future goods movement

3.3.1 Overview of Freight Flows and Modal Share

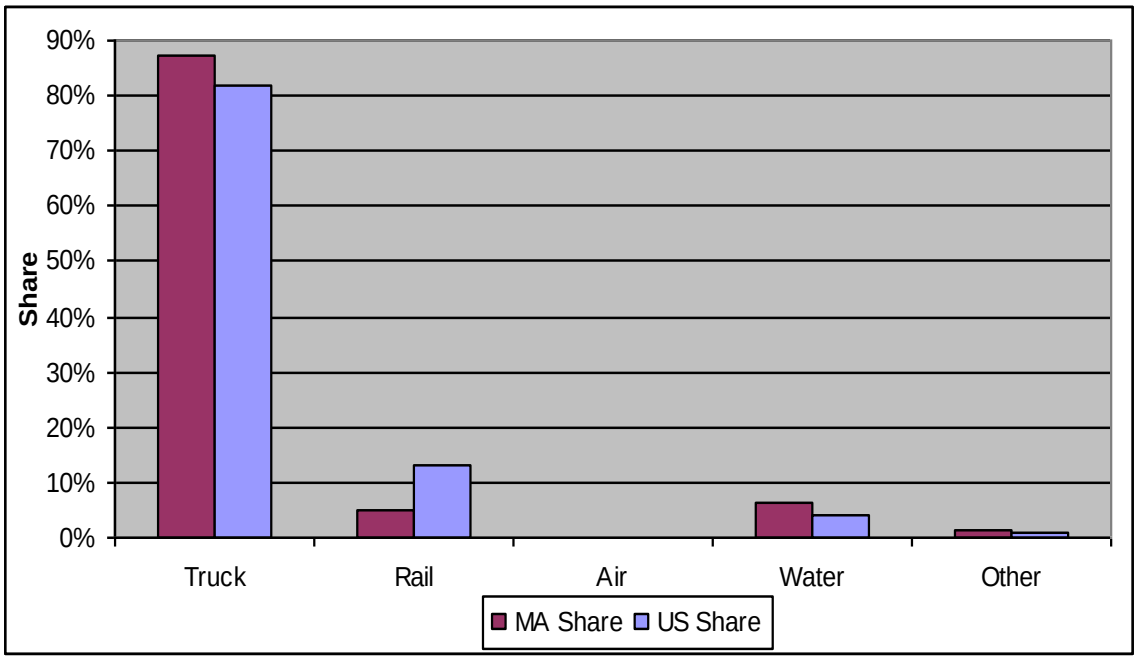
Slightly more than 278 million tons of freight was transported on Massachusetts infrastructure in 2007[11]. Freight moving through the Commonwealth travels by truck, rail, air, water, or a combination of the above[12].

Figure 3-6 shows that in 2007, Massachusetts is more heavily reliant than the US on trucks for goods movement.[13] In addition, the US relies more on rail than Massachusetts, with shares of 12.8 percent and five percent, respectively.

[11] Provided by Global Insight's TRANSEARCH Database.

[12] The groupings used to compare the datasets are: FAF[2], Truck/Rail intermodal movements are included in "Rail"; Air/Truck intermodal is included in "Air", and Other intermodal is recorded as "Other." Additionally, TRANSEARCH does not include intermodal movements, with the exception of some intermodal tons on rail cars and "Other" tons in TRANSEARCH data are NAFTA flows that are not distinguished by mode.

Figure 3-6: 2007 Modal Shares of Tonnage for All Freight Movements Excluding Through Traffic, Massachusetts and US

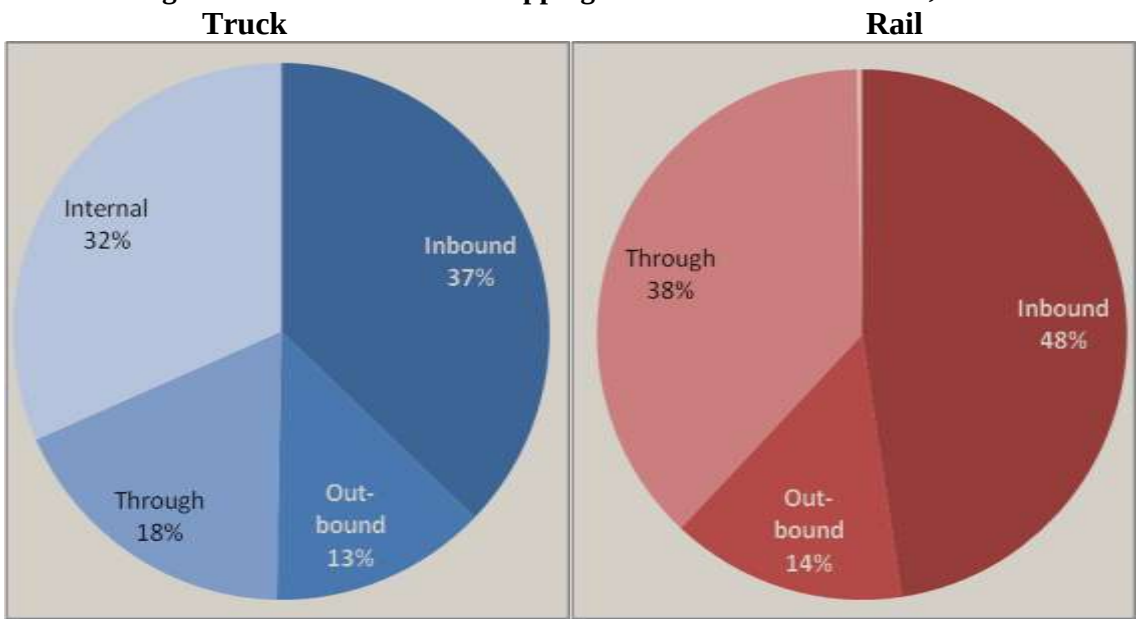


Source: Global Insight TRANSEARCH 2008 Release. FAF 2007 Provisional Release
Note: Other includes Other Intermodal Movements

Figure 3-7 and Table 3-2 provide a breakdown of Massachusetts freight movement by mode and direction. Inbound traffic dominates freight volumes in Massachusetts consistent with the strong consumer demand of its residents. Overall truck inbound shipments are more than double outbound volumes with significant through-trip volumes. Most volume carried by truck trips internally within Massachusetts reflects shorter distance secondary traffic movements. For rail, inbound shipments are more than three times higher than Massachusetts' outbound shipments. For through-trips, rail is estimated to capture almost 13 percent of goods movement as the rail mode is most competitive for longer-distance shipments. Through-trips account for 38 percent of all freight rail volumes.

[13] Note that US Modal Share is based on the FAF[2], while Massachusetts is based on TRANSEARCH. The FAF[2] data shows MA relying more heavily on truck than TRANSEARCH, with shares of 95.5% truck, 3.1% rail, 0.4% water, 0.1% air and 0.9% other/intermodal.

Figure 3-7: Truck and Rail Shipping Patterns in Massachusetts; 2007



Source: Global Insight TRANSEARCH 2008 Release.

Table 3-2: Massachusetts Freight Tonnage by Mode and Direction in Thousands of Tons, 2007

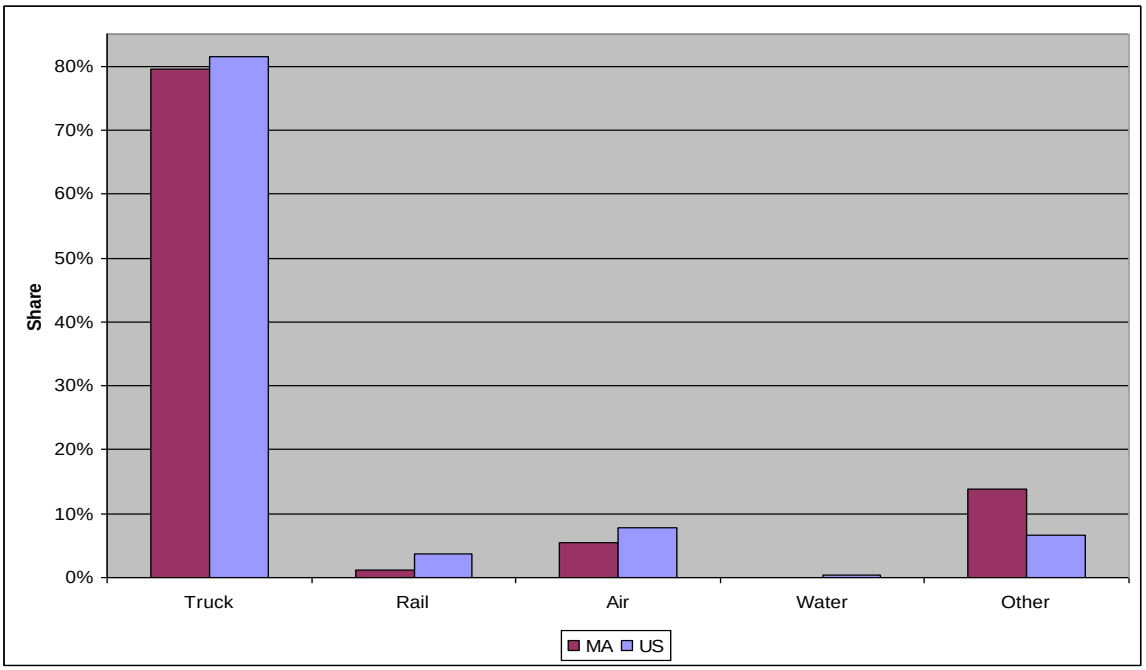
		Truck	Rail	Air	Water	Other	Totals
Inbound	**Tons**	89,006	8,542	162	12,886	3,002	**113,599**
	% Share	78.4%	7.5%	0.1%	11.3%	2.6%	
Outbound	**Tons**	31,310	2,579	154	356	447	**34,846**
	% Share	89.9%	7.4%	40.0%	1.0%	1.3%	
Through	**Tons**	43,367	6,764	-	-	3,220	**53,351**
	% Share	81.3%	12.7%	0.0%	0.0%	6.0%	
Internal	**Tons**	75,633	57	2	615	-	**76,307**
	% Share	99.1%	0.1%	0.0%	0.8%	0.0%	
							278,103

Source: Global Insight TRANSEARCH Database, 2008 Release.

The *value* of freight traveling on Massachusetts infrastructure, excluding through traffic, is 2.8 percent of the total freight value moving in the US. By comparison, the total number of tons shipped in Massachusetts is 1.8 percent of the total tonnage shipped in the US. This is an indication that the average value of goods shipped in Massachusetts is higher per ton than the US average. Figure 3-8 below indicates the modal share in terms of commodity value for Massachusetts and the United States. One of the main reasons that a greater share of value moves to and from Massachusetts, as compared to tonnage, is because of the light, high-

valued commodities produced within the Commonwealth. As shown, rail has a smaller share of goods movement in Massachusetts when measured by value compared to tonnage. This is 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, rail products tend to be heavier per dollar of value meaning that the dollar per ton shipped is lower, resulting in a lower overall share of freight by value. This second trend is true nationwide.

Figure 3-8: Modal Share of Value, Massachusetts and the US, 2007



Source: FAF[2] 2007 Provisional Commodity Origin-Destination Data Release

3.3.1 Statewide Commodity Flow Analysis for Rail

3.3.1.1 Rail Flows by Tonnage

The following commodity analysis focuses on the top ten commodities by tonnage that are transported on the Massachusetts rail network. The data contained in this section is primarily from the TRANSEARCH database, where each commodity is classified using the Standard Transportation Commodity Classification Code (STCC) system, created by the Association of American Railroads. The data includes commodity information by tonnage, mode, origin, and destination for the year 2007. From this information, the freight flow tonnage for rail can be determined. The freight flows covered in this section include inbound, outbound, internal and through shipments, as defined previously.

Rail traditionally ships heavier bulk commodities that are hauled longer distances and are generally not as time sensitive as air or truck movements, although maintaining delivery windows is still critical. The advantage of shipping freight via rail is the rail hauling capacity and relatively low costs, as it is one of the most efficient modes of transportation. Goods

moved by rail account for the 6.5 percent of all freight movements in Massachusetts, including through traffic.

For rail in Massachusetts, the most moved commodities by tonnage, regardless of direction, are pulp, paper or allied products. These commodities account for 2.8 million rail tons or 15.5 percent of all freight rail as shown in Table 3-3. Miscellaneous mixed shipments, including freight all kind (FAK) shipments and shipments that fall into multiple commodity categories, account for another 12 percent.

Table 3-3: Top Ten Commodities for Rail in Millions of Tons, 2007

Commodity	Total Rail Tons	% Share
Pulp, Paper Or Allied Products	2.8	15.5%
Misc Mixed Shipments	2.1	12.0%
Chemicals Or Allied Products	2.1	11.7%
Waste Or Scrap Materials	2	11.4%
Food Or Kindred Products	1.8	10.0%
Clay, Concrete, Glass Or Stone	1.3	7.3%
Coal	1.3	7.3%
Lumber Or Wood Products	1	5.7%
Farm Products	1	5.3%
Transportation Equipment	0.7	3.9%
TOTAL TONS:	**16.2**	

Source: Global Insight TRANSEARCH, 2008 Release

Tables 3-4 through 3-7 indicate the top rail commodities by direction moved: inbound, outbound, internal, or through. For all four directions, chemicals or allied products are within the top ten, and in the case of internal movements, it is the top commodity. Several commodities are in the top ten for all directions, except internal movements. These include pulp, paper, or allied products; food and kindred products; farm products; and clay, concrete, glass or stone. These commodities tend to be heavier and moved in bulk.

The primary outbound rail commodities are miscellaneous mixed shipments and waste or scrap materials. Combined, these commodities account for 60 percent of the total outbound tonnage.

Table 3-4: Top Ten Commodities Outbound from Massachusetts for Rail in Thousands of Tons, 2007

Commodity	Total Rail Tons	% Share
Misc Mixed Shipments	802.5	31.1%
Waste Or Scrap Materials	737.9	28.6%
Chemicals Or Allied Products	241.5	9.4%
Shipping Containers	184.6	7.2%
Pulp, Paper Or Allied Products	165.2	6.4%
Food Or Kindred Products	104.2	4.0%
Farm Products	91.6	3.6%
Clay, Concrete, Glass Or Stone	53.4	2.1%
Misc Freight Shipments	52.7	2.0%
Waste Hazardous Materials	28.9	1.1%
TOTAL TONS :	**2.5**	

Source: Global Insight TRANSEARCH 2008 Release

Of the inbound commodities, miscellaneous mixed shipments and food or related products account for most of the tonnage, 15.7 percent and 14.3 percent, respectively. Chemicals or allied products and pulp/paper products account for slightly more than one-quarter of total tonnage shipped inbound by rail.

Table 3-5: Top Ten Commodities Inbound to Massachusetts for Rail in Millions of Tons, 2007

Commodity	Total Rail Tons	% Share
Misc Mixed Shipments	1.3	15.7%
Food Or Kindred Products	1.2	14.3%
Chemicals Or Allied Products	1.1	13.1%
Pulp, Paper Or Allied Products	1	12.2%
Farm Products	0.8	9.1%
Transportation Equipment	0.7	7.8%
Nonmetallic Minerals	0.6	7.4%
Lumber Or Wood Products	0.5	6.2%
Clay, Concrete, Glass Or Stone	0.5	6.2%
Coal	0.3	3.4%
TOTAL TONS:	**8.1**	

Source: Global Insight TRANSEARCH 2008 Release

Internal freight rail shipments with an origin and destination in Massachusetts are very rare given the long-distance nature of rail shipping. Of this very limited market, chemicals or allied products represent nearly 65 percent of total internal rail tonnage with transportation equipment and waste/scrap metals accounting for more than 30 percent of the internal tonnage. An example is de-icing chemicals for use at Logan Airport.

Table 3-6: Top Five Commodities Internal to Massachusetts for Rail in Millions of Tons, 2007

Commodity	Total Rail Tons	% Share
Chemicals Or Allied Products	0.037	64.7%
Transportation Equipment	0.009	16.5%
Waste Or Scrap Materials	0.008	14.3%
Misc Mixed Shipments	0.002	2.7%
Metallic Ores	0.001	1.7%
TOTAL TONS:	**0.057**	

Source: Global Insight TRANSEARCH 2008 Release
Note: Based on the data, no other commodities are transported via rail within the Commonwealth of Massachusetts.

Commodities passing through Massachusetts are led by pulp/paper products (23.1%), waste/scrap metals (18.3%), and coal (15%).

Table 3-7: Top Ten Commodities Passing Through Massachusetts Rail in Millions of Tons, 2007

Commodity	Total Rail Tons	% Share
Pulp, Paper Or Allied Products	1.57	23.1%
Waste Or Scrap Materials	1.24	18.3%
Coal	1.01	15.0%
Clay, Concrete, Glass Or Stone	0.73	10.8%
Chemicals Or Allied Products	0.71	10.5%
Lumber Or Wood Products	0.48	7.2%
Food Or Kindred Products	0.47	7.0%
Primary Metal Products	0.33	4.9%
Farm Products	0.09	1.4%
Petroleum Or Coal Products	0.07	1.0%
TOTAL TONS:	**6.7**	

Source: Global Insight TRANSEARCH 2008 Release

Table 3-8 indicates that the Chicago region was the top freight rail origin and destination for Massachusetts in 2007. There are massive freight rail intermodal and transloading operations of national goods movement in the Chicago area. The remaining top ten origin-destination pairs are freight shipments inbound to the Commonwealth.

Table 3-8: Top Ten Rail Origin-Destination Pairs in Thousands, 2007

Origin Region	Destination Region	Rail Tons
Chicago IL	Massachusetts	2,155
Massachusetts	Chicago IL	1,074
Non-Metropolitan QC	Massachusetts	851
Non-MA Boston Region	Massachusetts	573
Toledo OH	Massachusetts	307
Cleveland OH	Massachusetts	268
St. Louis MO	Massachusetts	255
Non-Metropolitan ON	Massachusetts	252
Indianapolis IN	Massachusetts	240
Albany NY	Massachusetts	239

Source: Global Insight TRANSEARCH 2008 Release

Figure 3-9 portrays the movement of all rail tons, regardless of direction, on Massachusetts rail corridors. Although rail traditionally carries heavier bulk commodities, the most rail tonnage on any line segment within Massachusetts is approximately 10.7 million tons, less than ten percent of the heaviest highway segments, which handled 107 million tons. Interestingly, the heaviest level of rail traffic is in the western part of the state, between the Albany, New York area and Springfield. Other large freight rail corridors are along the northern part of the state traveling east-west and connecting to New York and Maine, as well as connecting north-south rail corridors.

Figure 3-9: Massachusetts Total Freight Rail Tons, 2007

Source: Global Insight TRANSEARCH 2008 Release

3.3.1.2 Freight Flows by Value

The top commodities by value of a total commodity are somewhat different from the largest commodities by tonnage. The three most valuable commodities moved into, out of, or within Massachusetts account for more than half of all value. Transportation equipment is the highest valued commodity for both 2002 and 2007, accounting for 25 percent of all value for 2007. That commodity category is primarily the shipment of autos by rail but also could include rail vehicles, pleasure boats, and commercial ships. Paper, plastics/rubber, and wood/furniture each account for 15 percent of total value in 2007.

Table 3-9 indicates that the commodities with the largest value shares moved within Massachusetts have remained relatively consistent over the past five years, but growth rates vary among the commodities. The greatest total increase in value of commodity moved is for plastics/rubber, increasing from $266 million in 2002 to $424 million in 2007. The greatest percent growth in value of commodities traveling about Massachusetts has been in coal. The value of coal moved was $5 million in 2002 and $9 million in 2007. Significant growth also occurred for plastics/rubber, 9.3 percent over the five-year period.

Table 3-9: Value of Rail Commodities Transported within Massachusetts 2002 and 2007 (Millions of Dollars)

	Value		Growth Rate
	2002	2007	2002-2007
Transportation Equipment	$802	$693	-2.90%
Paper	$354	$415	3.20%
Plastics/Rubber	$266	$414	9.30%
Wood/furniture	$313	$409	5.50%
Farm Prods/food/bevs	$358	$377	1.00%
Chemicals/Pharmaceuticals/Fertilizer	$247	$219	-2.40%
Base Metals	$204	$166	-4.00%
Misc Mfg Products	$33	$31	-1.00%
Electronics/Machinery	$28	$26	-1.60%
Minerals and Ores	$22	$21	-1.70%
Coal	$5	$9	13.20%
Stone and Sand	$10	$8	-5.20%
Gasoline, Fuel	$42	$6	-32.10%
Textiles/leather	$3	$2	-15.10%
Mixed Freight/Unknown	$1	$0	-28.10%
Precision Instruments	$1	$0	-100.00%
Waste/Scrap	$0	$0	0.00%
TOTAL:	**$2,689**	**$2,796**	**0.80%**

Source: FAF[2], 2007 Provisional Data

The top commodities by value moved outbound from Massachusetts were plastics/rubber, accounting for 59 percent of value or $131 million in 2007. Paper accounted for 32 percent or $72 million of the total value in 2007.

The top commodities moved inbound to Massachusetts were transportation equipment, accounting for $693 million or 27 percent of inbound value in 2007. Other commodities that represent significant portions of inbound value include wood/furniture (16%), paper (13%), and plastics/rubber (11%).

The value of inbound shipments is significantly higher than the value for outbound shipments. For 2007, the total value for inbound rail shipments in Massachusetts was $2.6 billion. Outbound shipments were valued at $221 million.

3.3.2 County and Regional Analysis of Freight Flows

This section of the trade flow analysis for rail focuses on county and regional freight flows and how freight volumes and commodities vary within the state. Table 3-10 presents the top five commodity flows by county for outbound, inbound, and internal rail shipments, with

Worcester County the largest in terms of both inbound and outbound volumes. Hampshire County is the largest for internal rail shipments.

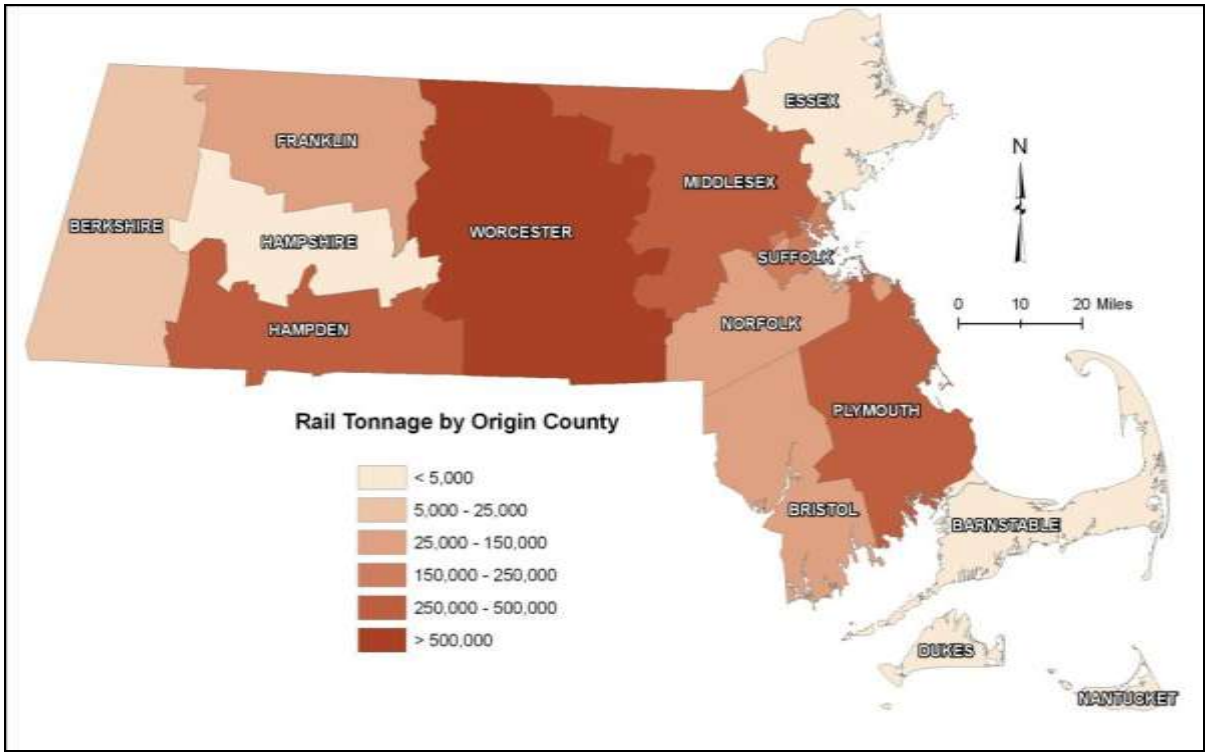
Table 3-10: Top Freight Movements by County and Direction, Millions of Tons

Inbound	Volume	Outbound	Volume	Internal	Volume
Worcester	1.05	Worcester	0.11	Hampshire	0.18
Middlesex	0.58	Franklin	0.09	Worcester	0.03
Hampden	0.41	Hampden	0.02	Hampden	0.03
Hampshire	0.32	Berkshire	0.01	Franklin	0
Franklin	0.03	Hampshire	-	Middlesex	0
Berkshire	-	Middlesex	-	Berkshire	-

Source: Global Insight TRANSEARCH 2008 Release

The freight tonnage moved varies both by region in the state and direction (inbound or outbound). Figure 3-10 and Figure 3-11 reiterate that more freight tonnage terminates in Massachusetts than originates in the Commonwealth. These figures also indicate that areas of heaviest origin are Suffolk County, Worcester, Middlesex and Norfolk Counties and areas with highest destination of freight are Middlesex, Worcester, Hampden and Suffolk Counties.

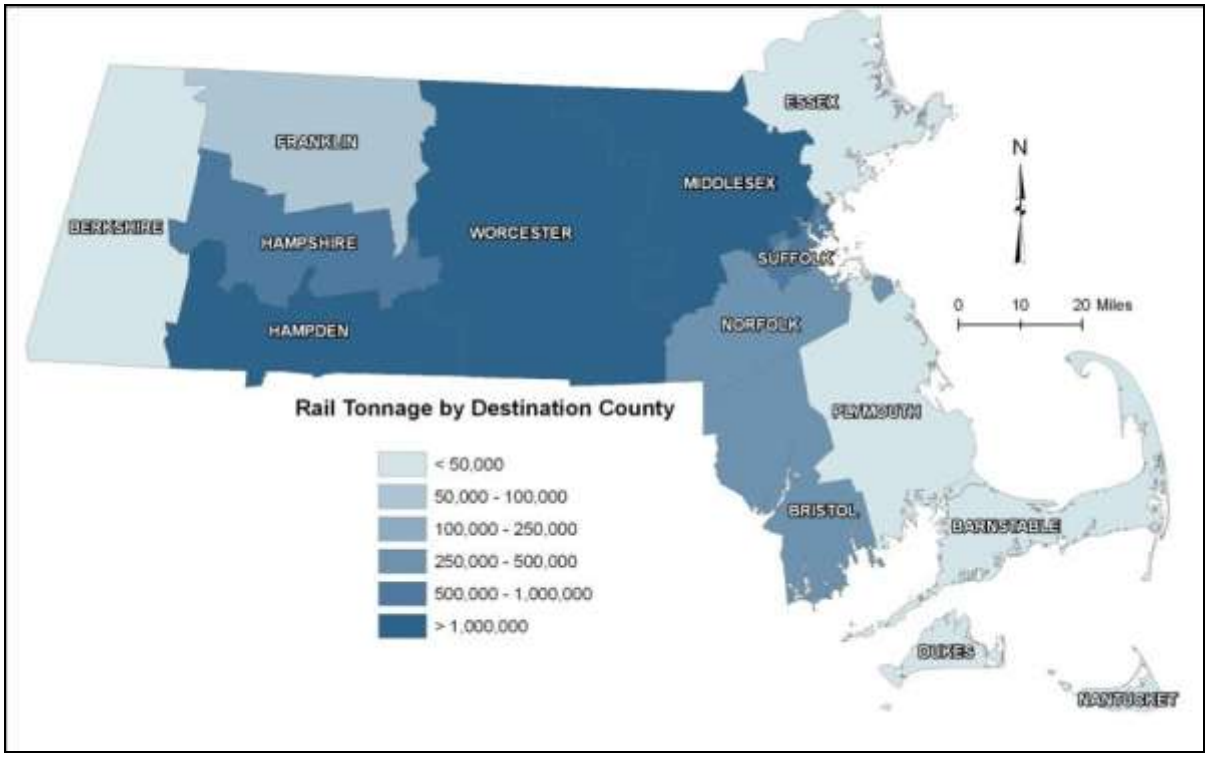
Figure 3-10: Rail Tonnage by Origin County



Source: Global Insight TRANSEARCH 2008 Release

The large consumer markets in the eastern part of the state, highlighted by Middlesex County, demonstrate the huge volume of freight demand for inbound goods, and provide evidence as to why freight is so important to the state.

Figure 3-11: Rail Tonnage by Destination County



Source: Global Insight TRANSEARCH 2008 Release

3.3.3 Freight Flows Forecast, Including Through Traffic

International and domestic trade flows have been growing rapidly in recent years and most projections estimate that freight volume growth will continue over the next 30 years. The volumes of freight by mode have implications for future infrastructure planning, projects, and modal choice. Recognizing that no forecast can exactly predict future freight growth, this section of the trade flow analysis includes a range of feasible estimates for future freight movements in Massachusetts.

While the current freight flow and infrastructure conditions are known, changes in transportation needs, demand for commodities, and costs will all have an impact on modal choice and the volume of freight moving on the Commonwealth's infrastructure. For example, high fuel costs and highway congestion could result in a shift away from truck to alternative modes, such as rail and short-sea-shipping, which would change the infrastructure needs at ports and rail-related facilities. The sections below detail the methodology and likely range of future freight tonnage in Massachusetts. This section also includes a discussion of factors that may impact future freight growth.

3.3.3.1 Methodology

Data Sources:

The 2002 Freight Analysis Framework-2 (FAF^2) data is maintained by the Federal Highway Administration (FHWA), and forecasts freight tonnage and value in five year increments from 2010 to 2035 for each state and the US as a whole. In addition, the FAF^2 Provisional Release data has the same 2007 commodity data available for Massachusetts. FAF^2 uses the Standardized Classification of Transported Goods (SCTG) to categorize commodities. The FAF forecasts were last updated in 2006[14].

Global Insight's TRANSEARCH database provides similar commodity flow data, but at the county level. TRANSEARCH uses 2007 as a base year and provides forecasts for the years 2020 and 2035. TRANSEARCH uses the Standard Transportation Commodity Code (STCC) to categorize commodities. The TRANSEARCH forecast was generated in 2009 and reflects some of the current economic downturn.

Appendix C provides a discussion about how differing commodity code classification systems were reconciled to produce comparable forecasts.

3.3.3.2 Freight Flows Forecast

The freight flow forecast based on the TRANSEARCH data indicates freight will grow by 70 percent from 2007 to 2035. The estimate includes all goods movement including through traffic. The vast majority of the freight tonnage is moved by truck, accounting for 239.3 million tons in 2007 and 412.0 million tons in 2035, which is 72.2 percent growth over the period (Table 3-11).

Freight rail is expected to grow 61 percent over the period, increasing tonnage from 17.9 million tons to 28.9 million tons by 2035. The fastest growing mode is air freight, which is forecast to increase 108.8 percent from 318,894 tons to 665,813 tons in 2035. While the tonnage is relatively low, it is important to note that freight moved by air often consists of lighter, high value goods. Waterborne freight and other freight are anticipated to grow the least, at 49.7 percent and 36.7 percent, respectively.

[14] The most recent version of the FAF, Version 2.2 was released in November 2006 with minor corrections to Version 2.1 that was released in January 2006.

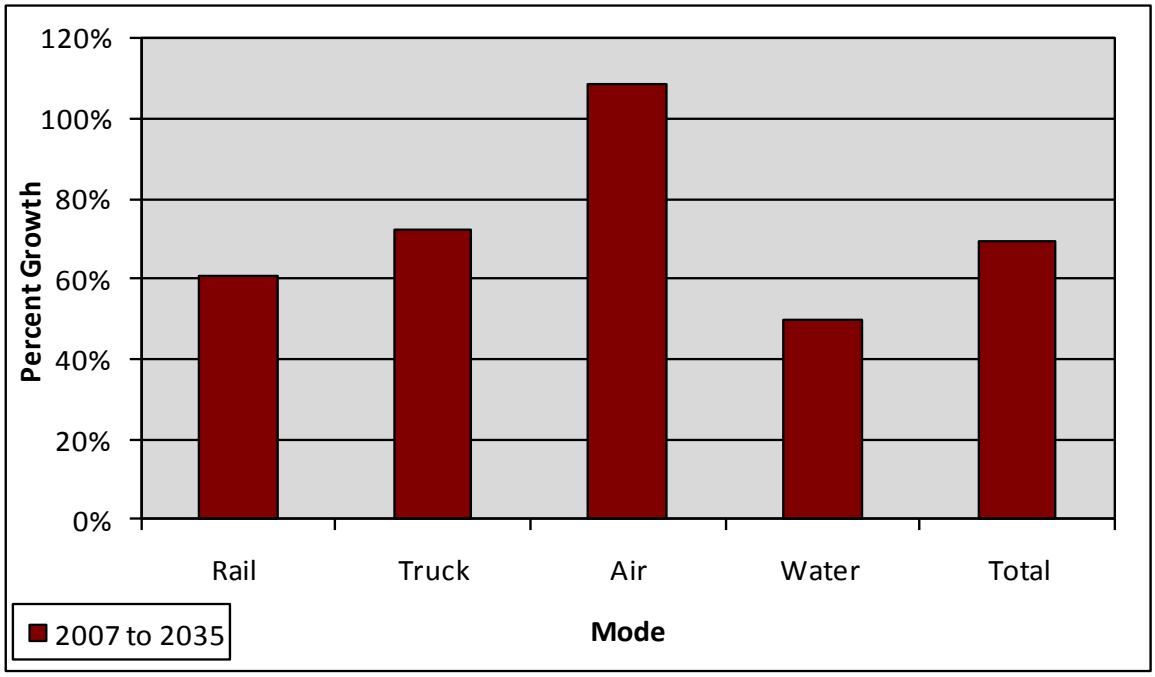
Table 3-11: Total Tonnage by Mode, Including Through Traffic, 2007, 2020, 2035 (Millions of Tons)

Mode	2007	2020	2035
Rail	17.9	21.8	28.9
Truck	239.3	308.2	412
Air	0.3	0.4	0.7
Water	13.9	17	20.7
Other	6.7	8	9.1
TOTAL:	**278.1**	**355.5**	**471.4**

Source: TRANSEARCH Forecast released 2009.

The incremental modal growth in percentage terms from 2007 to 2020, 2020 to 2035, and 2007 to 2035 is shown below in Figure 3-12.

Figure 3-12: **Modal Growth 2007-2035, Including Through Traffic**



Source: Global Insight forecast released 2009

Table 3-12 shows tonnage moved by modal share over time consistent with the forecast projections above. Despite growth of more than 60 percent, the rail modal share is expected to decline from 6.5 percent to 6.1 percent based on expected commodity and shipping patterns. While tonnage is anticipated to grow for every mode, truck and air are the only modes that are expected to see their relative share of overall movements increase.

Table 3-12: Massachusetts Freight Modal Share, Including Through Traffic, 2007, 2020, 2035

Mode	2007	2020	2035
Rail	6.45%	6.14%	6.13%
Truck	86.05%	86.71%	87.40%
Air	0.11%	0.12%	0.14%
Water	4.98%	4.78%	4.40%
Other	2.40%	2.26%	1.93%

Source: TRANSEARCH Forecast released 2009.

The projected tonnage growth from 2007-2035 for the aggregated commodity categories can be seen in Table 3-13. The major commodities anticipated to grow the most are precision instruments, electronics and machinery, miscellaneous manufacturing products, mixed freight/unknown, and waste/scrap. All of these commodities are expected to see their freight tonnage at least double over the period. The only commodity group that is expected to see a decline in freight tonnage over the period is textiles and leather, declining by approximately 35 percent.

The commodities in Table 3-13 that are highlighted in blue and italicized represented 206.5 million tons in 2007 and are expected to grow slightly less than 52 percent to nearly 313.2 million tons in 2035. These commodities, such as coal, fuel, chemicals and plastics, represent an opportunity for rail to capture additional tonnage if the infrastructure is sufficient. Electronics and machinery as well as transportation equipment are potential growth opportunities for rail to serve inbound consumer demand.

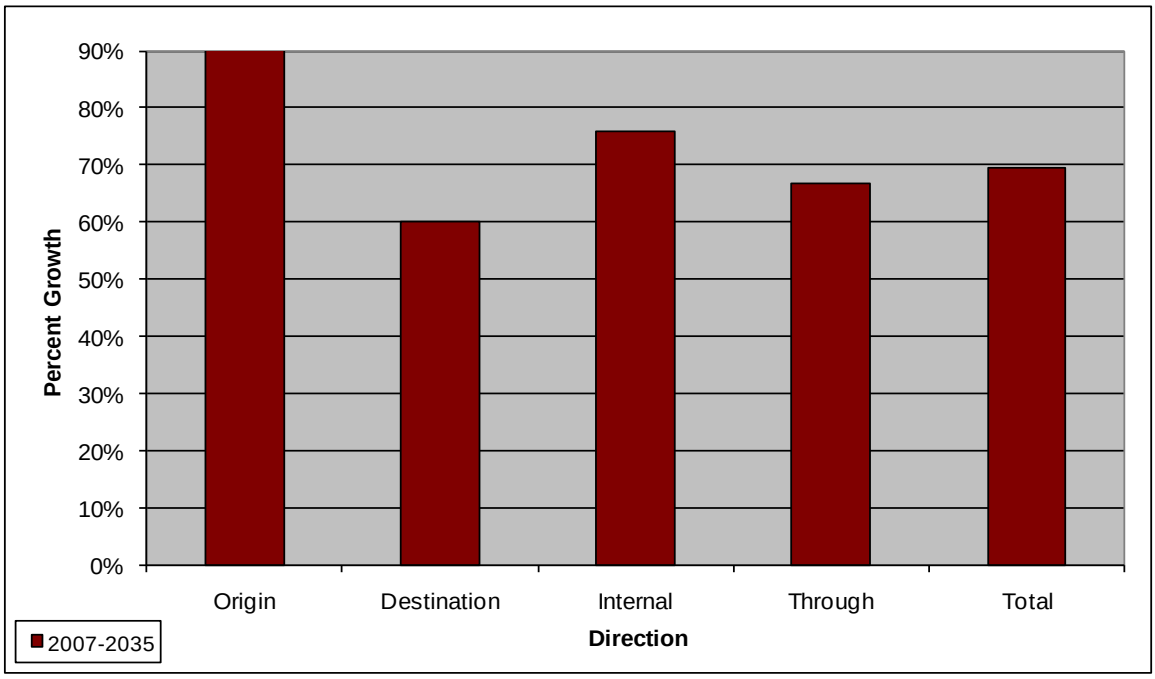
Table 3-13: Combined Commodity Tonnage and Growth for All Movement Directions 2007-2035 (In Millions)

Combined Commodity	2007	2020	2035	Growth 2007-2035
Farm Prods/food/beverages	36	45	54	50%
Stone and Sand	27	32	37	36%
Minerals and Ores	35	44	55	56%
Coal	2	3	3	21%
Gasoline, Fuel	44	58	70	57%
Chemicals/Pharmaceuticals/Fertilizer	29	37	41	40%
Plastics/Rubber	4	5	8	97%
Wood/furniture	9	11	14	57%
Paper	17	19	25	44%
Textiles/leather	2	2	1	-35%
Base Metals	15	19	23	54%
Electronics/Machinery	5	8	17	**222%**
Transportation Equipment	4	6	8	100%
Precision Instruments	1	1	3	**239%**
Miscellaneous Mfg Products	1	1	2	**176%**
Waste/Scrap	4	5	9	**103%**
Mixed Freight/Unknown	41	58	102	**148%**
TOTAL:	**278**	**355**	**471**	**70%**

Source: TRANSEARCH Forecast released 2009.
Note: Yellow cells represent growth over 100%.

Figure 3-13 represents the projected growth in freight movements by direction in Massachusetts over time. According to the TRANSEARCH forecast, freight originating in Massachusetts is anticipated to see the largest growth over the period from 2007 to 2035, increasing 90 percent while freight with a destination of Massachusetts is anticipated to grow by 60 percent over the same period. Movements internal to Massachusetts, which are miniscule for rail, are anticipated to grow 76 percent and through traffic movements are expected to increase by about 67 percent between 2007 and 2035.

Figure 3-13: Freight Tonnage Growth by Direction of Movement, 2007-2035



Source: TRANSEARCH forecast 2009 Release

Overall freight growth for all four directions is anticipated to be approximately 69.5 percent. The tonnage values associated with the percentages can be seen in Table 3-14 below.

Table 3-14: Massachusetts Freight Tonnage in Millions by Direction 2007, 2020 and 2035

	2007	2020	2035
Origin	35	47	66
Destination	114	141	182
Internal	76	101	134
Through	53	66	89
Total:	**278**	**355**	**471**

Source: TRANSEARCH Forecast 2009 release.

3.3.4 Freight Influences Impacting Future Goods Movement by Rail

Freight rail projections can vary considerably, depending on the demand for goods and services and the proximity of the origins of various products to their destinations. Rail freight flows depend upon business and resident demand in the Commonwealth, as well as regional demands for goods produced in Massachusetts. Global and national trends also influence freight flows in the state and must be considered in any analysis of the flow of future rail freight.

The national economy has recently been characterized by fluctuations in fossil fuel prices, the sub-prime lending crisis, and an overall contraction of economic activity. These

conditions have impacted near-term freight flows and may delay longer-term growth. Other issues include national infrastructure condition, congestion, and constrained system capacity, which could impede overall national freight flows. This section briefly outlines several of the more pressing issues that will influence the freight rail industry and trade volumes in the years ahead.

3.3.5 Rail Capacity Constraints

The national rail network in key interchange areas and routes is experiencing increasing levels of congestion. Utilization of existing rail capacity has more than tripled from 1980 to 2006, as shown in Figure 3-14.[15] 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).[16]

The ability to handle more freight does not necessarily mean the addition of track miles of new track. This is demonstrated by Figure 3-14 that the increase in ton-miles per mile of track and ton-miles handled nationally has been handled on a rail network that has experienced a decline in total track miles. While it would be impossible to sustain this trend, it does identify that the railroads have increased overall efficiencies in the rail system. Much of the improvements for Class I railroads has been gained from improvements to specific corridors illustrated in Figure 3-15.

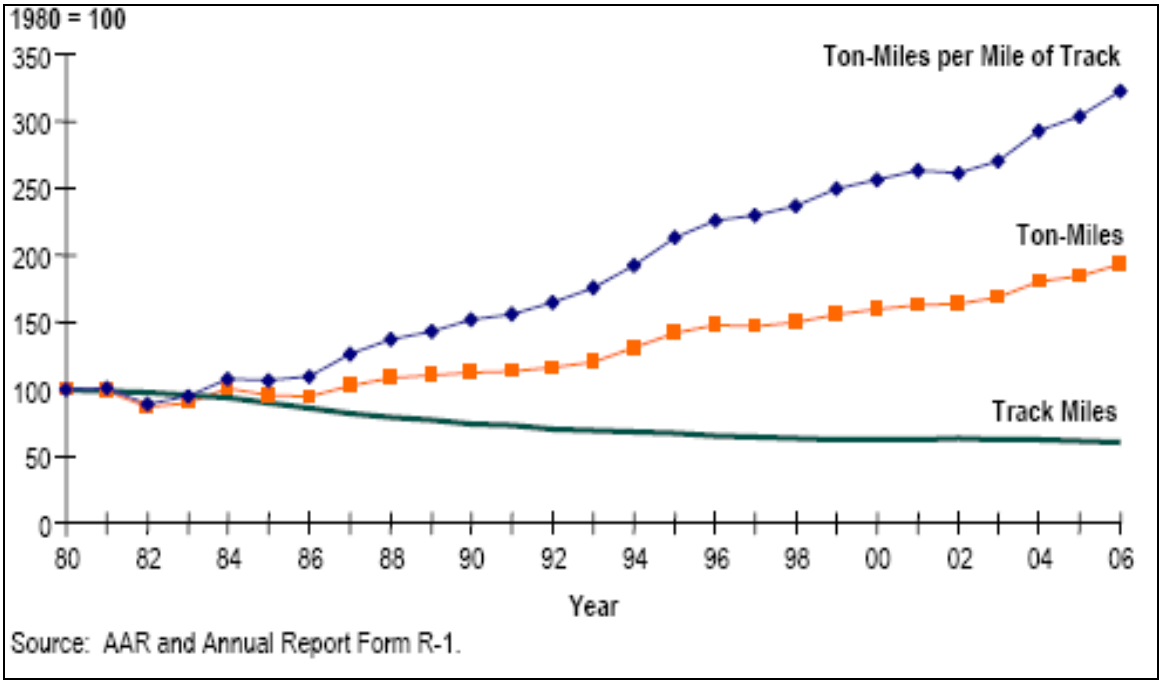
The corridor improvements have been focused on mainline capacity and increasing through put at yards and interchange points with other rail lines. Mainline capacity improvements have been combinations of improving existing track; adding more multiple track sections for passing sidings and/or increasing 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 as highway grade crossings in urban areas. Several examples of completed or ongoing initiatives with benefits for the national and the Massachusetts rail system are:

- Alameda Corridor Improvement Project – Elimination of highway rail crossing and improvements in rail trackage in a 20-mile-long rail cargo expressway linking the intermodal container ports of Long Beach and Los Angeles to the transcontinental rail network near downtown Los Angeles
- Union Pacific Sunset Route Track Improvement Project – Adding double track in a 760-mile Union Pacific corridor between Los Angeles and El Paso, TX connecting to the Alameda Corridor Improvement Project
- CREATE (Chicago Region Environmental and Transportation Efficiency) Program will reduce freight and passenger train delays and congestion throughout the Chicago area by focusing rail traffic on five rail corridors.

[15] This figure is also found in the "National Rail Freight Infrastructure Capacity and Investment Study"
[16] "National Rail Freight Infrastructure Capacity and Investment Study"

- Norfolk South Crescent Corridor – Improvements in the 2,500-mile rail corridor from New Jersey to Memphis with connections to the Gulf coast that will o increase capacity for intermodal and other rail traffic
- CSX National Gateway Improvement Project – Improvements for intermodal trains in three existing rail corridors that run through Maryland, Virginia, North Carolina, Pennsylvania, Ohio and West Virginia

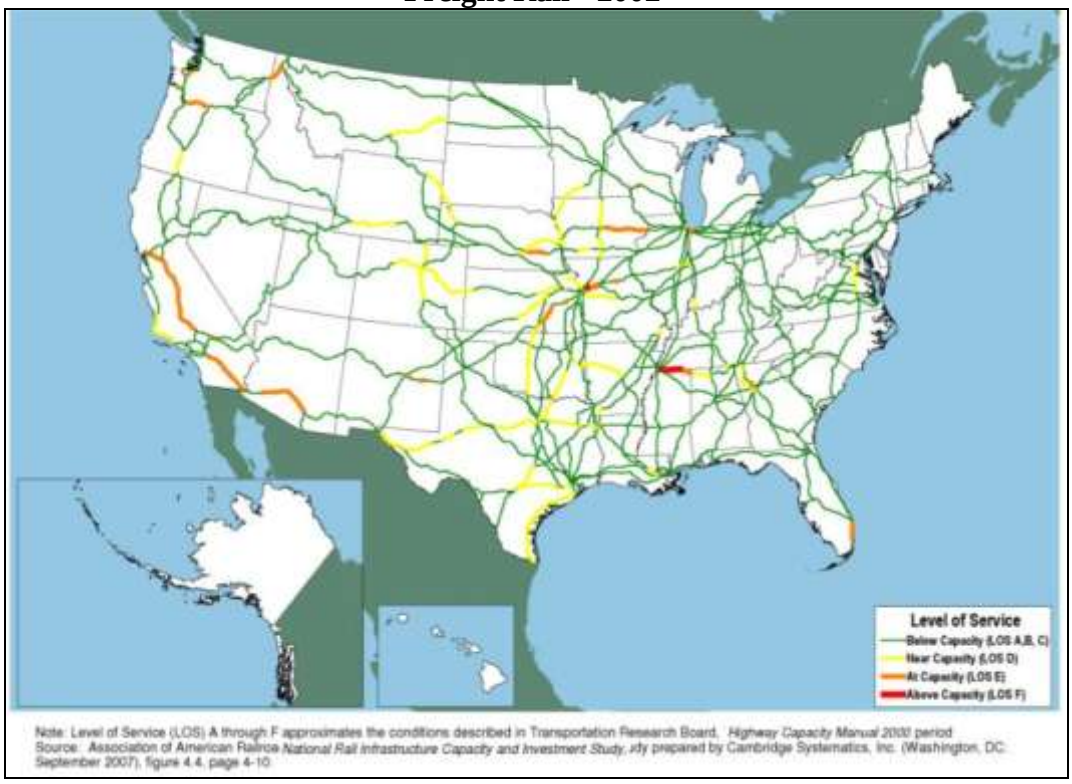
Figure 3-14: Freight rail Ton-Miles and Track Miles - Class 1 Railroads, 1980-2006



Projections for the future capacity of the nation rail system have been made by the FHWA. In 2002 there was generally excess capacity remaining in the rail system across the country as seen in Figure 3-15. Without improvements in system capacity, by 2035 significant capacity restraints are predicted for the principal rail routes generally located between the west coast and rail hubs of the Midwest. To respond to this projected congestion, all Class I railroads are pursuing improvements for increasing capacity and system efficiency including the initiatives noted above. Thus, it is envisioned that the capacity restraints depicted in Figure 3-15 will not be as severe as projected.

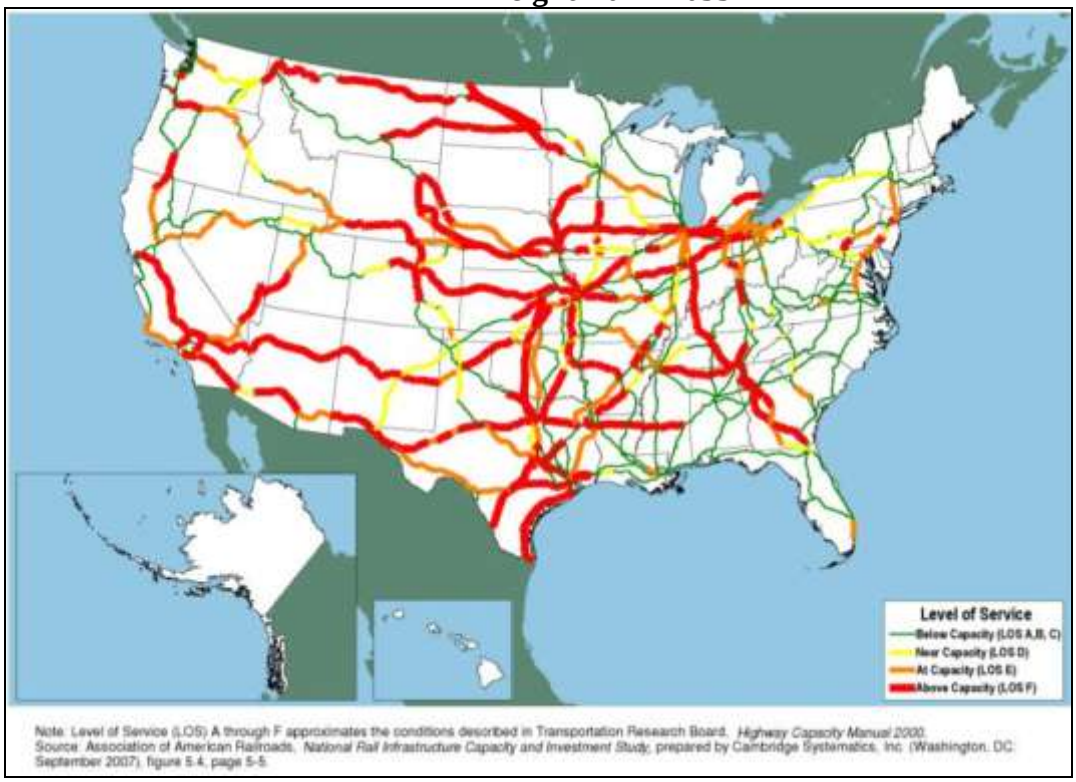
Figure 3-15: 2002 and 2035 Freight Rail Volumes Compared to Current Capacity

Freight Rail - 2002



Note: Level of Service (LOS) A through F approximates the conditions described in Transportation Research Board, *Highway Capacity Manual 2000* period.
Source: Association of American Railroads *National Rail Infrastructure Capacity and Investment Study*, rdy prepared by Cambridge Systematics, Inc. (Washington, DC: September 2007), figure 4.4, page 4-10.

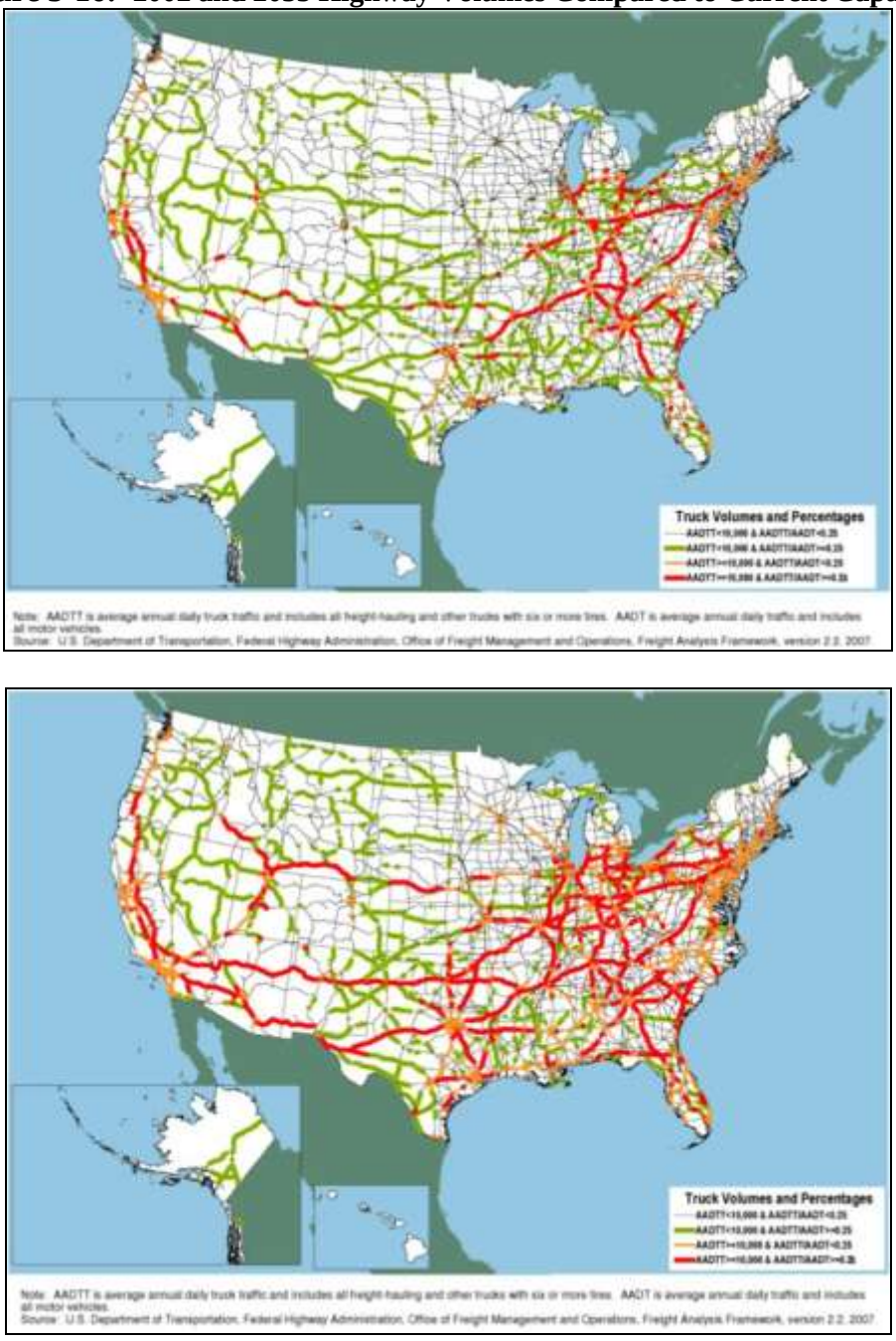
Freight Rail - 2035



Note: Level of Service (LOS) A through F approximates the conditions described in Transportation Research Board, *Highway Capacity Manual 2000*.
Source: Association of American Railroads, *National Rail Infrastructure Capacity and Investment Study*, prepared by Cambridge Systematics, Inc. (Washington, DC: September 2007), figure 5.4, page 5-5.

The projected highway system constraints are significant and the ability to expand the nation's highways is limited. Additionally, the ability to improve the operating efficiencies of the existing highway network is considered to have limited opportunities. 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.

Figure 3-16: 2002 and 2035 Highway Volumes Compared to Current Capacity



Source: FHWA FAF^2 Maps

The potential for highway capacity constraints illustrated in the above highway congestion maps can be supported by another recent study. The *2006 Status of the Nation's Highways, Bridges, and Transit: REPORT TO CONGRESS* by FHWA/FTA identifies that operational performance has declined despite the historic investment in highway infrastructure and improving conditions on many roads and bridges, operational performance—the quality of use of that infrastructure—has continued to deteriorate. From 1997 to 2004, the estimated percentage of travel occurring under congested conditions has risen from 27.4 percent to 31.6 percent; and the average length of congested conditions has risen from 6.2 hours per day to 6.6 hours per day.

The value of this comparison of 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 extreme levels. The second is that from a Massachusetts perspective, there is capacity in the eastern and northeast states for movement by rail now and this available capacity is expected to be an opportunity for the future. This indicates that it is of benefit to Massachusetts and the northeast to seek to maximize freight movement by rail by providing a competitive rail shipping environment.

Chapter 4 Freight Rail System Inventory

4.1 Overview

Railroads have contributed to the Massachusetts transportation system since the Granite Railroad between Quincy and Milton was established as one of the nation's earliest railroads in 1825. To meet the challenge of New York's Erie Canal, Massachusetts built the first Mountain Railroad over the Berkshires to connect Massachusetts with the rest of the country. The Western Railroad, which would become later become the Boston & Albany Railroad, was engineered so well during its 1837 to 1841 construction that most of the original 1840's alignment and quite a few structures remain today as CSX's Boston and Berkshire Subdivisions. This CSX line is currently the busiest freight corridor in New England hosting as many as thirty trains per day.

To support the continued expansion of rail to the west, Massachusetts funded the construction of the Hoosac Tunnel through Hoosac Mountain. The nearly 5-mile tunnel, which was drilled and blasted and took 24 years and 195 lives to build, was the second largest tunnel in the world when completed in 1875. The tunnel remains a critical element of Pan Am Southern's former Boston & Maine Railroad main line hosting at least six trains per day.

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 3 for a discussion of railroad classification). The following are railroads operating in Massachusetts.

Class I Railroad

- 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); and
- Connecticut Southern Railroad (CSO).

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); and
- Massachusetts Coastal Railroad (MC).

The terminal lines include:

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

There is a renewed recognition of the importance of rail for goods movement, and an increased awareness by public officials at the national and state levels of the benefits of providing an efficient, integrated multi-modal infrastructure system. Freight moved by rail results in less highway pavement damage, less highway congestion, fewer air pollutants, and less energy consumed – all reasons to consider public-private partnerships to enhance the opportunities for freight rail. This section of the Massachusetts State Rail Plan is thus focused on:

- An inventory of the existing overall freight rail transportation system within Massachusetts, which includes:
  - A summary of statewide freight rail statistics and historical information;
  - A description of the ownership of the freight rail system in Massachusetts;
  - A review of the major freight rail lines and facilities operating within the state; and
  - The identification of freight rail facilities operating within Massachusetts including major rail yards, intermodal terminals, transload facilities and seaports.
- An identification of the freight rail system's constraints, issues and bottlenecks within the state; and
- Opportunities to improve freight rail in Massachusetts.

4.2 System Description

4.2.1 Statewide Summary

As one of the earliest developed geographic areas of the United States, Massachusetts and New England have a mature infrastructure of railroads, highways airports and ports. Due to their early development, much of this infrastructure is located in highly urbanized areas. Further expansion of this infrastructure is constrained by surrounding land uses.

The Massachusetts and New England rail system had their origin in the early 1820s, and played substantive roles in the economic development of the region and the country. Over time, the rail system has been reduced from its maximum size and use as the highway system, largely built through federal and state government initiatives, has become the dominant mode for shipment of interstate commerce.

To place the current Massachusetts railroad system in perspective, Table 4-1 provides a ranking of neighboring states based on total miles in each state and some related basic metrics. Because of the relatively tight geography of New England and the longer distance nature of freight rail, the six New England states can also be combined to create a "New England" system as shown below.

Table 4-1: Benchmarking Massachusetts and New England Freight Rail Operations Comparison with other Northeastern States

State	Rail Miles	National Rank	Land area (Sq. mi.)	2008 Population (Mil)	Annual Tons (Mil)	Annual Carloads	Carloads per mile
MA	952[17]	28	7,840	6.5	9.7	318,975	271
ME	1,151	42	30,865	1.32	6.3	79,332	69
NH	415	34	8,968	1.32	1.5	16,571	40
VT	590	38	9,250	0.62	1.6	24,100	41
CT	330	38	4,845	3.5	3.4	38,452	117
RI	87	49	1,045	1.05	0.6	9,108	105
"New England"	3,525	"12"	62,813	14.3	23.1	486,538	138
NY	3,528	5	47,214	19.49	74.1	1,759,710	499
PA	5,139	1	44,817	12.45	123.3	1,982,977	386
NJ	993	19	7,417	8.68	43.5	1,434,930	1,445
MD	759	34	9,774	5.63	34.8	502,068	661

Source: Association of American Railroads (AAR) 2006 annual statistics.
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, terminating or moving through each state.

Massachusetts provides a key link for freight rail traffic entering and exiting the entire New England region. The large majority of freight rail into southern New England comes through Massachusetts via the CSX and PAS gateways over the Hudson River, as does a significant portion of the traffic destined for the three northern New England States. Through intermodal and automotive terminals and bulk rail to truck facilities, even more regional traffic is handled via rail in Massachusetts. As demonstrated in the trade flow analysis contained in Chapter 3 of this plan, the volume of rail varies dramatically by shipping pattern.

For example, inbound shipments to the state are the largest volume of freight rail, reflecting the large consumer markets, especially in eastern Massachusetts. The second largest volume of rail activity is for through-trips that start and end outside of the state, such as paper shipments from Maine destined for Mid-Atlantic States. While these trips provide minimal direct benefit to Massachusetts residents, they are a critical component of private rail business and reduce longer distance truck travel through the state.

Massachusetts railroads also accommodate significant amounts of passenger services. Amtrak provides intercity passenger rail over portions of the freight rail network, and the MBTA commuter rail system in eastern Massachusetts. All of the MBTA owned commuter rail lines were formerly freight lines. One of the key issues explored in this analysis is how

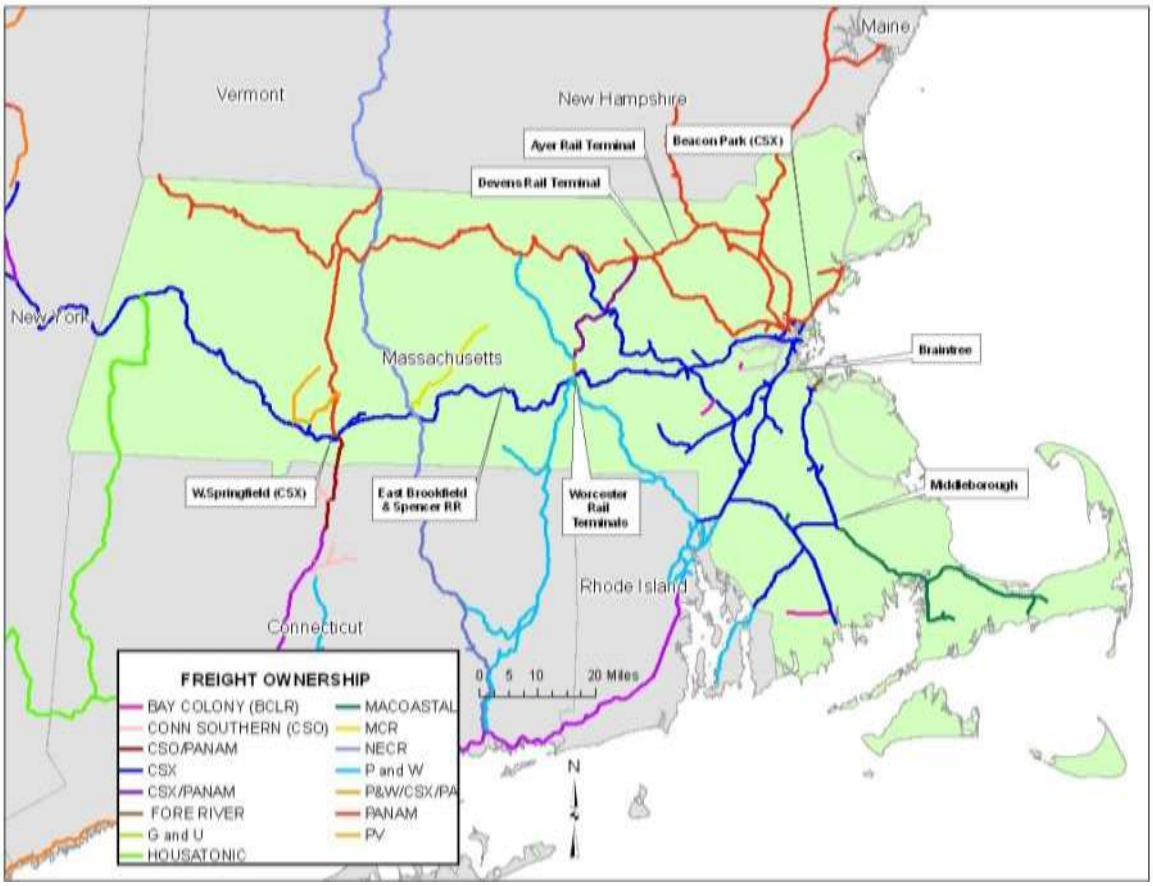
[17] If trackage rights for Massachusetts were included, the rail miles would increase to 1,175.

shared use of rail infrastructure affects operations and effectiveness of passenger and freight rail services.

The rail system in Massachusetts is composed of approximately 1,139 route miles (including trackage rights) of active rail lines, supporting both passenger and freight rail services.[18] The network handles more than 14.9 million carload tons and 3 million intermodal tons. The annual number of rail units – intermodal and carload - is 437,551.[19] It also transports 39.2 million commuters and 2.6 million intercity (Amtrak) passengers annually.

Figure 4-1 illustrates the Massachusetts rail network by ownership of lines along with regional connections to other New England states and New York.

Figure 4-1: Rail Ownership and Major Yards in Massachusetts



Note: Operation of the South Coast Railroad from Taunton to Fall River/New Bedford has been transferred from CSX to MassCoastal.

4.2.2 Ownership and Operations

4.2.2.1 State Owned Rail Lines

[18] Association of American Railroads 2008 Massachusetts State Profile
[19] Global Insight TRANSEARCH 2008 Release.

The rail network in the northeastern US region is unusual compared to other regions of the country because of the high level of public ownership (about 40 percent in Massachusetts) and the high proportion of track that is shared by freight and passenger operations (also about 40 percent in the Commonwealth).

Over the past forty years, the Commonwealth has acquired a substantial level of ownership in rail assets, through the acquisition of hundreds of miles of trackage by the MBTA and MassDOT, in order to support its immediate and long-term transportation goals. Railroads were entirely owned by the private sector until the early 1970s, which is when the majority of these acquisitions occurred due to the major rail line bankruptcies of the Penn Central railroad and the Boston & Maine Railroad. These acquisitions included some of the commuter rail lines, in which operations continued under ownership of the public entities. Legislation and funding programs, on the federal and state level, expanded public ownership of rail lines in response to the national rail crisis. To address the needs of the rail network and to implement its transportation objectives the Commonwealth continues to acquire strategic rail assets and trackage agreements.

Ownership and operation of the Commonwealth's rail network is shared between private and public entities, which, in many cases, provide passenger and freight rail operation over the same lines. MassDOT and the MBTA now own 41 percent of the transportation network. In most cases, this ownership is subject to retained freight rail operating rights or trackage rights agreements. Rail corridors owned by Amtrak, Massachusetts Water Resources Authority (MWRA), and MassPort represent approximately two percent of the overall rail line ownership. The remaining 59 percent of the active rail network is owned by private rail carriers. The MBTA anticipates expanding its commuter rail operations, and MassDOT continues to place a priority on preserving ROW that might be abandoned. This emphasis may result in a higher percentage of publicly owned rail lines in the years to come.

State ownership of rail lines and corridors falls into two categories: 1) lines acquired specifically for use as commuter routes or on which commuter operations have since been developed, and 2) light density lines acquired for preserving local freight service in specific corridors.

In most instances, the acquisition does not include an obligation for the Commonwealth to continue to provide common carrier freight service. For lines with existing common carrier responsibilities, the Commonwealth has met this obligation by leasing the freight operations to an independent rail operator that is able to meet the requirements of a common carrier under the Surface Transportation Board regulations. This is important because for a rail line without a common carrier obligation to handle freight, the Commonwealth it is not mandated to operate existing service or initiate freight rail service. This allows a rail line without common carrier requirements to be rail banked for future use.

As shown in Table 4-2, the Massachusetts rail network is owned by thirteen entities, with the MBTA, CSX Corporation, and Pan Am Railways (PAR) / Pan Am Southern (PAS) as the largest owners within the state.

Table 4-2: Active Rail Mileage by Owner

Rail Owner	Total Miles Owned Active
MBTA	378
MassDOT	152
Amtrak	10
Massachusetts Water Resource Authority (MWRA)/Fore River RR	3
SUBTOTAL PUBLIC:	**540**
CSX Corporation	231
Pan Am Railways/Pan Am Southern	216
Providence and Worcester Railroad	76
New England Central Railroad	53
Housatonic Railroad	38
Grafton and Upton Railroad	15
Pioneer Valley Railroad	12
Massachusetts Central Railroad	2
SUBTOTAL PRIVATE:	**643**
TOTAL:	**1,183**

Notes: 1.) "Total Miles Owned (Active)" refers to active rail corridors owned by "Rail Owner", and includes lines that are operated by "Rail Owner" and/or others; 2.) Mileage is estimated.

The following sections provide a summary of relevant operating and ownership information about the freight railroads in Massachusetts.

4.2.2.2 CSX Corporation (CSX)

CSX Corporation with its subsidiaries is a publicly traded company with its operating headquarters in Jacksonville, Florida. CSX is a large transportation services company with additional non-transportation business units. The principal railroad operating company is CSX Transportation (CSXT) and has operations in 21 states and 2 Canadian provinces. Nationally, CSX provides freight transportation services over a network of approximately 21,000 route miles. CSX Intermodal (CSXI) is a separate business unit that provides transcontinental intermodal transportation services through a network of facilities supporting multi-modal freight movement. This report refers to all rail ownership and operations by CSX, CSXT, and CSXI as "CSX" under name of the parent corporation.

CSX is the state's largest private owner of rail property and only Class I freight rail operator with direct services within the state. Within Massachusetts, CSX owns about 231 miles of active rail ROWs, and operates over a total of 410 route miles. The approximate 135 miles of the network operated but not owned by CSX within Massachusetts is operated under terms of retained freight easements or trackage rights agreements. Approximately one third of the rail lines operated by CSX under trackage rights are owned by the MBTA and MassDOT. Following the acquisition of the Fall River and New Bedford lines by the Commonwealth, the total CSX ownership has been reduced by 44 miles of ROW.

CSX's most important rail asset within the state is the Boston Line – a 162-mile rail corridor extending from Boston to the New York border in West Stockbridge and extending another 30 miles west to a major CSX classification yard and junction in Selkirk, NY. Selkirk is the major freight yard for CSX in the New England-New York region and is a key component of the CSX system.

CSX also owns or operates a number of secondary lines and industrial tracks throughout Massachusetts, the majority of which are located in southeastern Massachusetts. North of Boston, CSX continues to have operating rights over the Grand Junction Branch into the Chelsea and Everett industrial areas.

Most of the freight railroads operating in the Commonwealth interchange with CSX along the Boston Line. CSX connects to the HSRR in Pittsfield; PVRR in Westfield; and the Connecticut Southern Railroad (CSO) in West Springfield. Further east, CSX connects with the NECR and MCER at Palmer; the EBSR at East Brookfield, P&W and PAR in Worcester; and the GURR at North Grafton. In southeastern Massachusetts, CSX connects to several short line local railroads, including BCRR at Medfield and New Bedford and the MC in Middleborough and the FVRR in Braintree.

4.2.2.3 East Brookfield and Spencer Railroad (EBSR)

The East Brookfield and Spencer Railroad (EBSR) is a privately held terminal operation and operates over 4 miles of trackage 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 on the CSX main line in East Brookfield.

4.2.2.4 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 at Ayer.

The PAR/PAS owns approximately 216 miles of railroad ROW in Massachusetts, operating on over 373 miles 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 ST, which operates the railroad. PAR operates more than 150 miles of MBTA ROW and provides train dispatching for the perimeter[20] lines of the MBTA commuter rail network.

The PAR/PAS Freight Main Line is the railroad's most important line within the Commonwealth. It runs 475 miles from northern Maine to eastern New York. The Freight Main constitutes nearly 160 miles of the 216 miles in Massachusetts. Nearly 34 miles of the Freight Main Line is owned by the MBTA.

[20] Perimeter lines were those routes acquired by the MBTA in 1976 that did not initially host passenger operations, and were to be maintained and operated by the B&M. When MTBA added service to their routes the "Jointly Used Line" provisions would apply.

4.2.2.5 Pan Am Southern (PAS)

On May 15, 2008, Norfolk Southern and PAR announced the formation of a joint venture called Pan Am Southern. PAS has identified plans to conduct freight rail operations across parts of western and central Massachusetts to connections to Mechanicville, NY. The new entity was approved by the US Surface Transportation Board early in 2009. PAS began operations in the spring of 2009. This joint venture is anticipated to enhance rail competition in New England with the influence of another Class I freight railroad on railroad operations in the Commonwealth.

An important element of the joint venture is the rehabilitation of the PAS Main Line between Ayer and Mechanicville, NY. The partnership includes rehabilitation of 138 miles of track, replacement ties, and adding just over 35 miles of new rail. The $47.5 million effort that began in 2009, and expected to be completed in 2010, is one of the largest new private investments in the Commonwealth's rail system in decades. A new intermodal and auto terminal will be constructed in Mechanicville, NY, and expansions and improvements will be made to the auto and intermodal facilities in Ayer. This joint venture is operated by employees of the Springfield Terminal Railway, a wholly owned subsidiary of PAR. The investments in the Patriot Corridor have increased capacity and reliability to Ayer, Massachusetts, opening up future opportunities and connectivity throughout the region.

Throughout this document, the term PAR is used as reference to Pan Am Railways, unless the segment being discussed is jointly owned by PAR and NS, in which case, PAS will be used.

4.2.2.6 Providence and Worcester Railroad (P&W)

The Providence and Worcester Railroad is a publicly traded Class II regional freight railroad operating in Massachusetts, Rhode Island, Connecticut, and New York with headquarters in Worcester, Massachusetts. The P&W'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 P&W owns and operates about 95 miles of rail ROW in the Commonwealth, including lines emanating from Worcester to Gardner, and to the state line on routes to Providence, Rhode Island and Norwich, Connecticut. The P&W also has overhead[21] 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 P&W serves two major intermodal terminals in Worcester operated by Intransit Container Inc. The P&W also connects with PAS in Gardner and with both CSX and PAR in Worcester.

4.2.2.7 Bay Colony Railroad (BCLR)

[21] Overhead trackage rights refer to a right to pass over the route, but does not allow service to on line industries.

The Bay Colony Railroad is a privately held, Class III railroad with headquarters in Braintree, Massachusetts. BCLR has connections to CSX in Medfield and New Bedford, Massachusetts.

BCLR conducts freight rail operations over MBTA-owned ROWs between Newton Upper Falls and Needham Junction; Needham Junction and Medfield; Medfield and Millis; and on the Fall River Branch (a.k.a. Watuppa Branch) in southeastern Massachusetts.

4.2.2.8 Connecticut Southern Railroad (CSO)

The Connecticut Southern Railroad is part of the RailAmerica family of short line railroads (see NECR). It is a Class III railroad with operating headquarters in East Hartford, Connecticut, which operates about 77 miles of track in Connecticut and Massachusetts. The CSO interchanges with CSX at West Springfield, Massachusetts, and New Haven, Connecticut, the P&W 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.

4.2.2.9 Fore River Transportation Company (FRVT)

This Class III railroad is 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 deepwater port facilities and storage terminal.

Headquartered in Quincy, the FRVT currently provides freight rail services on three miles of track, under license and operating agreement with the Fore River Railroad Corporation, which 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. MWRA uses a private contractor, the New England Fertilizer Company (NEFCO), to process wastewater residuals which are piped from the Deer Island Treatment Plant to its processing facility in the former Quincy Shipyard. NEFCO operates sludge dewatering and drying facilities and utilizes the railroad to transport solid fertilizer to various locations around the country.

4.2.2.10 Grafton and Upton Railroad (GU)

The Grafton and Upton Railroad 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. The active customers 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.

4.2.2.11 Housatonic Railroad (HRRC)

The Housatonic Railroad is a privately held, Class III railroad with operations in Massachusetts, Connecticut and New York. Its operating headquarters are located in Canaan, Connecticut. The HRRC owns and operates about 38 miles of ROW in the Commonwealth, primarily along its Berkshire Line (formerly the Canaan Secondary) in western Massachusetts. HRRC also operates about 2.5 miles of ROW along the southern portion of the North Adams Secondary. The HRRC and MassDOT have an operating agreement with the Berkshire Scenic railway museum for tourist operations.

4.2.2.12 Massachusetts Central Railroad (MCER)

The Massachusetts Central Railroad is a privately held Class III railroad. The MCER operates freight rail service over the 25-mile Ware River Secondary in central Massachusetts, of which 23.5 miles is owned by MassDOT. 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, CPRS or NCER. The MCER interchanges with CSX and NECR in Palmer and has a plastics transloading operation in Barre, Massachusetts.

4.2.2.13 New England Central Railroad (NECR)

The New England Central Railroad is part of the RailAmerica family of short line and regional railroads. RailAmerica, owned by the Fortress Group, owns 42 railroads operating approximately 7,800 miles in the United States and Canada. NECR headquarters are located at St. Albans, Vermont.

The NECR is a Class III railroad that operates 54 miles of ROW between Monson and Northfield, Massachusetts, which is NECR's Main Line.[22] Its major 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.

4.2.2.14 Pioneer Valley Railroad (PVRR)

The Pioneer Valley Railroad (PVRR) is one of several railroads owned by the Westfield based Pinsly Railroads holding company, a privately held firm. PVRR 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. PVRR also provides transloading, warehousing, and trucking services through its subsidiary firm, Railway Distribution Services (RDS) of Massachusetts. PVRR interchanges with CSX in Westfield, Massachusetts, and is expected to soon reopen its connection at Easthampton with PAS.

[22] "Freight Rail in Massachusetts, 2008 Rail Fast Facts," Association of American Railroads.

4.2.2.15 Massachusetts Coastal Railroad (MC)

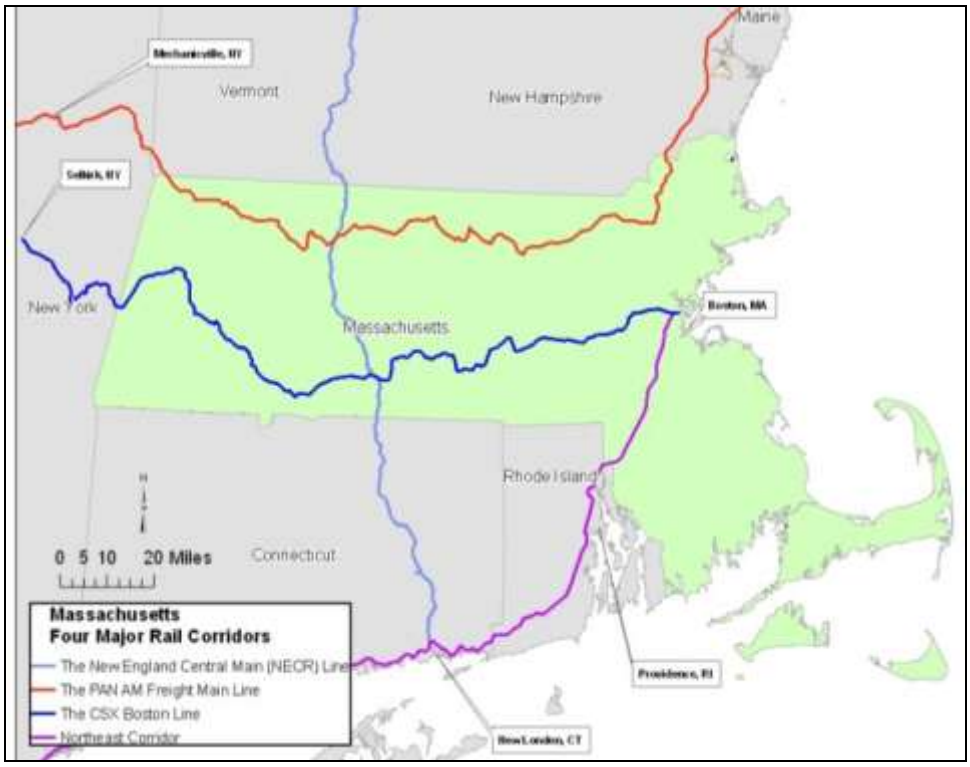
The Massachusetts Coastal Railroad (MC) is a privately held Class III railroad and is part of Cape Rail, Inc., which also operates the Cape Cod Central Railroad. The MC has headquarters in Hyannis, Massachusetts (Barnstable). MC connects to CSX in Middleborough and Taunton, and to BCLR in New Bedford. 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.

4.2.3 Principal Lines and Facilities in the Commonwealth

Based on rail volumes and interstate connections, there are four major rail corridors into and out of Massachusetts. Freight rail connections with the North American rail network are primarily accomplished by means of three corridors: the Boston Line; the PAR/PAS Freight Main Line; and the NECR Main Line. The two primary east-west routes that connect New England with the national rail system at Albany, New York, are Boston Line and the PAS/PAR Freight Main Line. The NECR Line crosses the state from north to south connecting northern Vermont and Canada with southern New England, terminating at New London, Connecticut. While other routes can be used to connect to the general rail network, the three routes cited are the primary and most direct routes. The fourth line, the Northeast Corridor, is the primary passenger route between Boston and Washington, D.C.

Figure 4-2 illustrates Massachusetts's four major rail corridors. These corridors provide nationwide and regional connectivity for Massachusetts rail passenger and freight.

Figure 4-2: Major Rail Corridors in Massachusetts



4.2.3.1 The Boston Line

Carrying over 10 million tons annually over much of the route, the CSX Boston Line is the freight rail corridor that handles the largest amount of freight rail traffic moving into and out of Massachusetts and New England. The Boston Line runs between Boston and Selkirk, New York (outside of Albany), generally paralleling the Mass Pike. It connects Boston, Worcester, Springfield, Pittsfield and Albany, with 162 miles of the Boston Line in Massachusetts, between Richmond and Boston. Much of the merchandise traffic destined for CSX yards and customers, PAR's northern New England customers, or many of the New England short line railroads enters or leaves New England via this route.

All intermodal traffic destined for West Springfield, Worcester and Beacon Park/Allston traverses this corridor. This rail corridor also handles finished automobiles into New England.

The MBTA operates commuter rail service between Boston and Worcester and Amtrak uses the route for its "Lake Shore" service to Chicago. The Amtrak "Vermonter" service currently uses the Boston Line between Springfield and Palmer until the completion of the Knowledge Corridor Project. Additionally, Amtrak trains on the Inland Route use this line between Boston and Springfield. The west end of this corridor, which transverses the Berkshires between Springfield and Albany, has many curves and significant grades on both sides of the mountains. Nonetheless, it provides a primary freight rail connection between Massachusetts and the south and west.

As discussed in the Preface, the Commonwealth and CSX are progressing with a transaction that will transfer certain CSX rail lines to Massachusetts. This includes the Boston Line between Framingham and Worcester. CSX retains the common carrier freight rights and responsibilities within this area. This will enable MBTA to expand commuter rail services between Boston and Worcester.

The transaction also includes a CSX and MassDOT agreement to complete work by August 15, 2012 to allow for 2nd generation double-stack freight rail from the New York/Massachusetts state line to Westborough. This will provide an unrestricted double-stack clearance rail corridor from Chicago to Worcester on the Boston or CSX Line for more competitive rail shipping. The CSX system acquisition includes the Grand Junction line that provides a direct connection between the MBTA's North and South side operations, and the Boston Terminal Running Track (Track 61) that serves the Port of Boston.

4.2.3.2 PAR/PAS Freight Main Line

The PAR/PAS Freight Main Line is a corridor linking northern Maine, New Hampshire, and northern Massachusetts to connections with New York State. The Freight Main Line serves up to 5 million tons annual of freight on the line between eastern Massachusetts and Mechanicville and Rotterdam, New York, near Albany. The route has 160 miles of the PAR Freight Main Line in Massachusetts. It is an important rail link for the paper and lumber industries located in northern New England and the Canadian Maritimes, and supports intermodal traffic destined for Ayer, Massachusetts, as well as general merchandise traffic for eastern Massachusetts. The PAR/PAS split on the Freight Main Line is in Ayer with the route west in the PAS joint venture.

This route is generally parallel to the Route 2 corridor and connects Boston, Fitchburg, Ayer, Greenfield, and North Adams, Massachusetts with the Albany, NY, area. The PAR Freight Main Line has fewer and less severe grades than the CSX-owned Boston Line, in part, because it travels through, rather than over, the Berkshire Mountains via the nearly 6-mile long Hoosac Tunnel. The East Deerfield Yard is a major facility located on the route, and is partially owned Commonwealth (MassDOT) but subject to permanent easement for railroad uses by PAS.

MBTA commuter rail service operates over the Freight Main Line between Fitchburg and Ayer and into Boston via the Fitchburg Main Line.

Within the Freight Main Line, the portion of the route from Mechanicville, NY to Ayer is included as part of the new PAS railroad. This section of the Freight Main line is known as the Patriot Corridor. The Patriot Corridor route, as a condition of the PAS creation, will realize a significant investment in improvements for track, signals and facilities under the Patriot Corridor program jointly funded and operated PAR and NS. Planned improvements include upgrading the corridor to handle 286,000 pound rail cars to Ayer from the west as well as enhanced automotive handling capacity.

4.2.3.3 NECR Main Line

The NECR Main Line runs in a north-south direction, providing a direct link between southern New England at New London, Connecticut and the Canadian National, at East Alburg, Vermont. Fifty-three miles of NECR Main Line are in Massachusetts. NECR interchanges with:

- The Vermont Rail System at Burlington, Bellows Falls, White River Junction, Vermont, and at Montpelier Junction in Vermont;
- Claremont & Concord Railroad at Claremont, Clarendon, New Hampshire and White River Junction, Vermont; and
- The P&W at New London, Connecticut.

The NECR's "Central Corridor," in partnership with Class I and other shortline carriers, has become an expanding through route for freight terminating and originating in Massachusetts and New England, such as ethanol, intermodal containers, finished automobiles, and coal.

Due to the large number of connections with other short lines, the NECR Line provides an important role in providing competitive access to the national rail system. The Line carries a variety of freight commodities, including lumber products shipped from Canada to the Port of New London. The current line provides for first generation double-stack intermodal operation. The improvements to the line to support full double-stack operation are potentially of value and should be subject to further study. Average annual freight rail tonnage in this corridor is approximately 1.3 million tons. The NECR accommodates the Amtrak "Vermonter" Service between Palmer, Massachusetts and St. Albans, Vermont.

4.2.4 Facilities

In addition to the rail lines and corridors, rail yards and intermodal terminals are an essential component of the state's freight rail infrastructure. They provide connections between rail lines and operators as well as critical intermodal integration between rail and trucks.

The freight facilities, yards and terminals in Massachusetts vary significantly in terms of size and function. They include intermodal facilities, automotive facilities, large to small rail switching yards, and rail-to-truck distribution centers.

Definitions:

For the purpose of this report, the terms **freight rail facilities and/or yards and terminals** are defined as locations where freight routes connect and/or terminate.

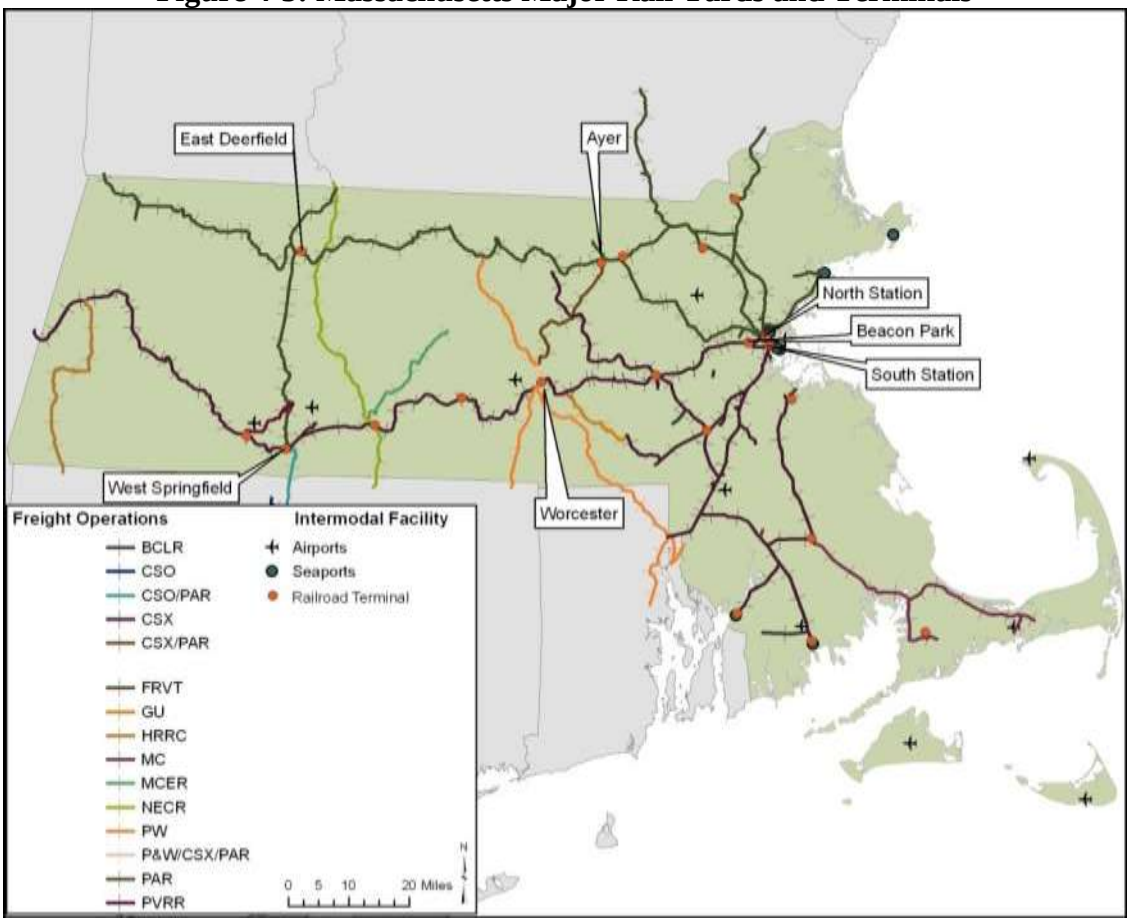
For the purpose of this report, **intermodal freight** is the term that describes shipments that involve more than one mode of transportation from origin to destination. Intermodal shipments may include rail to truck, truck to rail, ship to truck or rail and truck to air carrier. Some intermodal shipments of products also move into the region via pipeline and are then transferred to truck or rail for final delivery. Generally these commodities are energy related

gasses or fuels. **Intermodal facilities** are defined as specifically designed yards or designated segment of yards, where freight is interchanged or transferred to another mode. The focus in this analysis is on facilities with direct connections to rail.

4.2.4.1 Yards

The major freight rail yards in Massachusetts are illustrated Figure 4-3. The function, size and importance of these facilities, some in place for more than 100 years, have changed over the past half century as both land use patterns and transportation systems have evolved in both the state and the region. A current example of this change is the proposed PAS automotive and intermodal facility to be built on the site of a former rail car classification yard in Mechanicville, New York.

Figure 4-3: Massachusetts Major Rail Yards and Terminals



Related to the changes in transportation, demographics and development patterns are the locations of major freight generators, such as the distribution centers that have located around both the Route 128 and I-495 circumferential highways, and with considerable density in southeastern Massachusetts. Distribution facilities are also located and under development in central and western Massachusetts and eastern Connecticut. These large-scale distribution centers receive bulk volumes by rail or truck, or by marine containers that arrive by either rail or truck. The freight is then transloaded for regional and local delivery to wholesalers or

retail outlets. The local distribution is nearly always by truck. Distribution centers are considered a key component related to intermodal facilities.

For rail, the general movement of distribution centers from the urban Boston area to the Route 128 and I-495 corridors has been a significant development. The yards in the urban core of Boston were once integrated with large warehouse and distribution centers. Recent developments within the Boston urban area have occurred over a number of years that has resulted in most of the distribution and warehousing leaving the Boston proper area. Examples of this are the intermodal container facility that was operated by the Boston and Maine Railroad in Cambridge that was phased out in the 1980s; reduction of warehouse space in South Boston due to re-development related to the Central Artery/Tunnel Project; and most recently, the closing of warehouse space served by rail in the Beacon Park area of Boston.

The rail industry has responded to the changing nature of warehousing and distribution in Massachusetts. Examples are the expansion of intermodal terminals at Ayer and the Worcester areas for both containers and other intermodal traffic including facilities for distribution of new automobiles.

It is anticipated that rail will continue to have opportunities to participate in the changing distribution patterns. In addition to continued expansion in the Ayer and the Worcester areas, rail operators and shippers have noted that significant opportunity to increase rail supported warehousing and transload activity in the southeast area of the Commonwealth. The transfer of former CSX freight lines in the area to Massachusetts will greatly facilitate this opportunity. In western Massachusetts, there are similar opportunities for increases in rail served warehousing and distribution facilities, particularly for rail lines with good access to major highways.

4.2.4.2 Principal Intermodal Container and Automotive Terminals

Most yard infrastructure and connections between various railroads in Massachusetts have been reduced in size and eliminated over the past half century in response to ever-declining boxcar traffic volumes. Over time, formerly critical inter-railroad interchanges have been de-emphasized, while others have been improved and developed. The force behind these decisions is the rail customer. In general, the rail customer provides the market forces and the railroad follows with their best-case response to market demand. As demonstrated, the shifting emphasis of the economy away from large, bulk shippers of natural and manufactured products has limited the growth of rail customers. In some cases, this has dramatically reduced the number of businesses with shipping needs consistent with freight rail service. For reference, **Appendix A** provides a detailed table of railroad yards in the Commonwealth, their current use and role in the freight rail system.

Intermodal Container/Trailer Terminals

Principal intermodal shipments to Massachusetts and New England are related to container/trailer movements via rail cars. These shipments allow a container/trailer of freight

to move from origin to destination without opening of the container/trailer for re-handling or repackaging of the freight cargo. The genesis of this type of rail traffic was the use of rail flat cars to load truck trailers for shipment. This type of service is known as "trailers on flat cars" (TOFC). The initial method of loading of rail cars was to place a ramp at the end of a string of flat cars and the trailers were driven onto the cars. Most handling of trailers is now done with the use of a large lifting vehicle that moves along the string of cars to place and remove the trailers.

Over the past two decades, there has been a rapid rise in the development and use of containers. Containers are boxes configured similar to a truck trailer, but are designed without wheels. The containers can be stacked for storage and transport. Individual containers can be placed on a specifically designed truck trailer chassis for individual over road movement. The advantage, and the attraction, of a container is that for movement via rail and ship, multiple units can be conveniently handled. When used on rail cars, the service is known as "container on flat cars" (COFC).

The expansion of intermodal TOFC and COFC traffic is significant for the rail industry nationally, regionally, and within Massachusetts. The use of COFC has been particularly important to the expansion of rail handling of international freight. Containers now are the dominant form of moving finished freight material internationally via container ship.

Major ports and intermodal terminals located on the West Coast of the U.S. and Canada provide a significant means for railroad to capture containers at the ports and transport them via rail across the country – known as the "land bridge." The advantage of rail for this long haul of containers is based on lower cost per ton mile and the ability to place containers on trains up to 10,000 feet long. These trains can be operated with far fewer equivalent employees compared to individual truck transport of each container. Additionally, the long haul movement of containers via train is significantly more fuel-efficient. These advantages have provided the opportunity for railroads to capture and expand this market.

Secondary sources of container movements to New England and the Commonwealth are the container ports in Montreal, Canada and the East Coast of the U.S., principally in New York and New Jersey. These opportunities do not have the long haul aspects of the West Coast connections, thus intermodal container business has been limited for East Coast to Massachusetts based rail yards. Additionally, a significant issue for this movement is that all freight rail traffic must move through up state New York to across the Hudson River of CSX or PAS lines in the Albany area. While there have been successful arrangements to move containers from the New York/New Jersey terminals to intermodal rail yards in central Massachusetts, the limited cost differentials and ability for transport directly to a destination make the use of truck very attractive to most freight container shippers and receivers within the Commonwealth.

The initial TOFC type of intermodal traffic required 19'6" of vertical clearance. Containers used in COFC movements allowed for the stacking of containers on a rail car. Initial COFC traffic was based on using the standard 8'6" containers that when double stacked also required 19'6" of vertical clearance. In the last twenty years, the shipping industry has

increasingly used containers with a height of 9'6". When double stacked, these higher containers require a vertical clearance of 20'8". The use of two full height containers is generally referred to as "full double stack" intermodal. This is illustrated in Figure 4-6 (see section 4.3.4 Vertical Clearances for Intermodal).

While significant attention has been paid to the concept of double stack intermodal traffic and its vertical clearance requirements, the issue of vertical clearance extends beyond that issue to include the wide range of railroad equipment in use today. Sixty years ago, the majority of rail cars in the US did not exceed 15'6" (AAR Plate C). In the past several decades, longer and higher railcars have become the norm in the industry, meeting demands by shippers for increased volume per rail car. New boxcars are built to either Plate E or Plate F standards (Plate E height is 15'9", and Plate F is 17'0"). Tank cars, gondola cars and regular flat cars continue to meet Plate C standards, while most covered hoppers, bulkhead and center-beam flatcars, newer boxcars and automotive and loaded intermodal cars exceed Plate C. An additional type of intermodal traffic that requires significant vertical clearance is the automotive rack cars used to handle new automotive vehicles from manufactures or ports of entry to automotive unloading facilities. Distribution of the new vehicles to local dealers is accomplished by truck auto carriers.

Intermodal yards, including container and automotive facilities, are typically located in areas that have a market or markets for delivery/pickup of products that are within a distance of approximately 250 miles. This is to facilitate the movement from the intermodal yard to the origin/destination and return within a single shift for a truck driver.

In Massachusetts the rail intermodal container/trailer terminals are:

- Beacon Park in Boston (CSX)
- Worcester (CSX)
- Worcester (P&W)[23]
- West Springfield (CSX)
- Ayer (PAS)

Intermodal Automotive Terminals

In Massachusetts the rail terminals for new automotive unloading are:

- CSX automobile facility centralized in East Brookfield/Spencer, Massachusetts, along the Boston Line;
- New and existing PAS automobile facility in Ayer;
- New automobile facility in Davisville, RI, served by the P&W.

Future of Intermodal Container and Automotive Terminals

[23] 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 container and automotive terminals are major and expanding markets for rail service in Massachusetts. Substantial changes in intermodal terminals have recently occurred and additional changed are anticipated to occur in the near future. Principal changes include the following:

PAS has completed a second automotive unloading facility at Ayer and enhanced the intermodal container/trailer facility in Ayer. CSX is reconfiguring their intermodal container/trailer operations in the state, centering them on Worcester and West Springfield. CSX plans is to relocate their existing operation in Boston to these other locations, and is currently reviewing these plans with state, local, and regional officials. At West Springfield, CSX is designing changes to highway connections at the yard to enhance access to the facility.

4.2.4.3 Transload Facilities

Transloading refers to the transfer of a shipment from one mode of transportation to another. The term is used most commonly to describe the transportation of non-containerized freight by more than one mode. An example of transloading is the transfer of bulk material from a railcar to a truck. Such transfers may occur in railroad yards, port facilities, or public delivery tracks. This term differs from the general application of the term "intermodal" that is applied more specifically to containers or trailers on more than one mode.

Transloading may be accomplished at any facility where modes are able to connect. The freight yards and terminals in Massachusetts vary significantly in size and function. The key rail facilities with transloading capabilities include:

- Beacon Park Yard (Boston) - CSX
- Westborough Yard - CSX
- Worcester - CSX
- Worcester - P&W
- Ayer (Devens) - PAR
- Westfield - CSX

Included in this category are chemicals and fuel transfer facilities. Additionally, bulk material such as sand and gravel, roadway salt and lumber products are included in transload operations. Material such as this requires a significant area for temporary storage of material before final delivery. Other material, such as plastic pellets used in manufacturing, can be transferred directly from rail car to truck for final delivery. Because of the wide variety in the nature of transloading operations, rail transloading facilities will vary in size and level of activity. A critical consideration for transload operations is the availability of land served by rail. Thus, the issues related to land use are of significant interest to transload based rail operators and users.

4.2.4.4 Seaports

In Massachusetts, five seaports are rail accessible. They include:

- South Boston Industrial Park (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 and exportation of scrap metals. The largest port on the east coast is the Port Authority 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.

4.3 Freight Rail System Constraints and Opportunities

Rail system physical constraints include yard infrastructure and connectivity, congestion, vertical clearances, and allowed weight on rail.

During the stakeholder interview process, the stakeholders generally expressed support for freight rail service in Massachusetts. Some shippers expressed hesitation in using more rail based on service limitations, lack of reliability and, for some movements, higher costs.

4.3.1 Main Line Capacity Constraints

In the evaluation of the freight rail operations with in the Commonwealth the capacity of the rail system was considered. An important aspect of the rail capacity is the ability to move trains along a give rail route between rail yards and interchange points with other rail operators. The principal considerations for capacity to move trains along routes is the number of main tracks, passing tracks for meeting or overtaking of trains, and the speed allowed along the tracks.

In discussions with rail operators there where only a few locations that were identified as having insufficient main line capacity to handle existing and anticipated future freight and/or passenger needs. When considering main line capacity, the consideration is to be able to move the desired number of trains at the time of day when they would like to move. In some cases, physical capacity restrictions can be handled by rescheduling movements to occur at different times of the day. This is generally associated rescheduling of freight operations, but can be done with passenger operations. For passenger service, this might be best accommodated by intercity type of service as it might be less sensitive to meeting the demands of a commuter based service.

The other major type of main line capacity restriction occurs when track conditions do not allow a sufficiently high speed of operation to transit the route and serve the demand. This is typically associated with freight operations, but can also apply to passenger operations that utilize shared corridors, including non- commuter types of passenger service such as intercity and tourist based operations.

Major main line capacity constraints in Massachusetts not related to vertical clearance or rail car weight capacity include:

Andover Single Track - In the Andover area used for freight, commuter and Amtrak Downeaster operations there is single mainline track. The MBTA is using $17.4 million in ARRA funds to install double-tracking and improve the train control systems between Lawrence and Andover. This project will improve reliability and on-time performance for the Haverhill commuter rail line, Amtrak's Downeaster trains as well as freight rail operations.

Holyoke Interchange - In Holyoke there is a discontinued interchange connection between PVRR and PAS. This interchange will be restored in the near future to provide a second carrier connection for PVRR to facilitate increasing options for service.

4.3.2 Yard Infrastructure and Connectivity

The constraints associated with yard infrastructure result in choke points or bottlenecks that affect overall system performance. Improvements in travel time associated with rehabilitation of mainline tracks can easily be offset by efficiencies in handling of rail cars in yards or interchange points between railroads. Such constrained inter-railroad connections impair overall system capacity.

By example, connectivity between the P&W and CSX at Worcester is restricted due to the layout of each railroad's yard and interchange tracks that can lead to congestion in the area of Worcester Union Station. This situation may adversely affect Amtrak, MBTA as well as P&W and CSX operations. Both railroads have cooperated effectively over the years to minimize any main line disruptions and to provide a high level of service to freight customers in the region. However, this situation may make it difficult to expand service that is based on interchange between the railroads

From a regional perspective, a significant restriction cited for freight rail included inefficiencies in yards in Selkirk and Rotterdam Junction, New York. The rail yards are reported to have a need for additional capacity to handle the volume of trains to and from the yards. To respond, additional tracks are being considered for Selkirk Yard.

Another key driver of freight rail efficiency is "right-sized" yards. Over the past 50 years many of the rail yards in Massachusetts have been adapted to meet new or expanded roles, but in many other cases have been reduced or closed entirely as traffic moved to other transportation providers. Much like the connectivity discussion above, market forces drive these adjustments. With freight demand increasing, many of these smaller yards and facilities are unable to keep up with the demand. This results in less than acceptable service that limits use of rail by shippers.

The challenge in Massachusetts for both state government and the businesses that rely on freight rail service is that the railroad infrastructure has been downsized, real estate has been sold off, and new and incompatible land uses have developed around former rail yards.

The identified yard capacity restraints include:

Worcester Yard – CSX intermodal facilities have reached capacity. CSX is planning for expansion of the facilities.

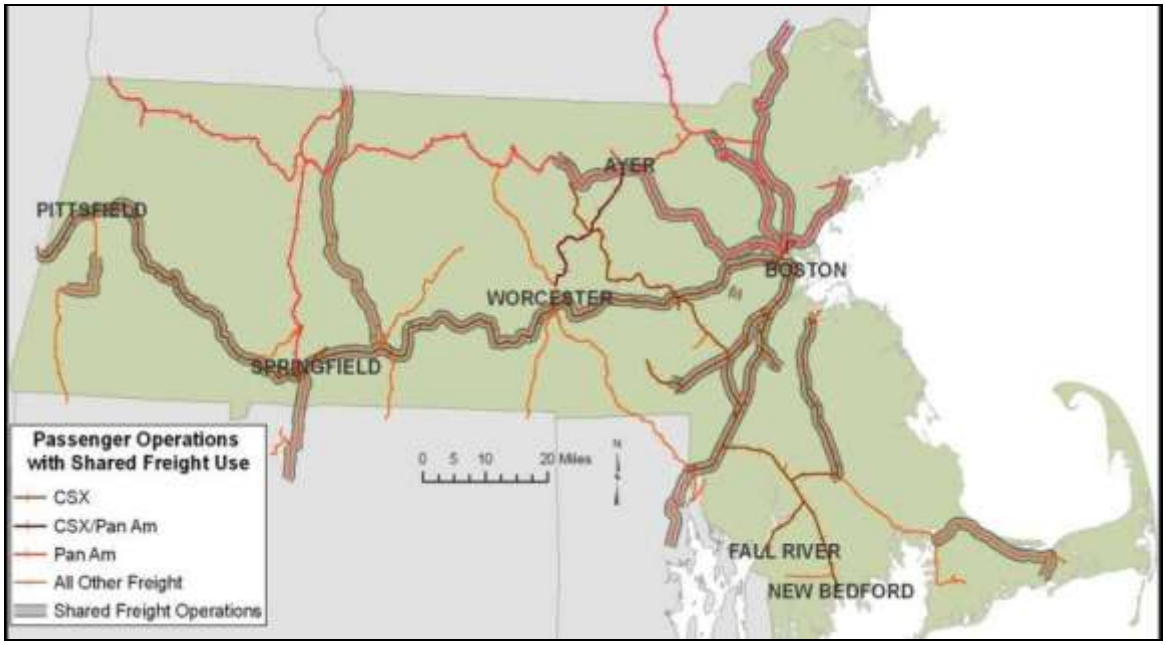
4.3.3 Shared Use

One of the important considerations for the rail network of the Commonwealth is the extent to which the network is shared by passenger and freight rail operators (Figure 4-4). These shared corridors within the Commonwealth generally function well. Shared use has the potential to improve the ratio of benefits to costs of infrastructure investments, yet complex issues often arise regarding scheduling, cost sharing and liability.

Within the Commonwealth, there are plans to increase the use of shared corridors. These include the relocation of the Amtrak Vermonter to the PAS Conn River line between Springfield and East Northfield and the extension of MBTA commuter service to Wachusett on the PAR/PAS Freight Main Line. This is the result of a cooperative assessment of passenger and freight needs on shared corridors.

It is important to note that although the cited use of shared corridors represents a mostly positive experience, the ability to add or expand passenger service, or even freight movements, on a given rail line cannot be taken for granted. The analysis of each passenger service must be undertaken in concert with the freight line owner or, in the case of state-owned lines, the freight operators. The passenger and freight changes associated with the CSX line acquisitions by the Commonwealth is an excellent example of the complete analysis needed to find the solutions to changes or improvements that are needed to support the expansion of shared use corridors.

Figure 4-4: Freight Operations with Shared Passenger Use



4.3.4 Existing Vertical Clearance Conditions for Intermodal

Vertical clearance is the envelope of space available between the top of rail and the lowest point of an overhead structure of a rail line. For a given rail line route, vertical clearance is determined by the clearance of the most restrictive structure on that particular route.

Many rail corridors within the Commonwealth do not have sufficient clearance to support the highest intermodal container full double stack cars. As seen in Figure 4-5, there currently are no full double stack container routes within Massachusetts. As part of the CSX transaction between the Commonwealth and the railroad for the acquisition of rail lines east of Worcester, improvements to vertical clearances west of Worcester will be made as indicated by the *Planned 20'-8"* corridor in Figure 4-5. This will allow full double stack trains to operate on the CSX line to intermodal yards in West Springfield and Worcester.

As mentioned in Chapter 3, interviews with shippers were conducted as part of the development of the Massachusetts State Rail Plan. The lack of rail lines in Massachusetts to handle Phase II full double-stack intermodal trains was cited by many shippers as limiting the efficiency of rail options serving the state. If the clearances were to be improved, it could increase the opportunity to divert trucks to rail from Worcester.

Estimates from stakeholder interviews indicated that increasing clearances could result in diverting significant container shipments by truck to rail that comes from the Port of New York/New Jersey to Massachusetts. This would also help alleviate some of the highway congestion on I-84 and I-90. This is illustrated by considering the Chicago – Boston container market. For routes from Chicago to New Jersey, where Phase II full double-stack clearances are available, the use of rail is favored over truck. This contrasts to routes from Chicago to Massachusetts, without a Phase II full double-stack intermodal rail route, where the use of trucks to move freight to Massachusetts is more cost effective.and Figure 4-6 illustrate the current clearances on rail routes in Massachusetts based on available information.

Figure 4-5: Current Vertical Clearances

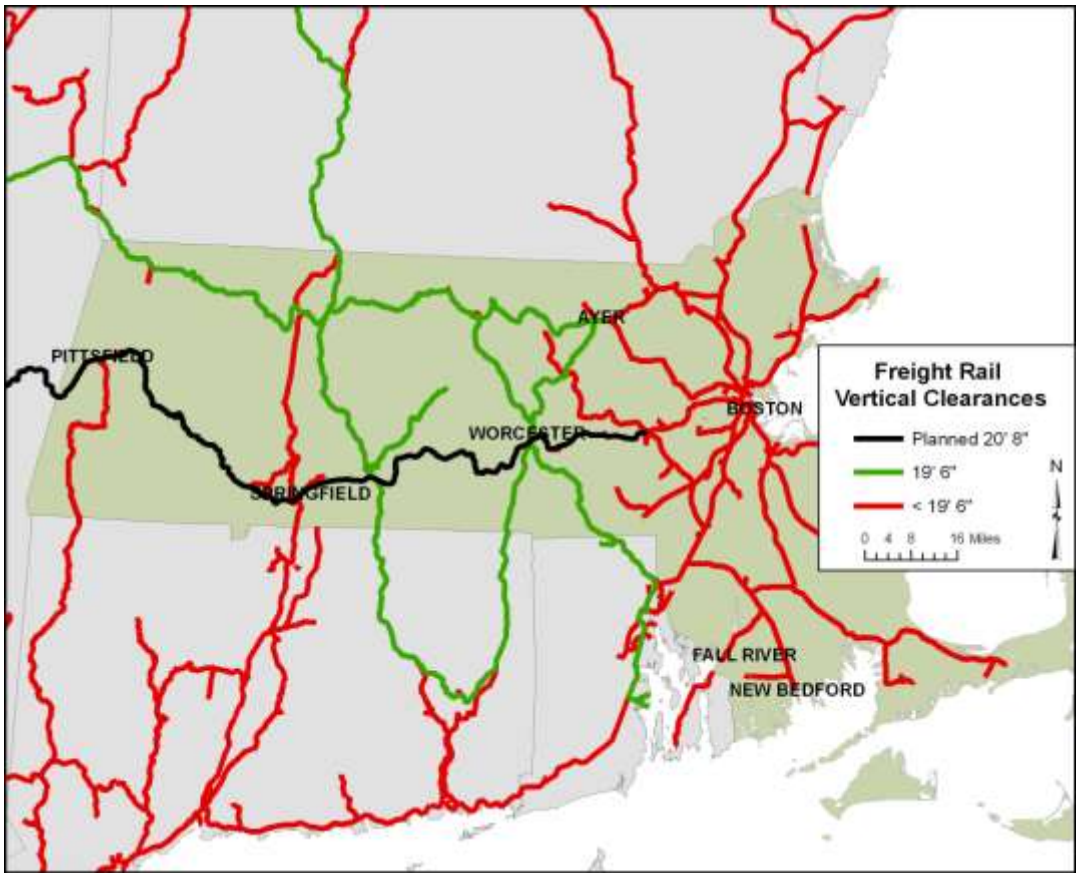
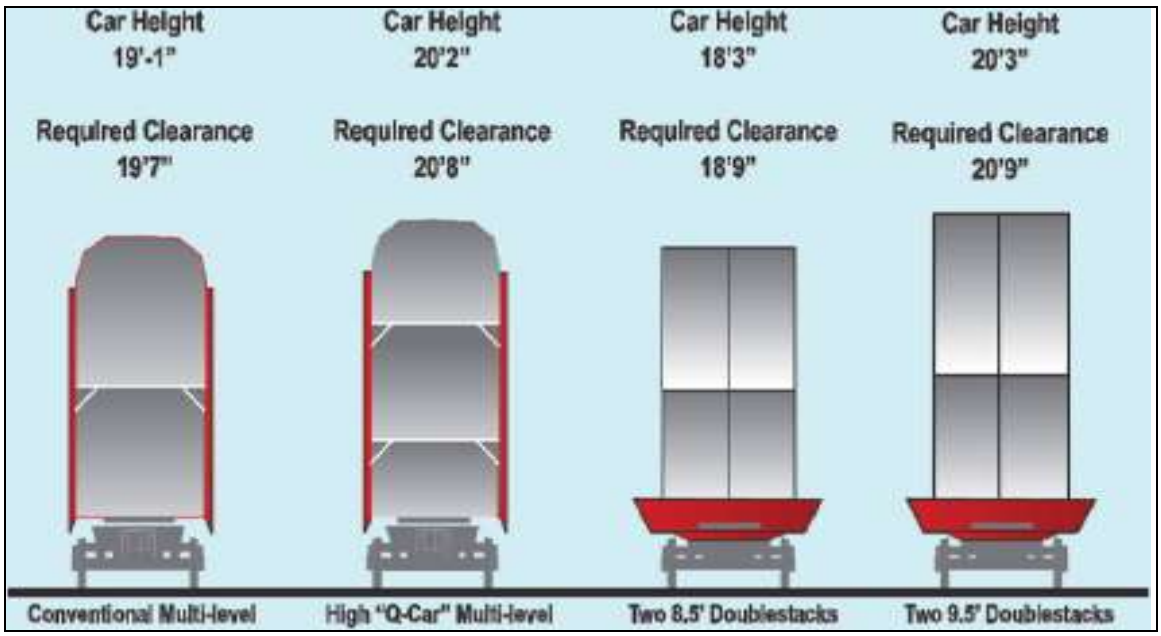


Figure 4-6: Auto Carrier and Intermodal Rail Car Clearance Requirements



The principal routes that would benefit from increased vertical clearance are the CSX Boston Line to Worcester and the PAS line to Ayer and potential continuing north to Maine. Improvements to the vertical clearance on the CSX Boston Line to Worcester are planned for completion in the near future. In the rail investment scenarios considered in Chapter 8, improvements of vertical clearance on the CSX line are assumed as an existing condition for analysis purposes. Of the potential vertical clearance rail corridor improvements assessed in the rail investment scenarios, full double-stack vertical clearance on the PAS line was identified to have produced a high return on investment.

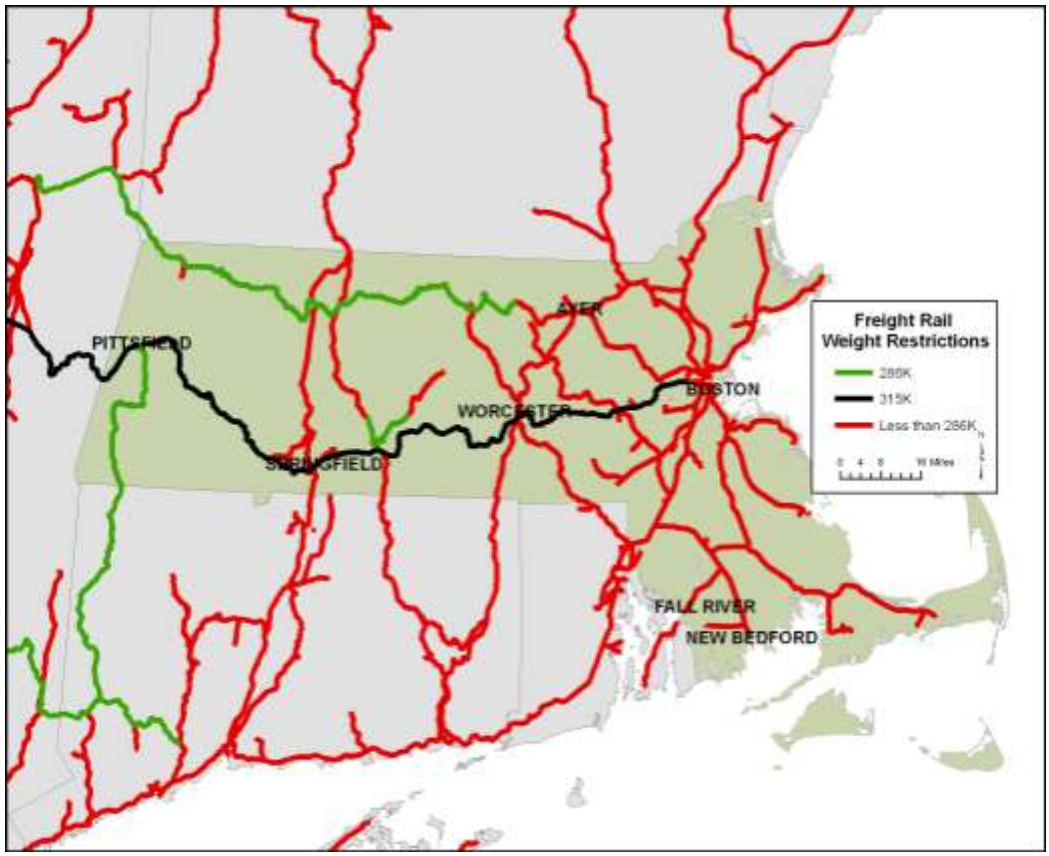
4.3.5 Weight on Rail

Rail lines are rated by the maximum weight rail car that can be carried on the rail line. The current minimum capacity, as stipulated by the STB, that a rail line must be able to interchange and handle is a 263,000 pound gross (total) weight rail car. However, in recent decades shippers have been employing freight cars with a gross weight of 286,000 pounds. As such, the used of the regulated minimum standard 263,000 pound cars is quickly being replaced by the heavier de facto standard of 286,000 pound rail cars. In some markets, rail cars with gross weight of 315,000 pounds are utilized.

The 286,000 pound rail cars provide for more cost effective transport of heavy products that provide benefits to shippers and receivers, and ultimately to consumers of products made with the shipped materials. Businesses in Massachusetts that cannot receive these heavier cars face delays in transit, extra costs for transloading, and the potential to see declining rail service.

Rail cars maximum weight limits in Massachusetts are illustrated in Figure 4-7.

Figure 4-7: Current Freight Weight Restrictions



The Commonwealth's interest in this matter is supporting the competitiveness of Massachusetts based companies. As rail cars have increased in size and weight capacity, and as shippers take advantage of the larger cars, those companies that must rely on older, smaller cars, find themselves disadvantaged in the marketplace.

Consider the example of a grain mill supplier or a distributor of canned goods who loads 286,000 pound cars for the vast majority of its customers. If it has to load certain cars to a different (lighter) standard, it must "Load by Exception." This means that the shipper must either re-tool or readjust its loading pattern to meet the needs of these few customers. Charges will be assessed accordingly. Cars loaded by exception are also often loaded later than cars for other customers as matter of convenience. In addition, the receiver, in getting lighter cars, must order more railcars to secure the equivalent amount of product. All of these factors combine to make Massachusetts companies on 263,000 pound lines less competitive than companies located on 286,000 pound lines.

Only three railroads in Massachusetts have any significant amount of trackage that is approved for 286,000 pounds weight on rail.[24] The entire CSX Boston Line is rated to carry

[24] The 286,000 pound discussion is based on four axle trucks. With the exception of specific heavy haul cars available at premium rates and utilized to move equipment such as transformers and other dimensional or overweight products, all the

cars weighing up to 315,000 pounds, though secondary tracks (branch lines) are generally rated at 263,000 pounds. Certain limited portions of the P&W are rated to carry 286,000 pound cars, and the entire Housatonic Railroad (in Massachusetts and Connecticut) is rated at 286,000 pounds. As part of the high-speed rail upgrade in Vermont and New Hampshire, the NECR route will be 286K capable to the Massachusetts state line by 2012. All other railroads in the Commonwealth are currently rated at 263,000 pounds. The PAR Freight Main Line from Mechanicville, New York, is rated at 268,000 pounds. One of the anticipated results of the upgrades contemplated in the creation of PAS is the ability to increase the allowed weight on this rail line to 286,000 pounds from Mechanicville, New York, to Ayer, Massachusetts.

Some of the 263,000 pound limits are driven by physical considerations including track conditions and bridge capacity, but a significant portion of the rail network in eastern Massachusetts is restricted to 263,000 pounds as a matter of policy. The track conveyed by Penn Central/Conrail and B&M/Guilford to the MBTA in the 1970s was transferred with then current load limits in place of 263,000 pounds. While the MBTA has rebuilt much of the rail infrastructure to support its commuter operation (and Amtrak service on the Providence Line), it has not changed the weight restrictions on any lines.

An assessment of the MBTA rail network may well find that the MBTA rail network is capable of sustaining heavier rail car loadings. Since the MBTA is only required by contract and deed restrictions to maintain the rail to levels it was deeded in the 1970s, there is no incentive for the MBTA to adjust the weight limit to 286,000 pounds. The reason for this is the expectation that if heavier freight rail cars run on the MBTA lines, there would be the need for an increased level of maintenance and costs. This concern could be addressed by negotiating new levels of fees with the freight carriers, as has been done on other commuter lines in the eastern United States.

4.4 Freight Rail Opportunities

As discussed in this chapter, there are a number of opportunities and benefits related to freight rail in Massachusetts. In particular, relatively high fuel prices tend to make freight rail more competitive with trucks as rail has "per ton mile" advantages of lower shipping costs, greater energy efficiency, less air emissions, and benefits to the highway system in terms of congestion relief, safety, and pavement damage. Nationally, freight rail is gaining in prominence due to these public benefits and the growing use of public-private partnerships to fund a range of freight rail improvements. A summary of key issues and opportunities includes:

- **Rail Network.** 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, and although it carries more than 40 percent of all freight moving through New England.

North American freight car fleet is equipped with four axle trucks. Loads can be moved by exception if six axle rail cars are utilized.)

- **Rail Impacts.** Freight shipped by rail rather than truck can reduce highway traffic congestion, emissions, and pavement impacts.
- **Vertical Clearances.** Restrictive vertical clearances on most of the Massachusetts freight rail network impact the ability of shippers and receivers to experience the efficiency and cost effectiveness benefits of Phase II Full double-stack service.
- **Weight Restrictions.** Much of the rail system is not designed and/or permitted for the emerging de facto 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.
- **Rail Access.** Rail access for many potential customers along rail lines needs to be built or upgraded, an expense that may limit opportunities to ship by rail. Development pressures on rail-adjacent land reduces the potential pool of rail customers. New industrial sites may not have rail access.
- **Shared Use, Rail Congestion and Competing Demands.** Much of the freight rail system operates on corridors that also have passenger rail (commuter and/or intercity rail) which creates challenges for scheduling and dispatch, safety, and the need for suitable switching and signal equipment. Shared use operations often require double-tracking and passing sides for the most heavily traveled routes (e.g., Northeast Corridor, Worcester-Boston, Downeaster route).
- **CSX Transaction.** MassDOT and CSX recently announced an agreement to relocate and consolidate the Beacon Park intermodal yard, in conjunction with planning to provide second generation (20'8") double-stack capability between Worcester and the western border. This agreement is likely to enhance freight rail opportunities to Worcester with expanded passenger rail between Worcester and Boston.
- **Pan Am Southern.** Pan Am Railways and Norfolk Southern have partnered to establish the Patriot Corridor as a second competitive Class I railroad in the state, with first generation (19'6" as limited by the Hoosac Tunnel) double-stack capability and 286,000 pound weight on rail capacity between Ayer and the western border.

Chapter 5 Passenger Rail System Inventory

5.1 Overview

Passenger rail service in the Commonwealth consists of high speed, 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. Each year, approximately 2.6 million riders in Massachusetts use Amtrak's services, and almost 40 million riders use the Massachusetts Bay Transportation Authority (MBTA) commuter rail system.

In addition to providing many contributions to the state's economic vitality, rail transportation 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 transport modes.

5.2 System Description

5.2.1 Statewide Summary

The Commonwealth has played a very active role in the development and maintenance of the passenger rail system. For more than 50 years, Massachusetts has been taking decisive and positive steps to preserve and enhance the railroad system within the state. Passenger rail service in Massachusetts has two principal providers: the MBTA for commuter rail service and the National Railroad Passenger Corporation (Amtrak) for a variety of intercity services.

The MBTA is the nation's 5th largest mass transit system. The MBTA serves a population of more than 4.5 million in 175 cities and towns within an area of more than 3,000 square miles. In its 2008 fiscal year, the MBTA provided nearly 375 million passenger trips, 21 million more trips than in 2007, a 6 percent leap and the highest ridership total in the agency's 44-year history. The MBTA's commuter rail operations transport about 38 million passengers per year on 14 commuter rail lines located throughout central and eastern Massachusetts.

Amtrak is the national intercity passenger railroad that serves four different routes in Massachusetts. Amtrak was created by the federal government in 1971, to assume the responsibility of intercity passenger operations. In exchange, Amtrak was granted the ability to operate on any rail line.

Amtrak employs nearly 19,000 people. It operates passenger service on 21,000 miles of track primarily owned by freight railroads connecting 500 destinations in 46 states and three Canadian provinces. In fiscal year 2008, Amtrak served 28.7 million passengers, representing six straight years of record ridership, In Massachusetts there were 2.8 million riders

5.2.2 Ownership

In 1972, the MBTA purchased the commuter rail lines south and west of Boston from the Penn Central Railroad. In 1976, the MBTA completed the acquisition of the B&M's 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 acquisition of rail lines was important for several reasons:

- The purchase included rail lines on which only freight service was operating. This created the possibility of the future expansion of the commuter rail system.
- The MBTA was able to apply for federal funding to begin the long and extensive process of rehabilitating and upgrading the commuter rail network.
- By acquiring virtually all of the rail lines in eastern Massachusetts, the Commonwealth positioned itself to develop and improve both commuter and freight rail service on the extensive network of publicly-owned rail lines.

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, while concurrently recognizing the importance of freight rail services.

In Massachusetts, Amtrak owns the six miles of the Springfield line to New Haven, CT that it received in 1976 through an Act of Congress. MBTA ownership of railroad lines has facilitated Amtrak expansion on Downeaster and the improvements to Northeast Corridor.

There are approximately 460 route miles of railroad in the Commonwealth of Massachusetts over which regularly scheduled commuter rail and/or intercity passenger rail trains operate. Of the 460 miles, approximately 394 miles are part of the MBTA commuter rail system. In all, there are five distinct commuter/intercity passenger train services in Massachusetts. A summary of these services and the primary characteristics of each is presented in Table 5-1.

Table 5-1: Passenger Rail Operations

Service	Route miles[(1)]	Weekday Number of Trains	Average Daily Ridership	Ownership
MBTA North Side Service	161.5	198	51,350	MBTA, PAR
MBTA South Side Service	212.2	293	92,620	MBTA, MassDOT, Private, CSX
Amtrak NEC	38[(1)]	42	32,236	MBTA
Amtrak Inland route and Vermont service	200[(2)]	16	2,182	MBTA, MassDOT, CSX, Amtrak, NECR
Amtrak Downeaster	33[(3)]	10	1,260	MBTA, PAR

Source: Amtrak published data and MBTA Blue book, 2009.
[(1)] In Massachusetts
[(2)]NEC Master Plan
[(3)]In Massachusetts Boston to Portland is 116 miles

5.3 MBTA Commuter Rail Service

The MBTA's commuter rail network is comprised of 14 lines, five north of Boston, that terminate at North Station, and nine south and west of Boston, that terminate at South Station. Daily ridership in 2009 for the commuter rail was 137,104 passengers, slightly down from 2008 daily ridership of 138,928 passengers. Total fare revenue collected in 2009 was $138.6 million, according to the MBTA Fiscal Year 2009 Budget Book.

The MBTA operates 491 one-way weekday trips with 293 trips on the South Side and another 198 on the North Side. The MBTA operates 670 miles of track, with 394 route miles split between the North Side at 169 miles, South Side at 146 miles, and Old Colony at 79 miles. The total train miles operated in 2009 was 4.1 million.

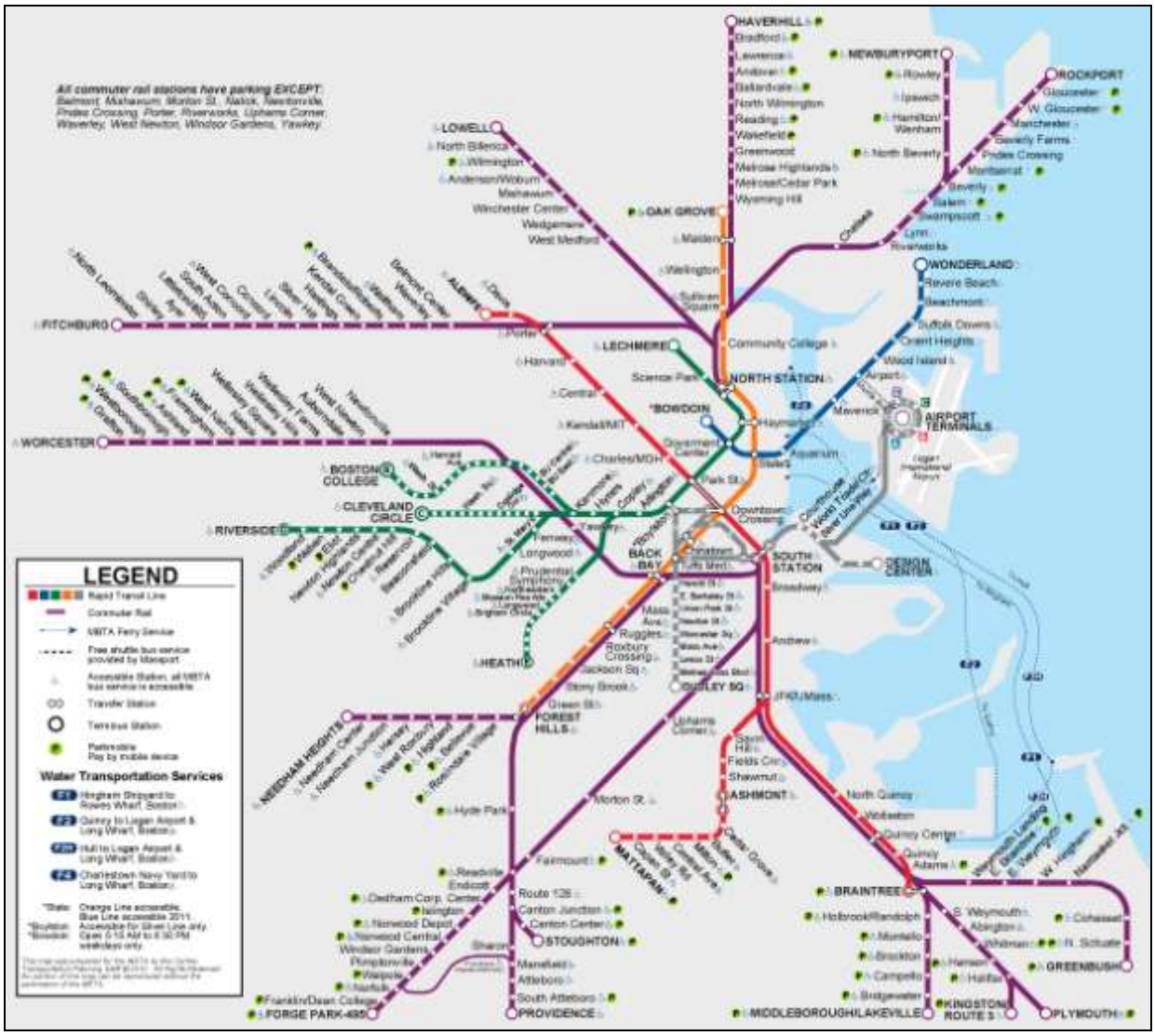
The MBTA contracts the operation and maintenance of the service to Massachusetts Bay Commuter Railroad Company (MBCR). The MBTA revenue vehicle fleet included 80 passenger locomotives and 410 active passenger coaches. The age of the current fleet ranges between 6 to 30 years old, and anticipate partial fleet replacement in 2014. Of the 410 coaches, 140 are multi-level vehicles for increased passenger capacity. The MBTA Kawasaki-manufactured multilevel coach has the ability to seat approximately 180 passengers. The typical single level passenger coach has a capacity of 88 passengers.

Over the last two years, the on-time performance on commuter rail has improved. Actual On-time performance for all commuter rail system in 2009 was 89 percent, while the adjusted on-time performance was 95 percent. Adjusted on-time performance removes weather and other disturbances outside of railroad control.

The commuter rail system as shown in Figure 5-1 serves 133 stations, providing for nearly 40 million passengers per year. The average daily weekday ridership of approximately 142,000 passengers makes the MBTA system the fifth largest in the United States, after the three New York City services (the Long Island Rail Road, New Jersey Transit, and Metro North) and the Chicago service (METRA).

Contained within the MBTA system are approximately 100 route miles, shared by the MBTA's commuter trains and Amtrak-operated intercity passenger trains. These shared line segments include the Northeaster Corridor between South Station and the state line at Attleboro (and beyond to Providence), between North Station and Haverhill, and between South Station and Framingham. With the exception of some of the newer lines in the MBTA system and a few scattered segments, such as Boston to Readville via Back Bay and Forest Hills, virtually the entire MBTA network also has freight trains operating on a daily basis.

Figure 5-1: MBTA Commuter Rail Map



Source: MBTA web site

Details of MBTA Commuter Rail Network

Table 5-2 below contains a line-by-line summary of the MBTA commuter rail network.

Table 5-2: MBTA Commuter Rail Network Summary

Route	Distance (mi.)	Number of Stations Served	Number of Trains per Weekday	Average Daily Ridership	FRA Class of Track/ Maximum Operating Speed	Miles of Single Track/ Double Track	Lines Shared with Freight Traffic
Newburyport/ Rockport	53.5	18[(1)]	64	18,348	Class 4 70 MPH	37.75 DT 15.7 ST 16.15 Shared with freight	YES
Haverhill	33	14	46	10,510	Class 4 60 MPH	15.4 DT 17.6 ST	YES
Lowell	25.5	9	58	12,573	Class 4 70 MPH	25.5 DT	YES
Fitchburg	49.5	19	34	9,918	Class 4 60 MPH	40.5 DT 9 ST	YES
Framingham/ Worcester	44.3	17	41	17,664	Class 4 79 MPH	44.3 DT	YES
Needham	13.7	12	32	7,599	Class 4 60 MPH	1.5 DT 12.2 ST	NO
Franklin	18.5	16	37	13,047	Class 4 70 MPH	5.7 DT 15.5 ST	YES
Providence/ Stoughton	47.7	13[(2)]	68	27,871	Class 8 79 MPH (Amtrak runs at a maximum speed of 150 MPH)	36.0 DT 9.1 Triple Track	YES
Fairmount	9.1	5	44	1,864	Class 4 60 MPH	9.1 DT	YES
Middleborough/ Lakeville	35.6	10	24	9,707	Class 4 70 MPH	2.2 DT 33.4 ST	YES
Kingston/ Plymouth	25.7	11	28	10,421	Class 4 70 MPH	2.2 DT 23.5 ST	NO
Greenbush	17.6	10	24	4,445	Class 4 70 MPH	2.2 DT 15.4 ST	2 miles only from Quincy to Weymouth
TOTAL:	**373.7[(3)]**						

Source: MBTA reports and MBTA Blue book, 2009.
[(1)]Includes North Station
[(2)]Includes South Station and Back Bay
[(3)]Total mileage is higher than actual track mileage due to shared track within terminal area.

As is shown in Table 5-2 above, much of the MBTA commuter rail system is double tracked. However, the Fitchburg, Haverhill, Needham and Franklin lines all have lengthy sections of single track, and the most recent line expansions are single track with passing sidings. These line expansions include the Newburyport extension and comprise the "Old Colony" expansion with three lines with terminus at Greenbush, Plymouth/Kingston, and Middleborough/Lakeville. The Providence/Stoughton line has a 9.1-mile portion of triple track, in addition to 31 miles of double track. The entire system is signaled and all public grade crossings have modern warning systems in place.

Investment in MBTA Commuter Rail System

The MBTA invested more than $2.0 billion in capital expenditures to maintain and improve its commuter rail system between 1996 and 2006. MBTA has programmed an additional $900 million for capital improvements to the commuter rail system over the next three to five years.

MBTA Commuter Rail Service Maintenance and Operation

The MBTA commuter rail service is operated under contract by Massachusetts Bay Commuter Railroad Company (MBCR), a consortium established for this purpose by Veolia Transportation, Bombardier, and Alternate Concepts, a locally based transportation management company. MBCR's contract with the MBTA requires the operation and maintenance of the entire commuter rail system, including track and structures, signals and communications, and all railroad equipment.

The only exceptions to the above-described maintenance of infrastructure arrangements are the line from South Station to Worcester[25], which is maintained by CSX, and the line from South Station to the Rhode Island border, which is owned by the MBTA and maintained by Amtrak, under the terms of a 30-year maintenance agreement with the MBTA. Signed in 2003, this MBTA/Amtrak agreement stipulates that Amtrak provides to the MBTA maintenance of infrastructure and train dispatching services on this line at no cost for the life of the agreement. The primary reason for this arrangement is that the line segment is part of Amtrak's Northeast Corridor and is the line over which Amtrak's Acela high speed service operates between Boston, New York City and Washington, DC. Because Amtrak needs to retain train dispatching and maintenance control over this line, it maintains the line segment at no cost to the MBTA. MBTA also has the rights to make use of the traction power system, should the authority elect to utilize electric locomotives.

Active MBTA Commuter Rail Projects

Fitchburg Line Improvements – MassDOT and the MBTA are investing just under $200 million for improvements along the Fitchburg Commuter Rail Line, including interlocking work, double-tracking, and other improvements. The funds include $10.2 million in American Recovery and Reinvestment Act (ARRA) funds for the first stage of the Fitchburg

[25] The Commonwealth will Purchase the line to Worcester from CSX in September, 2012.

Commuter Rail Improvement Project; an additional $39 million in ARRA funding for double-tracking; and $150 million in Small Starts funding from the Federal Transit Administration to support installation of new switches and signals, to renovate two stations and to reconstruct the existing track on the state's oldest commuter rail line.

Wachusett TIGER Project – The Fitchburg Commuter Rail Line will also benefit from the $55.5 million Transportation Investment Generating Economic Recovery (TIGER) Funded Wachusett Commuter Rail Extension Project which will extend passenger rail service approximately 4.5 miles west of the Fitchburg commuter rail station, construct a new "Wachusett Station" and a new MBTA layover facility.

Worcester Frequency Improvements – A major benefit of the CSX transaction is the agreement between CSX, MassDOT and the MBTA to add 20 new weekday commuter rail trips to Worcester. This fulfills a long-standing objective of the Commonwealth to improve and increase the service on the Worcester Line.

Haverhill Line Improvements - The MBTA is using $17.4 million in ARRA funds to install double-tracking and improve the train control systems between Lawrence and Andover. This project will improve reliability and on-time performance for the Haverhill commuter rail line, Amtrak's Downeaster trains as well as freight rail operations.

Extension of MBTA service to T. F. Green Airport – In the fall of 2010, the MBTA Providence Line service will be 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 provides capital funds to the MBTA in exchange for operating service in and to the state. The MBTA uses these capital funds to purchase equipment and make improvements to facilities in Massachusetts.

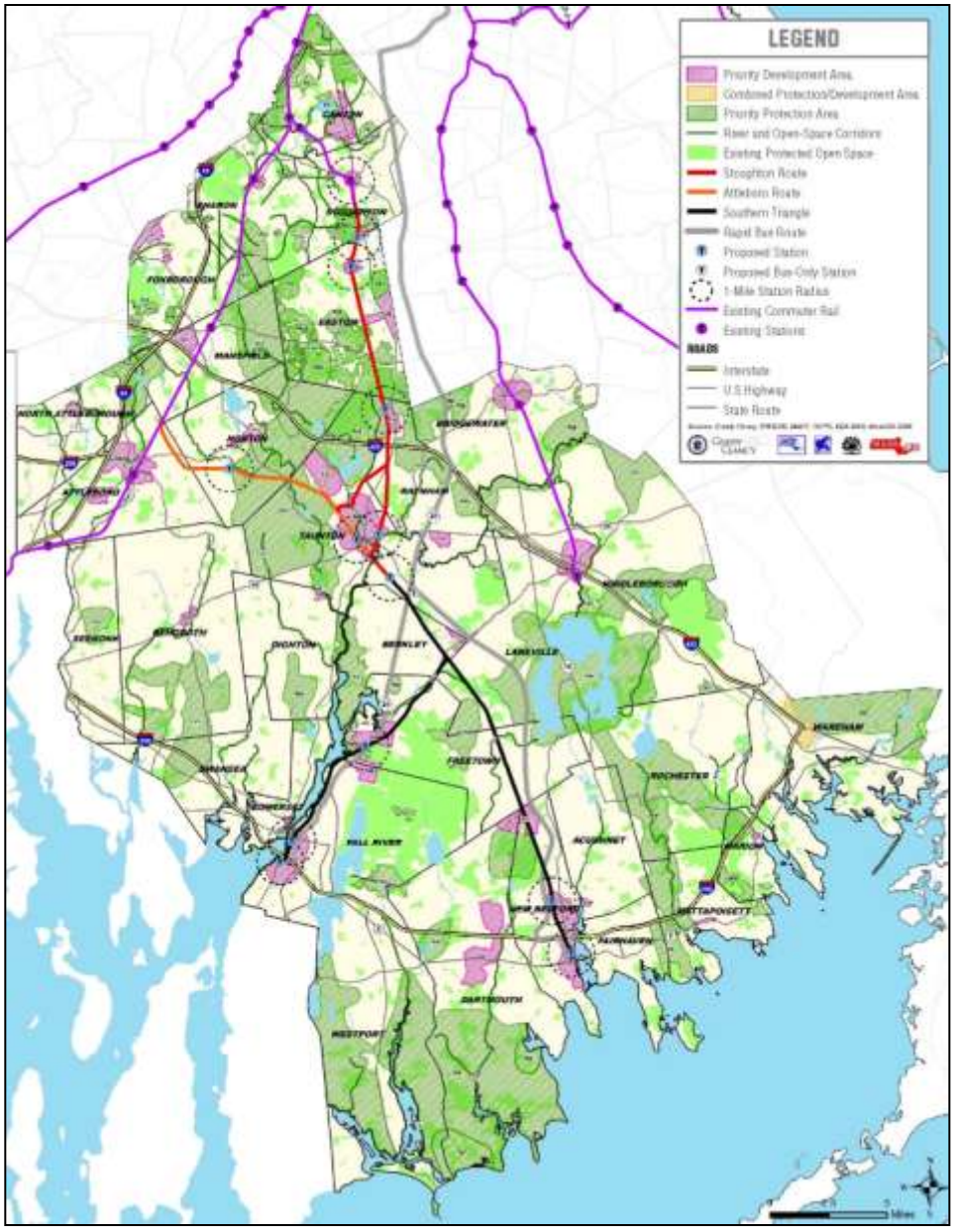
New Commuter Rail Equipment – The MBTA is in the process of acquiring twenty new locomotives and seventy five bi-level passenger cars to replace existing equipment which is nearing the end of its useful life. The MBTA has placed the order for the new locomotives and the contract includes options to purchase an additional twenty. The first locomotives are expected to be in service within 36 months, delivery of the first new passenger cars is expected in 2011, and the last cars will be delivered by the end of 2014.

South Coast Rail - In April 2007 Governor Deval Patrick renewed the state's commitment to the South Coast Rail project to restore passenger rail service between Boston and Fall River and New Bedford by investing $17.2 million to fund the project's three-year planning phase. At the three-year mark, the project has acquired the rail right-of-way from Taunton south to New Bedford and to Fall River, obtained initial federal funding to reconstruct three rail bridges, held over 100 civic engagement meetings to guide the project's design, and is in the final stages of environmental review.

In June 2010, Massachusetts purchased over 30 miles of track from CSX Corporation, including the Fall River and New Bedford Secondary Tracks. The Commonwealth now owns the tracks over which passenger rail will run.

In Febuary 2010, Massachusetts was awarded $20 million in federal economic stimulus funds from the competitive grant program called Transportation Investments Generating Economic Recovery (TIGER) program. The grant will be used to reconstruct three structurally-deficient rail bridges immediately north of the planned Whale's Tooth Station in New Bedford. The bridge work will maintain the ability for freight rail to use these bridges and help revitalize New Bedford's waterfront. The project is also the first step in the construction of South Coast Rail.

Figure 5-2: South Coast Rail



These past three years of planning has advanced the state and federal environmental review through the Massachusetts Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA). In 2009, a short list of alternatives was selected for rigorous analyses. Over 5,000 pages of technical information comparing the alternatives and assessing environmental conditions and impacts have been published. These materials include recommendations on station sites and projections on the number of people expected to ride. The Commonwealth expects that the Army Corps of Engineers to release the Draft Environmental Impact Statement later this fall. The Corps will then take public comment and, shortly thereafter, make a determination on the best route, called the Least Environmentally Practicable Alternative. All environmental review work is expected to be completed by the end of 2010, permits obtained in 2010-2012 with commencement of construction in 2012 and service beginning in 2016.

South Coast Rail is expected to be a model for green rail and smart growth. Its large scale offers unprecedented opportunities to protect communities and the natural environment while also finding ways to shape new economic and housing growth. In order to achieve these goals, MassDOT and the Executive Office of Housing and Economic Development developed the *South Coast Rail Economic Development and Land Use Corridor Plan* to help reach the $500 million in new annual economic activity the *Corridor Plan* projects is possible. The plan includes: 1) station area concept plans for transit-oriented development; 2) a Priority Map, showing what places are priorities for environmental preservation and what areas should be targeted for redevelopment or new development; and 3) state policy commitments to support the implementation of the Priority Map by targeting infrastructure and open space funds. Its smart growth framework and extensive civic engagement process recently won the president's award for outstanding planning from the Massachusetts Chapter of the American Planning Association. Each year, the state provides up to $300,000 in technical assistance awards to the 31 cities and towns within the South Coast Rail corridor to help implement the *Corridor Plan* so the region can realize the most economic development and environmental quality from this large infrastructure investment.

5.4 Amtrak Intercity Passenger Service

Long distance intercity passenger rail service in the United States is provided by Amtrak. Amtrak's national passenger rail system currently covers over 21,000 miles and serves more than 500 destinations in 46 states. During federal fiscal year 2009, over 27.1 million passengers rode Amtrak, amounting to the second largest annual ridership total in history but was a decrease of approximately 1.6 million passengers from FY 2008.

Amtrak provides service to 11 stations in Massachusetts. Table 5-3 summarizes the boardings and alightings by station for Amtrak service in Massachusetts. Table 5-4 summarizes key statistics about the Amtrak services and routes in Massachusetts. The table indicates Amtrak service to 15 stations in Massachusetts because some stations are served by more than one route.

Table 5-3: 2009 Amtrak Station Usage in Massachusetts

City	Boardings + Alightings
Amherst	13,581
Boston - Back Bay	398,240
Boston - North Station	403,203
Boston - South Station	1,287,615
Framingham	1,778
Haverhill	36,159
Pittsfield	6,700
Route 128 (Boston)	366,649
Springfield	111,215
Woburn	14,620
Worcester	6,701
Total Massachusetts Boardings & Alightings:	**2,646,461**

Source: AMTRAK website, www.amtrak.com, Amtrak Fact Sheet, Fiscal Year 2009, Massachusetts.

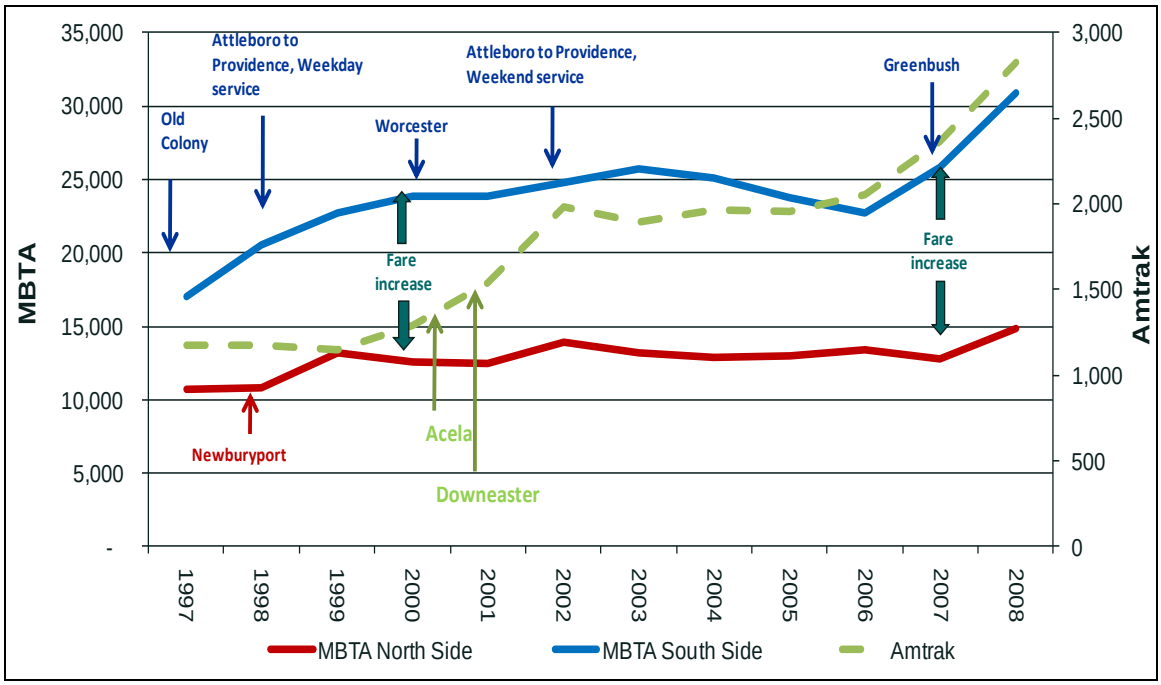
Table 5-4: Amtrak Intercity Rail Network Summary

Route	Distance (mi.)	Number of Stations Served in MA	Number of Trains per Weekday	Average Daily Ridership	FRA Class of Track	Lines Shared with Freight Traffic
Northeast Corridor	456	3	42	32,236	VI	Y
Downeaster	116	3	10	1,348	IV	Y
Vermonter via Springfield/Palmer	63	1	12	994	IV	Y
Lake Shore Limited	959	6	2	982	IV	Y
Vermonter	611	2	2	206	IV, III	Y

Source: AMTRAK Website - www.amtrak.com

The annual Massachusetts passenger ridership for the MBTA commuter rail and Amtrak intercity services is shown in Figure 5-3**.** The MBTA commuter rail ridership is segmented into the North Station routes (North Side) and South Station routes (South Side) districts. In addition, the graph also shows major service or fare increases on the MBTA commuter rail. As the figure shows, the two MBTA districts have increased ridership significantly since 1997, despite two fare increases. The North Side MBTA ridership increased 39 percent during this period, while the South Side MBTA district ridership has increased 81 percent. The South Side growth reflects the introduction of new commuter rail services such as the Attleboro/Providence and Greenbush routes. Over the same time period, Amtrak ridership increased 140 percent with two notable service enhancements: the Acela express service on the Northeast Corridor in 2000 and the Downeaster service to Portland, Maine in 2001.

Figure 5-3: Massachusetts Passenger Rail Annual Ridership: 1997 – 2008 for MBTA and Amtrak



Source: MBTA, "Ridership and Service Statistics Twelfth Edition 2009" Boston, MA; and Amtrak ridership data.

The Northeast Corridor

Amtrak's Northeast Corridor intercity passenger rail service operates from South Station through New York City to Washington, D.C. (Figure 5-4). The Northeast Corridor from Boston to Washington, DC, is a distance of 457 route miles of railroad. Amtrak owns all of those miles except for the first 38 miles from South Station to the Massachusetts-Rhode Island border owned by MBTA; and New York/Connecticut owns a 56 mile segment between New Rochelle, NY and New Haven, CT. Amtrak is responsible for both the train dispatching and the infrastructure maintenance on this line in Massachusetts.

Amtrak operates a daily service on the Northeast Corridor consisting of 42 trains, or 21 round trips. Twenty of these trains are the Acela Express high speed, limited stop service trains, with the balance of twenty two offering a conventional Northeast Regional service in the corridor. After leaving South Station, Amtrak trains on this line make two additional station stops in Massachusetts, at the Back Bay and Route 128 stations. MBTA commuter trains also stop at these stations. On the Northeast Corridor, the Amtrak Acela trains can operate at speeds up to 150 miles per hour.

The Northeast Corridor rail system, between Boston, New York City and Washington, is an important component of the nation's transportation network and a critical alternative to congested interstate highways and air corridors in the densely developed Northeast.

Figure 5-4: Amtrak Northeast Corridor

Source: AMTRAK Website - www.amtrak.com

Inland Route/Springfield Line/Knowledge Corridor

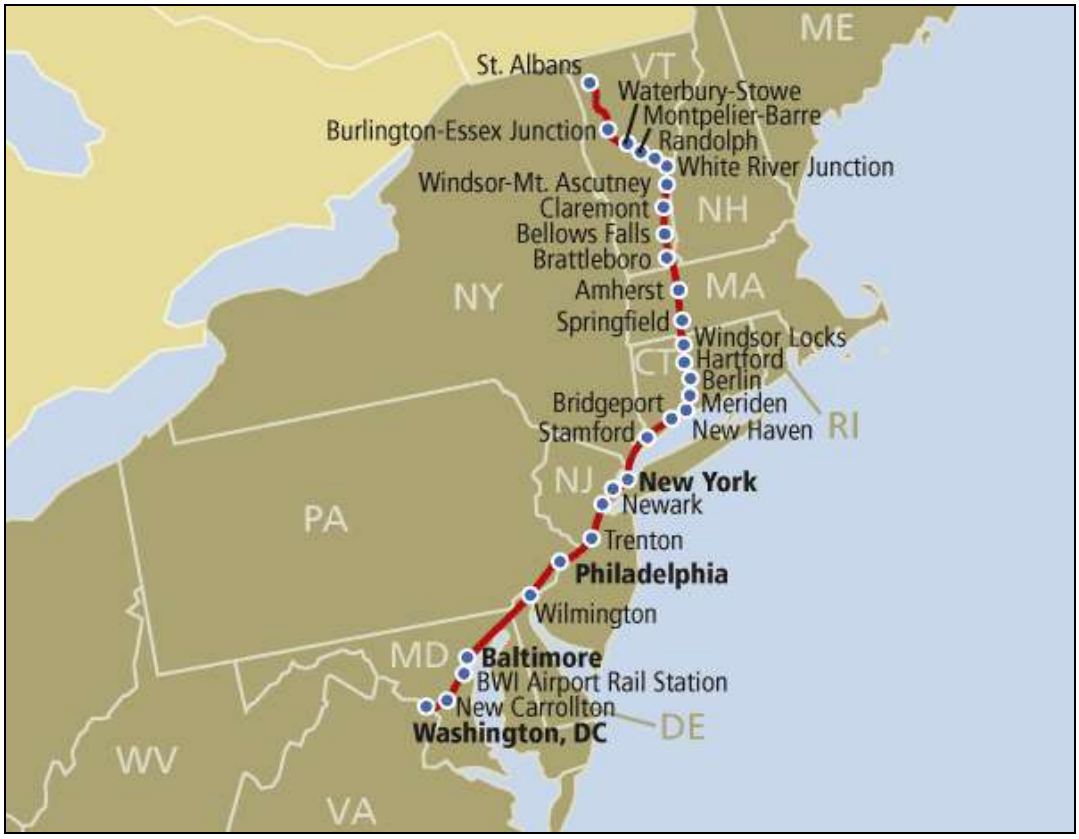
Amtrak is currently operating 12 trains a day (six round trips) over the 62-mile Amtrak-owned Springfield Line between New Haven, Connecticut, and Springfield. Of these 62 route miles, approximately 10 miles are in Massachusetts, with the remainder in Connecticut. While these trains serve a total of eight stations, only one, Springfield, is in Massachusetts.

Four of the round trips are "shuttles" and operate only between New Haven and Springfield. A fifth round trip is part of Amtrak's Northeast Corridor "Regional" service and provides through-connections between Washington, D.C. and Springfield.

The remaining round trip train operating between Springfield and New Haven is the Vermonter (Figure 5-5). Amtrak provides daily service in each direction between St. Alban's, Vermont and Washington, D.C., a distance of 611 miles, of which approximately 70 miles are in Massachusetts. The train currently operates over the trackage of three different railroads in Massachusetts (New England Central, CSX and Amtrak), and makes two station stops in Massachusetts at Amherst and Springfield. The State of Vermont provides funding to support continued operation of this service. Massachusetts received a $70 million award from the FRA to restore the Vermonter to the PAR Connecticut River Line route between Springfield and the Vermont border with new train stations in Northampton and Greenfield.

For more information, see the section on High Speed and Intercity Passenger Rail Projects below.

Figure 5-5: AMTRAK Vermonter



Source: AMTRAK Website www.amtrak.com

Amtrak's Lakeshore Limited long distance train originates in Boston and continues through Worcester and Springfield to Albany, where it combines with the New York City section of the train, then continues on to Chicago via Buffalo (Figure 5-6). On the return trip, the train splits at Albany, with one section heading to Boston and the other to New York City.

Figure 5-6: Amtrak Lake Shore Limited

Source: AMTRAK Website www.amtrak.com

The Downeaster

In December 2001, after an absence of more than 40 years, intercity passenger rail service returned to Boston's North Station with commencement of the "Downeaster" service. This Amtrak operated, state supported service runs between Boston and Portland, Maine, a distance of 116 rail miles. Downeaster trains run over MBTA-owned trackage between North Station and the Massachusetts-New Hampshire border, which is about four miles east of the Haverhill station, and on trackage owned by PAR from the Massachusetts-New Hampshire border to Portland.

The Downeaster was established by, and is under the control of, the Northern New England Passenger Rail Authority (NNEPRA), which was created in 1995 by State of Maine statute to develop the service. Figure 5-7 shows the cities served by the route. The Downeaster trains are operated as state supported services under contract with Amtrak with required operating subsidies provided by the State of Maine through NNEPRA.

Since its inception, this new intercity service has been well received. Service consists of five round trips, seven days a week, to a total of 10 stations, three of which are in Massachusetts: Boston North Station, the Anderson Transportation Center in Woburn and Haverhill. The equipment for these trains is provided by Amtrak and consists of two train sets, each with a locomotive and four to five cars. Since the Downeaster service runs out of North Station and Amtrak's Boston-area equipment maintenance facilities are located in the vicinity of South Station, these two train sets are shuttled back and forth across the Charles River via the Grand Junction Branch for servicing, maintenance and repair.

Figure 5-7: AMTRAK Downeaster Services

Source: AMTRAK Website www.amtrak.com

5.4.1.1 High Speed and Intercity Passenger Rail Active Projects

Knowledge Corridor

The Federal Railroad Administration awarded MassDOT $70 million in the first round of the competitive HSIPR Program to rehabilitate 49 miles of track and construct two stations for the Vermonter train service in Western Massachusetts. This project is complemented by HSIPR awards in Connecticut and Vermont that will improve service on the entire New Haven - St Albans corridor. Pan Am Southern will rehabilitate the Connecticut River Line for passenger operation with oversight provided by the MBTA Design and Construction Department. Final design will take place in 2010 and construction will be in 2011 and 2012. Service is expected to begin in October 2012.

New Haven – Hartford – Springfield Commuter Rail

Massachusetts has been an active partner with The Connecticut Department of Transportation (ConnDOT) planning for this expanded service on the rail line. The project entails installing some 20 miles of new double track in Connecticut as part of the service expansion project. The line currently has 23 miles of double track, which will be increased to 42 miles over the 62-mile route. Challenges include environmental mitigation requirements, coordination with freight activity and development of adequate station and support facilities.

Northeast Corridor

As the nation's first High Speed Rail line, the Northeast Corridor is a critical element to the transportation and economic health of the New England and Mid-Atlantic states. Massachusetts and the other corridor states are committed to completing the necessary environmental and planning documents to allow significant investment in the corridor for Amtrak and commuter trains. The recently completed Northeast Corridor Master Plan

indentifies more than $50 billion in rail projects on the corridor whose completion will advance the Northeast Governors' goal of doubling the number of riders on the corridor by 2030.

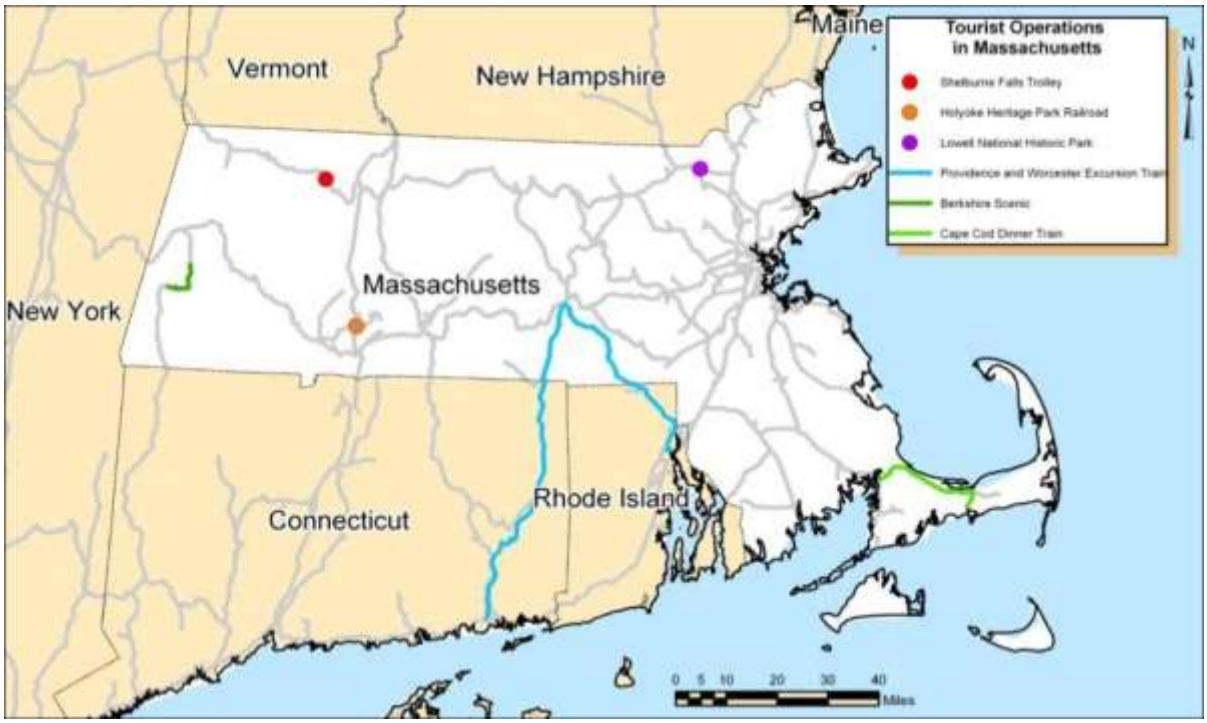
The expansion of South Station will provide new tracks to accommodate additional passenger service on Amtrak and MBTA trains. This project is a priority for future rounds of HSIPR funding for Massachusetts. MassDOT has submitted an application to request funds for Preliminary Engineering and Environmental work as a foundation for a future request for construction funds.

Downeaster – Another priority for future rounds of HSIPR funding is improvements to the Downeaster route, to reduce travel times between Portland and Boston. This project would involve close partnership with the Northern New England Passenger Rail Authority (NNEPRA). A major component of the improvements necessary in Massachusetts is rehabilitation of the Merrimack River Bridge in Haverhill which is a critical element of the region's transportation system.

5.5 Tourist Railroads

There are six tourist trains services in Massachusetts, as shown in Figure 5-8. These tourist railroad operations do not operate on segments with intercity or commuter rail operations in the Commonwealth.

Figure 5-8: Tourist Railroads in Massachusetts



Source: MassGIS, with project team inputs

The Berkshire Scenic Railway

The Berkshire Scenic Railway Museum, Inc. (BSRM), in Lenox is an all-volunteer not-for-profit 501(c) 3 organization founded in 1984. BSRM operates tourist passenger service over an eleven-mile segment of the Housatonic Railroad under terms and conditions of an operating agreement. It operates under a passenger easement owned by MassDOT on the Housatonic Railroad. The passenger easement was obtained as part of grants awarded to the Housatonic Railroad for track improvements in Massachusetts.

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.

Lowell National Historic Park

The National Park Service owns and operates a trolley service within the confines of the Lowell National Park over trackage formerly owned by the Boston & Maine Corporation. This system operates over tracks once used to service the mills and warehouses in Lowell's downtown district. The Park Service owns three trolleys, and the Seashore Trolley Museum (of Maine) also operates one of its historic trolleys on the route. There are plans being considered to provide a transit link to the Gallagher Transportation Center and the MBTA's commuter rail system. The system is not directly connected to the national railroad network.

Providence & Worcester Railroad

The P&W offers occasional excursion trips utilizing its equipment and track on private railroad property. The P&W 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.

Shelburne Falls Trolley

The Shelburne Falls Trolley Museum is a 501(c)3 non-profit organization whose goal is to preserve railroad and trolley history and artifacts, especially of the Franklin County, Massachusetts, area, and to educate the public about these artifacts and historical information through collection, restoration, display, demonstration and enjoyment of railroads and trolleys.

The Museum recreates the experience of an early-1900's rural street railway by giving rides on restored trolley and railroad equipment. The rides include interpretive talks on the history and uses of the equipment, the importance to the community of the services the railroad and trolleys provided and their role in the development of the community.

Tourist Railroads fill in a unique niche with the state's transportation network. Some tourist operations focus on the equipment, others on scenic opportunities along rail lines. Each offers unique perspectives to residents and visitors.

5.6 Stations and Intermodal Connections

5.6.1 South Station

Boston's South Station is over 110 years old. It is a terminal for the south side of Boston for high-speed rail, regional rail, commuter rail, rail rapid transit (subway) and the Silver Line Transitway, a dedicated underground busway. It is also the location to the South Station Transportation Center, a terminal for intercity, regional and local bus operations with service to much of New England and the Mid Atlantic.

South Station is the northern terminus of Amtrak's Northeast Corridor and it is the eastern terminus for Amtrak's Lake Shore Limited from Chicago. It is the Boston terminus for MBTA South Side commuter rail operations to Worcester, Needham, Franklin, Providence, Middleboro, Plymouth, Stoughton, and Greenbush.

The thirteen platform tracks at South Station are currently operating at or near capacity. South Station is unable to handle the additional service that is set forward in the recent Northeast Corridor Infrastructure Master Plan (NEC Master Plan). The NEC Master Plan calls for an increase in service of 50 percent in both high-speed express service and cumulative intercity passenger service to Boston.

In order to handle the expected service increases by both Amtrak and the MBTA Commuter Rail, it is proposed that South Station be expanded to 20 total tracks. In order to achieve this goal, the current United States Postal Service general mail facility will be relocated to a new location in South Boston. This expansion will help foster the growth in high-speed and other intercity service throughout the Northeast as well as improve service to the southern communities along the MBTA Commuter Rail line. The improvement in South Station would not only benefit Boston but would benefit the entire northeast.

The benefits of an expanded South Station include improvements for on-time performance and additional high-speed intercity service. With the system currently at operating capacity, constraints that influence on-time performance include terminal congestion, approach interlocking and traction power issues. Without the expansion, on-time performance will continue to be an issue.

The expansion will also facilitate potential new passenger service along the Boston to New York corridor along the Inland Route. This is a designated HSIPR corridor and would both serve new markets and relieve capacity constraints on the main line between Boston, Providence and New Haven. The proposed Inland Route would service metropolitan areas of Worcester and Springfield, MA and New Haven, CT.

In addition to the benefits to the intercity service, the expansion would also allow for a planned expansion of the MBTA Commuter Rail service that predicts growth on nearly all of the lines connecting to South Station.

5.6.2 North Station

Boston's North Station is a rail terminal for intercity rail, commuter rail, rail rapid transit as well as local bus connections. It is the southern terminus for Amtrak's Downeaster service connecting to Portland, Maine. It is the Boston terminus of the MBTA North Side commuter rail operations to Fitchburg, Lowell, Haverhill, and Rockport/Newburyport. North Station also includes a station on the Green and Orange lines of the MBTA rapid transit system as well as MBTA local bus route 4.

5.6.3 Back Bay Station

Back Bay Station is a train station located in Boston's Back Bay neighborhood with commuter rail, high-speed intercity rail, rapid transit and local bus connections. Similar to South Station, it is a stop along Amtrak's Northeast Corridor and Lake Shore Limited service as well as the Worcester, Needham, Franklin, and Providence/Stoughton MBTA commuter rail lines. It provides a station on Orange Line of the MBTA rapid transit system. Local bus service accommodated at Back Bay Station includes MBTA routes 10, 37, and 170.

5.6.4 Route 128 Southside Station

The Route 128 station is located in Westwood adjacent to Route 128/Interstate 95. It is able to handle a high volume of commuter rail and intercity rail as it has significant parking facilities. It is a stop along Amtrak's Northeast Corridor (including the Acela Express service). It also provides a station stop on the Providence/Stoughton MBTA commuter rail line and has day and overnight parking facilities.

5.6.5 Anderson Regional Transportation Center

This train station is located in Woburn, and provides commuter rail, intercity rail, and parking facilities near I-93 and I-95, north of Boston. It is a stop along Amtrak's Downeaster service to Portland, Maine. It also provides a station stop on the Lowell MBTA commuter rail line with connections to North Station. The station also provides bus connections to Logan Airport in Boston and Manchester Airport in New Hampshire with automobile and bicycle parking lots.

5.6.6 Worcester Union Station

Located in downtown Worcester, this station provides intercity rail and bus, commuter rail, and local bus connections. The station is the western end of the Worcester/Framingham MBTA commuter rail line with service into South Station in Boston. It is a stop on the Lake Shore Limited Amtrak intercity rail service connecting Boston to Chicago. It also provides connections to Peter Pan and Greyhound intercity bus travel as well as local bus service with the Worcester Regional Transit Authority.

5.6.7 Springfield Union Station

Springfield's Union Station is located on the east-west line of CSX. It is immediately east of the north-south line of Amtrak going south to New Haven, and PAS Conn River Line continuing north. It is one of two Massachusetts train stations along Amtrak's north-south Vermonter route (Amherst is the other). It serves as the northern terminus of Northeast Regional service connecting to Virginia and the New Haven-Springfield shuttle train service. Combined, there are eight trains a day traveling south from Springfield to New Haven. It is also a stop on the east-west Lake Shore Limited Amtrak service. Most of the original Union Station facility is closed. Limited station facilities are operated by Amtrak. A recent redevelopment plan for the station proposes to restore the station and integrate bus services directly at Union Station

Connecticut's planned commuter rail service would use Springfield as the northern terminus connecting to Hartford, New Haven and stations in between. Intercity and local bus service connections are located within walking distance at the Springfield Bus Terminal on Main Street.

5.7 Passenger Rail System Constraints, Issues, and Bottlenecks

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

5.7.1 MBTA Fiscal Conditions

In 1999, the Massachusetts Legislature and Governor made a decision to pursue legislation that would enable the MBTA to become self-sufficient beginning in fiscal year 2001 using an identifiable revenue stream. To accomplish this goal, Massachusetts guaranteed that 20 percent of the Commonwealth's sales tax collections (exclusive of meals taxes) would be allocated to MBTA operations.

This legislation, known as Forward Funding, required that the MBTA develop a finance plan that set revenue and expenditure benchmarks for fiscal years 2001 through 2008. In addition, the finance plan called for the MBTA to:

- Decrease operating costs 2 percent per year from FY01 through FY06;
- Balance each year's budget;
- Meet cash flow needs without short-term debt by building working capital reserves from $64-$100- million; and
- Decrease long-term debt by generating cash surpluses worth 5-10 percent of gross revenues that would fund capital investment.

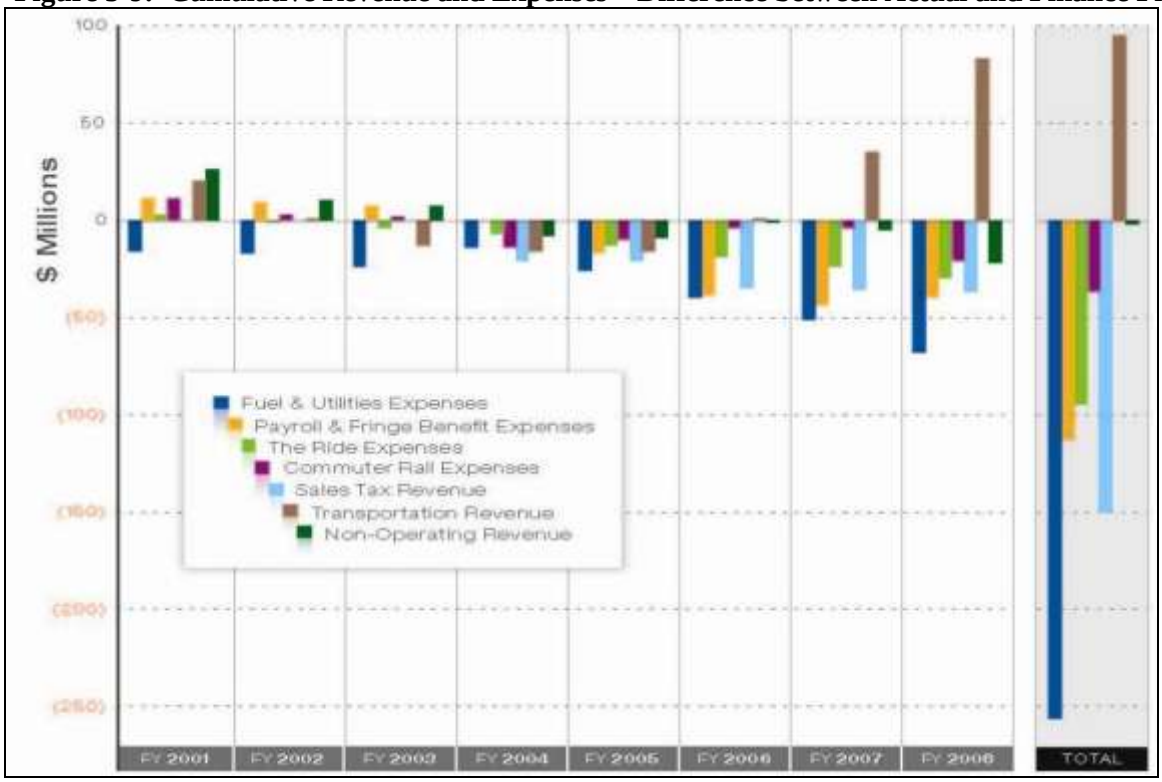
Unfortunately, the Forward Funding legislation proved problematic in many of its requirements.[26] The Finance Plan called for a two percent annual decrease in operating costs between FY01 and FY06. Not only was this not achieved, cumulative costs grew $558

[26] MBTA Review, by David F. D'Alessandro, Paul D. Romary, Lisa J. Scannell, Bryan Woliner, November 2009.

million above projections by FY08. Instead of the 2 percent annual decrease, operating costs grew an average of 5 percent higher each year or by a cumulative 35 percent.

According to the MBTA Review completed in November 2009, MBTA operating costs have exceeded Finance Plan projections by $500 million between FY01 and FY08 for the cost centers evaluated in the study. Revenues from all sources underperformed Finance Plan expectations by $58 million. The combined effect has produced a cumulative variance of $558 million against the Finance Plan for Forward Funding's first eight years, as shown in Figure 5-9. Fuel and utilities expenses were the most significantly different, $256 million more than expected. Sales tax revenue also fell short of projections by $150 million.

Figure 5-9: Cumulative Revenue and Expenses – Difference between Actual and Finance Plan



Source: MBTA Review, by David F. D'Alessandro, Paul D. Romary, Lisa J. Scannell, Bryan Woliner November 2009.

5.7.2 Congestion

Congestion on Massachusetts' roadways has grown substantially in the past several decades, leading to demands for improved public transit services. MBTA's commuter rail network has continued to grow, add services and increase mobility options for commuters heading into the core of the metropolitan area. Ridership on both the MBTA's commuter rail and transit networks also enjoyed significant growth. In spite of his growth, roadway congestion has continued to increase. Regional congestion in the I-95 corridor has also increased, and Amtrak has seen annual growth of ridership on both its Acela and Northeast Regional services.

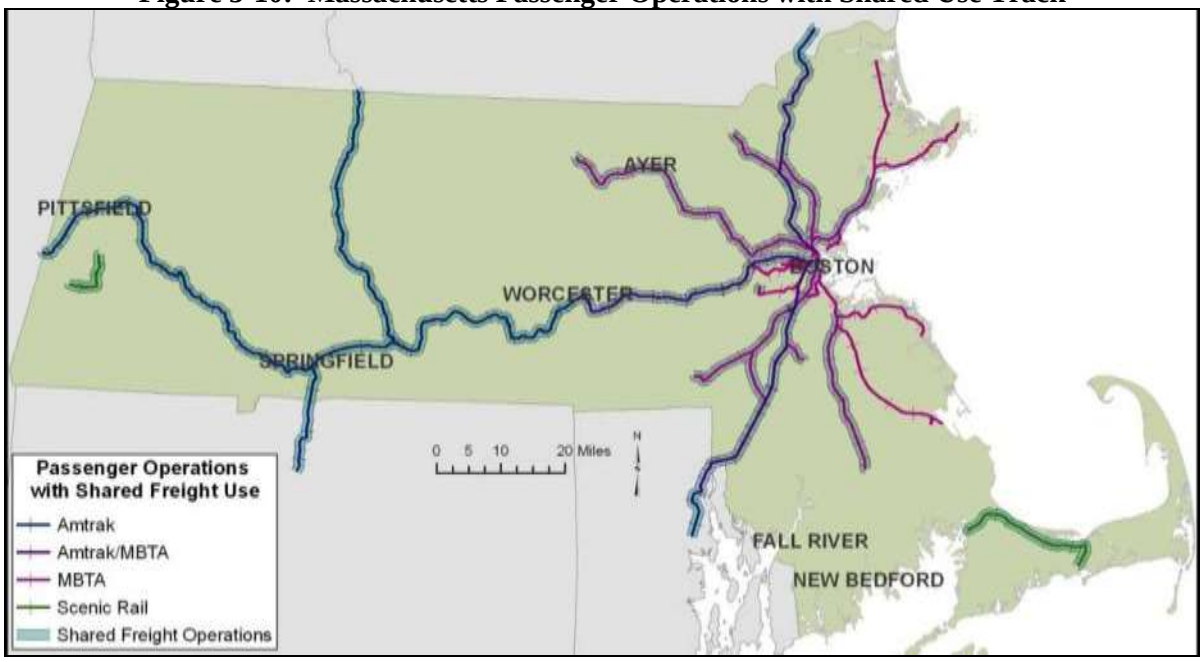
5.7.3 Capacity

Massachusetts, like most other states along the East Coast, faces rail system capacity constraints in some critical areas that can impact train schedule reliability as well as the ability to expand operations. In some cases, railroad ROW is constrained by dense urban development and the challenges of expanding rail in or near existing residential areas. For example, South Station in Boston is currently constrained by land use and existing buildings such that plans for expanded Amtrak and MBTA services could be limited. An example of a long-time issue that is currently being addressed is the MBTA Fitchburg line that is being improved with double-track capacity and improved signals for faster service with fewer freight rail conflicts. Another specific capacity challenge is the east-west CSX Main Line between Springfield and Worcester. It is a shared use rail corridor with the heaviest freight rail volumes in the state that also carries the Lake Shore Limited Amtrak service along a single rail track. The capacity of the CSX line from Worcester to Springfield must be evaluated in the context of plans to expand freight rail on the corridor, consistent with the CSX Transaction to double-stack the corridor, and improve passenger rail on the Inland Route.

5.7.4 Shared Use

One of the important elements of the Commonwealth's rail network is the extent to which the network is shared by passenger and freight rail operators. The operating relationships between railroads are managed by Inter-Carrier or Joint Facility Agreements. A complete discussion of this issue and shared trackage generally was provided in Chapter 4, Freight Rail System Inventory. The constraints caused by shared use of rail lines will become even more important in the future, as the MBTA continues to acquire, develop and operate existing freight rail lines for commuter rail service. Figure 5-10 below shows the passenger operations with shared use track in Massachusetts.

Figure 5-10: Massachusetts Passenger Operations with Shared Use Track



Source: MassGIS, with project team inputs

The rail system in Massachusetts is also physically constrained by adjacent land use, structure clearances (both horizontal and vertical), and track geometry that is controlled by natural features such as rivers, streams, and geologic formations. These constraints restrict the ability to add capacity by double tracking or increase the number and locations of passing sidings. Freight operations are significantly different from passenger operations, and this challenge is exacerbated by single track routes.

The MBTA has developed effective methods to accommodate most freight demand on their system, but as needs and methods of freight service change, these conflicts develop in new locations. Effective communications are critical in dealing with the daily operational challenges, and capital investment is essential to provide the long range solution to these problems. Developing technology has enabled better utilization of railroad assets; however, physical improvements are still required to address the need to accommodate increased demand for freight and passenger mobility.

5.7.5 Infrastructure

Rail Safety and Security is contingent on its infrastructure. Many safety hazards are caused by deferred maintenance of rail components and human error in railroad operations and inspections. The pertinent infrastructure issues facing the MBTA and Amtrak include positive train control, state of good repair and parking.

5.7.5.1 Positive Train Control (PTC)

In 2008, Congress enacted the Passenger Rail Investment and Improvement Act (PRIIA). The legislation includes a mandate (Safety Improvement Act of 2008) that requires each

Class I railroad carrier and each entity providing regularly scheduled commuter rail and intercity passenger transportation, within 18 months after enactment (April 1, 2010), to develop and submit a plan for implementing a Positive Train Control (PTC) system by December 31, 2015.

By definition, PTC is a train control system with the capability to positively enforce train movement authorities. This system helps prevent accidents that are caused by the "human factor" mistake. The system is meant to automatically prevent train-to-train collisions, over-speed derailments, incursions into established work-zone limits, and a train from incorrectly diverting onto another set of tracks through a switch left in a wrong position.

PTC must be installed on all main lines with passenger and commuter operations, as well as those over which toxic-by-inhalation hazardous materials (TIH) are transported. Significant capital costs are anticipated with the development and implementation of PTC, as well as ongoing operating expenses.

The FRA must review and approve or deny the railroads' required plans for implementation of PTC systems. No railroad carrier will be permitted to begin the implementation of their plan before getting approval from the Secretary of Transportation. Rail lines where a PTC system must be implemented are those main lines where intercity or commuter rail passenger service is regularly provided.

In the Commonwealth, due to extensive shared use of rail lines between passenger and freight railroads, PTC will introduce many challenges for the railroad entities. Most notably, the MBTA shares trackage with PAR and CSX, while Amtrak shares trackage with CSX, NECR and CSO. The East Brookfield and Spencer Terminal Railroad currently operate onto controlled siding to interchange cars, Even though they do not run onto the main line, the controlled sidings are included in the FRA ruling. Because of the inaction of freight and passenger operations, the only freight carriers in Massachusetts that will not be impacted by the FRA ruling due to shared passenger operations are PVRR, GURR, and MCER.

Industry and government projections indicate that passenger and freight traffic will continue to increase over the next several decades and will require planning and investments in transportation infrastructure to address future capacity constraints simply to maintain the current levels of service. PTC offers the potential for some relief, however there will need to be substantive efforts undertaken by both the passenger and freight railroads to respond to this federal mandate.

5.7.5.2 Northeast Corridor (NEC) and NEC Infrastructure and Operations Advisory Commission

The NEC Main Line from Boston to New York to Washington, D.C. is the most heavily used rail corridor in North America. In addition to service within the region, the NEC provides connectivity to the national passenger and freight network. The corridor supports intercity rail service and hosts commuter rail services in each major city along the route. The corridor

provides a competitive travel alternative to the region's overburdened airports and air corridors, as well as the congested highway system.

Amtrak's NEC routes now handle 54 percent of the New York to Washington air-rail travel market and 39 percent of the New York to Boston air-rail travel market. A significant reason for this strong market share is the connectivity to other modes. The NEC states have made many significant investments in rail infrastructure and supporting intermodal services. That investment has enabled the main stem of the corridor to benefit from the multiple feeder services supported by the states. These feeder services and connections to the corridor are essential to providing the critical mass of users essential to its continued success.

The US DOT's vision for high-speed rail in America (Figure 5-11) includes enhancements to the NEC as well as incremental steps to implement the northern New England high-speed rail network that will ultimately connect Boston, Springfield, and Portland with Montreal. High-speed rail has the potential to promote economic expansion, support new manufacturing jobs, create new choices for travelers other than flying or driving, reduce national dependence on oil, and foster urban and rural community development. High-speed rail is also considered a "Green Technology." Today's intercity passenger rail service consumes one third less energy per passenger mile than automobiles. It is estimated that if the high-speed rail lines on all federally designated corridors were established, it could result in an annual reduction of 6 billion pounds of CO_2.

Figure 5-11: Vision for High-Speed Rail in America

Source: Federal Railroad Administration (FRA) web site

According to FRA studies, approximately 11 percent of air travelers would change to high-speed rail, alleviating airport congestion.

The NEC hosts a complex and unprecedented mix of high-speed rail, intercity rail, commuter rail, and freight service. Capital investment to date has been insufficient to maintain the infrastructure in a state of good repair, much less provide additional capacity. As a result, the condition of key elements of the network is inadequate. Although states and railroads throughout the Northeast are calling for greatly expanded rail services, the NEC is not poised to accommodate future growth. Substantial investment is needed to ensure a vigorous future for the corridor.

Massachusetts has a vital interest in the NEC, as both the owner of the property and a user. As such, the Commonwealth will take an active role in the recently created Northeast Corridor Infrastructure and Operations Advisory Commission. Established by Congress in PRIIA, this commission will include members from each of the corridor states (MA, RI, CT, NY, PA, DE, MD, and the District of Columbia). Members from the states are appointed by the governor of each state. The commission will also include representatives of Amtrak, the US DOT (including the FRA), and non-voting representatives of freight railroads with operations on the corridor.

The role of the commission is to promote cooperation and planning pertaining to the rail operations and related activities of the NEC and to develop and transmit to Congress a statement of goals concerning the future of the corridor rail infrastructure and operations.

Of significance to the region and the Commonwealth, the commission also will work to develop a standardized formula for determining and allocating costs, revenues, and compensation for NEC commuter rail passenger transportation that uses Amtrak facilities or services or provides facilities and services to Amtrak. It will develop a proposed timetable for implementing the formula and transmitting the timetable to the Surface Transportation Board (STB). Should the parties fail to implement new agreements based on the formula, the STB will determine the appropriate compensation and enforce the determination.

This last issue is of major importance to Massachusetts, since the ownership of the corridor is held by the Commonwealth through the MBTA and therefore no cost allocation formula should apply for MBTA's use of its own property. Massachusetts will need to take an active role in these discussions to protect its interests.

5.7.5.3 Parking

One of the most critical aspects of successful commuter rail service is the provision of adequate, convenient, and cost-effective parking. At the same time that smart growth and sustainable development proponents would like to see more residential and commercial development within walking distance of train stations, the reality is that passenger rail ridership is also a direct function of having sufficient on-site and nearby parking. This issue

is most notable within the MBTA commuter rail system as many stations in the suburbs of metropolitan Boston are either partially or primarily park-and-ride stations as commuters drive from home to the station to catch a train into the urban core.

Consistent with this issue, the MBTA commissioned the Central Transportation Planning Staff (CTPS) to complete a study and forecast of constrained and unconstrained parking at commuter rail and rapid transit stations throughout the system. The study then estimated the ridership implications of these parking conditions with findings that constrained parking based on existing conditions do lead to less ridership in some cases, and sub-optimal transit trips in other cases as riders seek less convenient locations but with adequate parking. The results of this work are in a December 2008 report titled "Projections of Parking Demand, Kiss-and-Ride Passengers, and Ridership for MBTA Commuter Boat, Express Bus, Commuter Rail, and Rapid Transit Services." Detailed findings from this study are used as inputs to a passenger rail investment analysis in Chapter 8 that evaluated the benefits of expanding parking for commuter rail.

5.7.5.4 Potential Passenger Train Layover Facilities

In order to address functional and operational needs for operation of the MBTA system, additional passenger train layover facilities or expansion of existing facilities will be required. The primary objective is to provide for layover facilities at the end of a line. This provides overnight layover of trains at the point were revenue service starts and ends each day. Having the trains at this point eliminates the additional cost of operating trains in non-revenue service to and from layover facilities. The need for layover facilities is evaluated as part of ongoing operational assessments and as a component of specific rail projects. Specific MBTA projects that will need to determine layover facility operations include South Coast Rail and the CSX/MassDOT Transaction.

5.8 Passenger Rail Planning Efforts in Massachusetts

Currently, there are a number of ongoing planning efforts for improving the passenger rail systems for the Commonwealth including those in the MBTA's Program for Mass Transit (PMT). Rail Projects in the MBTA's PMT have not been repeated here but are understood to be included in the Rail Plan by extension. The planning effort for this study identified a number of potential services which planning may begin in the future including Berkshire Passenger Rail Service, Rail Service to Cape Cod, and Worcester to Providence Service.

Notable ongoing planning efforts for improving high speed and intercity passenger rail include the following.

5.8.1 Inland Route New Haven – Hartford – Springfield & Springfield – Worcester – Boston and Boston to Montreal

Inland Route/Knowledge Corridor Montreal Study – Massachusetts and Vermont are using Federal Railroad Administration Planning grants to develop High Speed and Intercity Passenger service along two routes from Boston to New Haven via Springfield and from Boston to Montreal. This study would identify a set of improvements necessary to operate

high-speed passenger rail service along the route. The preferred improvements would be determined based on identified corridor constraints, economic development opportunities and estimated ridership. Completing this plan will then allow the identified improvement projects to compete for future rounds of federal funding. It is expected that this planning feasibility study will be initiated in the second half of 2010.

The Inland Route Double Track Restoration Project is an example of a state level effort that has regional implications beyond the borders of Massachusetts. The project would restore capacity to this critical 98-mile route and reconnect Boston, Worcester, and Springfield with significantly improved passenger rail services while concurrently enhancing freight service. As currently planned, the project would be an incremental step to implementing high-speed passenger rail within the federally designated Northern New England High Speed Rail Corridor. The Commonwealth recognizes that freight service will remain a priority on the route, and the cooperation of the freight carrier will be critical to the success of the program.

5.8.2 Northeast Corridor (NEC) Multi-Modal High Speed Rail Improvement Plan

In May 2010, Massachusetts along with the Northeast states from Maine to Maryland, submitted a multi-state proposal requesting that the FRA lead a planning effort to further define the role that intercity and high-speed passenger rail in the northeast. Specific elements of the request was to assess how improved passenger rail service can play in helping to improve the region's transportation network, expand capacity, relieve highway and aviation congestion, and stimulate sustainable economic growth along the Northeast Corridor (NEC). The submittal includes identification of strong support from Amtrak and the Coalition of Northeastern Governors (CONEG).

The study will build off the successful three-year collaboration among twelve states – including the Northeast states mentioned above and Virginia – Amtrak, and commuter and freight railroads to produce the Northeast Corridor Infrastructure Master Plan, which was completed in May 2010.

The proposed study will document capacity constraints across the entire transportation system in the Northeast from Maine to Maryland through 2050, including highways and airports. The scope of the study is designed to: identify projects contained in the Master Plan that are ready to move forward in the short to medium term; perform a multi-modal systems analysis; develop a preferred rail configuration plan; and lead to a revised Programmatic Environmental Impact Statement (PEIS) for the NEC Main Line from Washington to Boston. The last PEIS was done in the late 1970s.

5.8.3 New Hampshire Capital Corridor Study

With the strong support of New Hampshire Governor John Lynch, the New Hampshire Rail Transportation Authority is engaged in an active planning effort to develop the Capitol Corridor. This initiative would extend the existing MBTA Lowell Line commuter rail service into New Hampshire, at least as far as Manchester, and perhaps as far as Concord. To meet this objective, the Rail Authority has been in discussions with the MBTA, which owns the

Lowell Line as far as the New Hampshire state line, and with PAR, the owner of the rail line in New Hampshire.

When this service last ran from 1980 to 1981, the service did extend to Concord, with intermediate station stops in Manchester, Merrimack and Nashua. New Hampshire recently submitted a planning grant application to the FRA with the expectation that they will receive federal funding to help complete a detailed engineering, environmental, and ridership feasibility study of this proposed rail corridor.

5.8.4 South County Rhode Island Service through the Pilgrim Partnership

The Rhode Island Department of Transportation (RIDOT) is studying the restoration of commuter service as far as Westerly, on the Connecticut-Rhode Island border almost 90 miles from Boston. Commuter rail service from Boston to Westerly was last operated in the late 1970s.

5.8.5 The Downeaster Planning Study

The Northern New England Passenger Rail Authority, sponsor of the Amtrak-operated Downeaster intercity rail service between Boston and Portland, Maine, has plans to increase its service from five to seven daily roundtrips. An award from the FRA HSIPR stimulus grant program will enable expansion of the Downeaster service to the northeast along the Maine coast to Brunswick by 2013. Downeaster Corridor Improvements Program that targets reduced transit time between Boston and Portland, from the current 2 hours 25 minutes to approximately 2 hours. Further expansion of the Downeaster service to the north is also planned that will enhance the capability of the service to meet the mobility needs of residents and tourists throughout the region.

5.8.6 North South Rail Link

MassDOT has resubmitted a previous request for 100 percent federal funds to advance the environmental and engineering for this complex project.

Chapter 6 Rail Safety and Security

In order to achieve success and efficiency, the rail transportation system in Massachusetts needs to address both personal safety and infrastructure security. One of the primary goals of the Rail Plan is to provide MassDOT with an understanding of the important safety and security issues facing the rail transportation system.

6.1 Federal and State Roles

The primary government agency charged with the responsibility for regulating, monitoring and improving safety on the nation's rail system is the FRA. Legal considerations of rail safety and security in Massachusetts and the United States, for that matter, are regulated by the FRA. Post September 11, 2001, however, the United States Department of Homeland Security (DHS) and the Transportation Security Administration (TSA) have been assigned oversight of aspects of both passenger and freight rail operations.

In 1970, Congress determined that there was a need for further legislation to improve the safety of the nation's railroads, and they enacted the Federal Railroad Safety Act of 1970. The bill gave FRA specific authority over all rail safety related matters and authorized the FRA to establish civil penalties for violations of the regulations issued under the Act. The passage of the 1970 Act provided the railroad safety program with a new and fundamentally different charter, which included:

- Broad regulatory authority to address all areas of railroad safety;
- Strong emphasis on national uniformity of safety standards;
- Effective sanctions, including the ability to address emergency situations; and
- State participation in enforcement of national standards.

Subsequent legislation passed during recent years has increased the FRA's regulatory authority. Notable related changes have been associated with limits for hours of service of employees operating trains and maintain signal systems.

Federal regulations pertaining to railroad safety are described in Title 49 CFR, Subtitle B, Chapter II. Railroad companies must submit a record of all highway-rail grade crossing accidents to the FRA within 30 days of occurrence, as required in 49 CFR, Part 225. All Highway-rail grade crossing accidents must be reported by the railroad. If death or injury from such an accident does occur, then the accident must be filed on Form FRA F 6180.55a.

The FRA regulates grade crossing signal system safety in 49 CFR, Part 234. This part prescribes minimum maintenance, inspection, and testing standards for warning systems at highway-rail grade crossings, and it defines standards for reporting and taking action on system failures.

The FRA also requires railroads to conduct periodic inspections of track in as stipulated in the Track Safety Standards of 49 CFR Part 213. The railroads must use qualified inspectors

and maintain records for FRA review. FRA inspectors will also perform independent inspections. This same procedure applies to railroad structures, such as bridges, as well.

During the past several years, there have been a number of new regulatory requirements and initiatives enacted by FRA and required by the Rail Safety Improvement Act of 2008.The new FRA regulations focus on human factors in rail safety. They include stringent requirements for the testing and inspecting of the performance of railroad operating crews and for better training and qualification of the supervisors conducting the testing and inspection programs.

The new rail safety law establishes a number of new safety initiatives and required programs, which include a timeline for their implementation. Some of the principal elements of the new law include:

- Positive Train Control, a collision avoidance system;
- Performance monitoring requirements;
- Railroad safety risk reduction program; and
- Grade crossing safety.

All of these required programs apply to Amtrak passenger rail service in Massachusetts and will have to be developed and implemented according to the timeline specified in the safety law. One mandate is the implementation of Positive Train Control (PTC) that must be implemented by 2015 by intercity and commuter railroads that operate over freight main lines that transport certain hazardous materials.

Some of the safety and security challenges are common to both passenger and freight modes, while others are unique to specific rail operations. A number of challenges center on securing passenger operations, improving the rail system, and fortifying rail security. Open access to rail lines and rail stations, as well as the high levels of mass transit ridership make railroads more difficult to secure than airports. The challenges faced by both modes are described in the section immediately below, while the issues specific to passenger and freight rail are outlined separately later in the chapter.

6.2 Safety and Security Issues Common to Both Passenger and Freight Rail

6.2.1 Highway-Rail Grade Crossing Safety

At intersections with at-grade crossings of highway and rail modes of transportation, the issue of safety is paramount. 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. Crossing accidents put the safety of many people at risk, including vehicle occupants, as well as passengers and train crews.

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. It has been the policy of Massachusetts to reduce, wherever possible, the number of highway-railroad grade crossings on public thoroughfares. Dozens of highway-railroad grade crossings have been permanently closed under this initiative.

It is important to note that the Northeast Corridor rail line between Boston and the Massachusetts-Rhode Island border, over which Amtrak operates the vast majority of its service in the Commonwealth, does not have any grade crossings. This removes a significant safety issue from the Amtrak services that the MBTA must deal with on a daily basis.

The MBTA system, which, at nearly 400 route miles and nearly 500 daily trains, makes it one of America's largest systems, is an "open" system: the tracks are not fenced, the stations are barrier-free and there are a large number of highway-rail at-grade crossings. Consequently, the two most frequent types of accidents involving MBTA commuter trains are grade crossing collisions with motor vehicles and trespassers on the tracks being struck by a train. On average, there are at least one to two grade crossing incidents/trespasser strikes a month, with the trespasser incidents frequently resulting in a fatality.

As of 2008, the FRA reported 1,359 highway-rail grade crossings in Massachusetts, of which 837 were active grade crossings located at public roads, as shown below in Table 6-1. Of the active crossings, 111 utilize only cross buck signs as protection devices. All other known locations use active warning devices (e.g., lights, bells or gates). Although there has been significant progress over the past 30 years in upgrading the level of warning devices at the state's public grade crossings, these systems need to be maintained. 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.

Table 6-1: Warning Devices at Public Highway-Rail Grade Crossings in Massachusetts, 2008

Warning Device	Total	Percent of Total %
Gates and Flashing Lights	321	38.4
Flashing Lights	283	33.8
Crossbucks	111	13.3
Stop Signs	8	1.0
Unknown	36	4.3
Special Warning	61	7.3
Bells only	14	1.7
Other	3	0.4
TOTAL:	837	

Source: U.S Department of Transportation, Federal Railroad Administration (FRA), Railroad Safety Statistics, 2008 Preliminary Annual Report (Data as of February 2010), Table 9-4.

Table 6-2 shows that from 2004 to 2008, there have been a total of 49 incidents at public highway-rail crossings and 8 incidents at private highway-rail crossings in Massachusetts, of which 7 were fatal. According to Massachusetts Operation Lifesaver, Inc. (OLI), although railroad traffic in the Commonwealth of Massachusetts has been increasing in recent years, casualties associated with crashes at crossings remains low. However, the number of casualties associated with trespassing, while small, is high based on the miles of rail lines in the Commonwealth.

Table 6-2: Total Highway-Rail Crossing Incidents

Year	At Public Crossing	At Private Crossing
2004	15	3
2005	10	1
2006	10	1
2007	7	2
2008	7	1
Total Fatal:	6	1
Total Nonfatal:	45	3
TOTAL:	**49**	**8**

Source: US Department of Transportation, Federal Railroad Administration (FRA), Railroad Safety Statistics, 2008 Preliminary Annual Report (Data as of February 2010), Table 1-12.

6.2.2 Performance Monitoring

Long-term safety success requires continual performance monitoring and the thorough documentation of accidents. It is important that railroad operators maintain comprehensive statistics, so that patterns can be evaluated and corrective actions taken. It is also important

to investigate accidents to collect and analyze data to identify an accident's probable cause and contributing factors.

Accident investigations by safety professionals are focused on preventability, not fault or liability. These investigations offer a window into the providers' operating practices and adherence to stated policies and procedures. They supply the knowledge needed to modify or reinforce procedures. Aggregate investigation data can identify industry-wide issues and trends.

The MBTA is the largest contract-operated commuter rail system in America. Safe operation of the trains, as well as the safety of passengers and employees using the system and working in the system, is the primary responsibility of MBCR. Since May of 2007, MBCR's 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 MBCR's 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 MBCR is also performed by the MBTA's Safety and Railroad Operations Departments, and an external audit of MBCR's safety management program was conducted by auditors from the American Public Transportation Association (APTA) in March of 2009.

6.3 Safety and Security of Freight Rail

In addition to the safety and security issues described previously, freight railroads have additional security concerns. Following the events of September 11, 2001, the AAR established a Railroad Security Task Force. That task force produced the "Terrorism Risk Analysis and Security Management Plan" designed to enhance freight rail security. The plan remains in effect today.

As a result of the plan, freight railroads enacted more than 50 permanent security-enhancing countermeasures. Communication among security officials, law enforcement and the railroads is critical to ensuring secure operations in Massachusetts' rail transportation system. The AAR and the American Short line and Regional Railroad Association (ASLRRA), as well as their member railroads, work cooperatively with TSA in implementing a range of safety, security and communications procedures. The details of these programs are subject to security controls and are not generally available to the public.

6.3.1 Hazardous Materials

Railroads are required to comply with federal and state 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

Secretary of Transportation, the FRA administers a safety program that oversees the movement of hazardous materials, including dangerous goods such as petroleum, chemical, and nuclear products, throughout the nation's rail transportation system. FRA's role in the safety program also extends to shipments transported to and from international organizations. The FRA also has authority to oversee the movement of a package marked as hazardous, to indicate compliance with a federal or international hazardous materials standard, even if such a package does not contain a hazardous material.

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.

On November 26, 2008, TSA and DHS published a new final rule applying to the transportation of certain kinds of highly hazardous materials.[27] On that same day, a US DOT rulemaking was finalized that applies to railroad carriers, focusing primarily on routing and storage in transit.[28]

The freight rail provisions of the TSA rule address the transport of security-sensitive materials by rail from start to finish, including shipment handoffs, secure areas for transfers, and the reporting of shipment locations to TSA. The designation of rail security coordinators for passenger and freight rail carriers also is mandated by the Rail Security final rule, and all significant security concerns must be reported to the TSA. The rule also codifies TSA's broad inspection authority.

Requirements preventing hazardous material transport through certain cities may result in network congestion and increase the length of haul for these substances. This could increase operating costs, reduce operating efficiency, and result in a greater risk of an accident involving hazardous material transportation. Application of these rules is under consideration and may affect most freight routes. The impact to Massachusetts rail railroads will be identified as the rules are implemented. Noncompliance with these new rules may result in significant penalties to the noncompliant entity and may be a factor in litigation that results from a train accident.

[27] http://edocket.access.gpo.gov/2008/pdf/E8-27287.pdf
[28] http://edocket.access.gpo.gov/2008/pdf/E8-27826.pdf

6.4 Safety and Security of Passenger Rail

Throughout their more than 150-year history, passenger trains have been considered to be one of the safer modes of transportation available to travelers. While that continues to be true in the United States today, it is the ongoing obligation of every railroad, transportation agency and/or other entity engaged in and/or responsible for providing any type of passenger rail service to implement a wide array of safety plans and programs, as well as to comply with all safety regulations that govern the railroad industry.

During the past several years, there have been a number of new regulatory requirements and initiatives established by FRA and required through the new omnibus rail safety law, PRIIA, which went into effect on October 16, 2008. The new FRA regulations focus on human factors in rail safety and provide for more stringent requirements for the testing and inspecting of the performance of railroad operating crews and for better training and qualification of the supervisors conducting the testing and inspection programs.

The new rail safety law establishes a number of new safety initiatives and required programs and includes a timeline for their implementation. Some of the principal elements of the new law include:

- Performance Monitoring Requirements;
- Grade Crossing Safety; and
- Railroad safety risk reduction program.

All of these required programs apply to both Amtrak and the MBTA commuter rail system and will have to be developed and implemented by the MBTA and by MBCR in a timely manner.

Amtrak has in-place a range of security measures aimed at improving passenger rail security, some of which are conducted on an unpredictable or random basis. The following security measures may be conducted in stations or on board trains:

- Uniformed police officers or Mobile Security Teams;
- Random passenger and carry-on baggage screening;
- K-9 Units;
- Checked baggage screening;
- On-board security checks; and
- Identification checks.

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.

6.4.1 Rail Openness and Trespassing

One of the safety and security concerns of the MBTA and Amtrak is related to the fact that both systems are "open" and trespassers can be anywhere on the system at any time. There is very little of the railroad ROW that is fenced, and all stations are barrier-free. Trespassers are an ongoing problem for Amtrak, as they are for the MBTA. The problem of trespassers on railroad tracks while trains are operating can have severe consequences for the trespassers, as Amtrak's trains operate at a maximum speed of 150 miles per hour in the Commonwealth, and MBTA trains run at a maximum speed of 80 miles per hour. In an effort to respond to these safety concerns, MBTA, MBCR and Amtrak are all engaged in the national Operation Lifesaver program that promotes safety on and around railroad property.

The openness of the rail system in Massachusetts presents many security concerns, in addition to the safety ones described above. One of the issues is due to the fact that rail facilities, passenger rail stations and passenger rail equipment not in operation can be vandalized. While damage and graffiti left by vandals does not present as great a problem for commuter rail and for Amtrak as it does for the MBTA's subway and bus systems, nevertheless, these are persistent issues that must be continually confronted.

An example of vandalism and theft includes the theft of signal line wire. Railroad communications systems and components of the signaling system which control railroad operations are frequently contained in telephone-like line wire systems running alongside the tracks. These line wires are made of copper and have been the target of thieves. As the price of copper rises, as it has over the past several years, the incidents of line wire thefts can rise dramatically. Combating this problem requires significant effort from railroad police forces. This is a nationwide problem, and the Federal Bureau of Investigation (FBI) and state police forces are in the process of forming task forces to address this problem and reduce the number of line wire thefts. Amtrak is heavily involved in this initiative. In the long term, however, railroads are replacing these communications and signaling systems with wireless systems and with circuitry that runs through the railroad track.

Another security issue includes the break-ins that occur to passengers' automobiles at railroad station parking lots. It is a greater problem for the MBTA than it is for Amtrak, as Amtrak's responsibility of stations only includes a part of the enclosed, secured parking structure at the Route 128 station in Westwood which has both Amtrak and MBTA trains serving it. The MBTA, on the other hand, has 133 stations, mostly unattended and unsecured, where commuters can park, and it is well known that the preponderance of these automobiles will be left in these parking lots for at least six to eight hours or more. MBTA and local police have cooperated to address this problem.

6.4.2 Safety Assessment Interviews

A series of interviews with the several key railroad and federal officials were conducted during the course of this study. These interviews are the primary basis for the safety assessment. The following individuals were interviewed:

- The Assistant Federal Security Director for the New England region for TSA;
- The Director of Safety for MBTA;
- The Chief of Police for the MBTA;
- The Chief Transportation Officer for Railroad Operations for the MBTA;
- The Deputy Chief of Police for Amtrak for the New England/New York region; and
- The Manager of Safety for MBCR.

The findings from these interviews are summarized below.

6.4.2.1 Summary of Interviews

The MBTA commuter rail system is the fifth largest in the United States, based on the number of passengers carried. Commuter rail operations in the Commonwealth exist in the Boston area, primarily within the I-495 belt. The MBTA has contracted with MBCR to operate the commuter rail system. The system is the largest privately operated service in the country and is subject to the terms and conditions of a voluminous, detailed contract known as an operating agreement. It is the responsibility of MBCR to operate the MBTA service in compliance with all of the numerous safety and performance requirements contained in this operating agreement. In addition, the MBTA commuter rail system falls under the jurisdiction of the FRA, so all of the federal regulations governing the operation and the maintenance of passenger trains apply to MBCR's efforts.

The MBTA Police Department, which has jurisdiction throughout the commuter rail system, works very closely with local police departments in the various cities and towns to try to reduce train-related accidents/incidents and to assure expeditious response in the event of a train-related accident/incident. While the MBTA has a 277-officer police force, which also has responsibility for the MBTA subway, light rail and bus systems in addition to commuter rail, Amtrak has a relatively small contingent of police officers in Massachusetts. As a result, the need for Amtrak to work closely with and get cooperation from local police forces around the Commonwealth is even more pronounced than it is with the MBTA.

MBTA did have a policy in years past to furnish fencing to communities that requested it to fence areas adjacent to the railroad where heavy pedestrian traffic had been observed. In return, the community agreed to maintain the fencing. The Amtrak Deputy Chief of Police who was interviewed for this report echoed his MBTA counterpart in calling for an expanded fencing program at high-risk areas around the state.

Amtrak is also subject to all of the requirements of the new rail safety law, as discussed above, in relation to the MBTA commuter rail service.

TSA has concentrated their security efforts on the high-volume, mass transit rail operators in the greater Boston area. The majority of their resources have been used to install video surveillance cameras and motion sensors at high risk locations.

6.5 Publicly Funded Safety and Security Projects

Similar to most states, Massachusetts participates in the Section 130 highway-rail grade crossing program. This program 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 grade crossing projects from 2003 to 2009 was approximately:

2003 - $1,930,000
2005 - $650,000
2007 - $420,000
2008 - $1,110,000
2009- $670,000

The railroads receiving Section 130 funding for grade crossing projects over the past 6 years are: Bay Colony Railroad, PanAm Railways, Mass Central Railroad, MBTA, Providence and Worcester, and New England Central Railroad.

Chapter 7 Evaluation Criteria and Benefit-Cost Analysis Framework for Rail

This section of the Rail Plan presents evaluation criteria and a benefit-cost analysis framework for assessing potential freight and passenger rail investments. It also includes a performance evaluation of passenger rail services operating in the state, and a description of strategies to achieve those objectives, which fulfills Section 22705.a.10 of PRIIA. The passenger rail service objectives of Massachusetts are also provided for commuter rail, intercity passenger rail and tourist railroads, which satisfies Section 22705.a.3 of PRIIA.

7.1 Evaluation Criteria

In order to prioritize proposed alternative investment and policy scenarios for passenger rail, a set of screening evaluation criteria was developed. Evaluation criteria aid in the prioritization process for selecting capital infrastructure projects to improve the rail system. The evaluation criteria were developed to link to freight and passenger rail goals, objectives, and performance measures. This criteria is consistent with and enhanced from Section 22705.b.3 of PRIIA. While the evaluation criteria were intended for the screening of the plan's alternative investments, these criteria are suitable for use by:

1) MassDOT as a decision-making framework and set of consistent criteria when evaluating future investment and policy alternatives; and

2) Metropolitan planning organizations (MPO) to help identify and prioritize transportation projects in the development of long-range plans and transportation improvement programs (TIP).

The evaluation criteria are both quantitative and qualitative in nature and intended to help planners and decision makers weigh the relative benefits of project proposals to determine which should be advanced and funded.

7.1.1 Passenger Rail Evaluation Criteria

To best determine the potential value of new passenger rail opportunities, the following evaluation categories and criteria should be applied. It may prove useful to augment this set of criteria with additional evaluation elements on a case-by-case basis.

- Connectivity;
- Access and use of assets;
- Ability to grow new service;
- Ability to sustain and grow freight service on shared use lines;
- Utilization of assets;
- Cost effectiveness (benefits/cost ratio);
- Farebox recovery ratio;
- Attractiveness and accessibility of station locations; and
- Public benefits.

A new passenger rail service should be connected to other elements of the overall transportation system to provide the maximum transportation benefit to the state and to its users. Connectivity may take many forms and be evaluated from several perspectives, including, but not limited to, the opportunity for integration:

- With other passenger rail services, including the ability to provide joint ticketing arrangements for passengers.

- With other public transportation services. A prime example of how this must occur is in the close coordination of passenger train schedules with the services offered across the state by the fifteen Regional Transportation Authorities.

- And coordination with other state transportation initiatives. In the case of the MBTA, rapid transit and/or light rail extensions that are destined to occupy commuter rail corridors may also lead to the opportunity for a fully-integrated service, particularly, as is already the case on several commuter rail lines, if the opportunity is provided to access the central core MBTA transit system at a station outside of North or South Station. Such a system/service design element may also help to alleviate both present and future terminal congestion at those points if properly applied.

A new passenger rail service proposal may have a great deal of anticipated merit in the planning stages, especially if the ridership projections and forecasts are robust. If the planned service is intended to operate over an existing freight rail line that is owned by a private railroad, however, the question of how much time and how much money will be necessary to achieve the necessary access to the rail line for the new service is one that must be dealt with as early in the planning process as possible. For example, planners for the Virginia Railway Express, the commuter rail that serves Washington, DC-bound commuters from Northern Virginia, spent the better part of a decade trying to achieve the requisite access from three separate freight railroads so that this much-anticipated new service could begin.

Access, as described above, is only the beginning of what a passenger service will need to be successful. Virtually every one of the 12 to 15 "New Start" passenger rail systems funded by the Federal Transit Administration (FTA) have begun operation in North America since 1989 have been faced with calls for more service almost immediately after service start-up. In evaluating a new service opportunity, gaining access to the rail line is not enough. Once the trains start running, there almost certainly will be pressures to increase the number of peak hour trains, to add midday and evening service, to run trains on weekends and so forth.

Providing passenger service on a freight rail line may prove to be a mixed benefit if the inception of the passenger service reduces the ability of the line to carry freight service and, in doing so, eliminates the ability of the freight service on the line to grow in the future. Such a result means more heavy trucks on the highway network, or making a region less economically competitive. Providing for both present and anticipated future freight service must be considered as part of the evaluation of any new passenger service proposal.

Every new passenger rail service/system incurs two types of public cost: capital cost for the construction of the new service and ongoing operating costs for the continued provision of service. The notion that capital costs are "one time" costs can be misleading. Rail systems and railroad services tend to be highly capital intensive, with needs that will begin to surface no more than a few years after a new service starts for such things as replacement infrastructure, equipment overhaul and refurbishing, station improvements, parking expansions and service extensions.

While there are federal financial resources available for capital costs, that is not the case with operating costs. Those almost always have to be borne by the government agency or jurisdiction sponsoring the service. An additional element in calculating potential operating costs that must be considered is the manner in which the new service is going to be provided. If the operation will be a public service provided by public employees, the cost of service should be calculable with reasonable accuracy. Contracted service costs are dependent on the contracting strategy that will be employed.

For example, if the contract is planned to be a fixed price arrangement, which is very common in the US today, the estimated cost of service is only one factor. Based on the amount of risk and responsibility that the public sector wished to transfer to the private sector contractor through the agreement that governs the provision of service, the price of service, as determined by the competitive bidding process, will be a very real factor.

Another aspect of the methodology for evaluating projected service/system costs involves the anticipated utilization of the service and includes cost per passenger, based on ridership projections, and cost per seat. In evaluating a proposed new service, the cost per passenger may be quite high, especially in the early years while the service is developing and attracting ridership. Looking at the cost per seat being provided is another way to consider the potential benefit of a new service.

The case has not been made successfully in the US that "New Start" passenger rail systems reduce highway traffic, although there has been some indication that these new services do help in slowing the rate of traffic growth. Additionally, each new passenger rail proposal may have a number of projected public benefits associated with it, such as potential economic development or transit oriented development, as well as easier access to employment centers.

The passenger rail specific evaluation criteria presented below are intended to provide decision makers with a framework to evaluate projects related to passenger rail. These criteria, both quantitative and qualitative, address passenger rail infrastructure needs including operations, safety, funding, connections, and conditions. As described previously, part of the evaluation should also consider the project implications from an integrated transit system, high speed rail, and the rail network perspective.

Table 7-1: Passenger Rail Evaluation Criteria

Category	Evaluation Criteria	Metric	Support Rail Goals and Objectives
Operations Performance	Number of Train Miles	Increase	Goals #1, #2
	Number of Passenger Miles	Increase	Goals #1, #2
	Increase in ridership	MBTA and/or Amtrak ridership by route	Goals #1, #2, #3, #5
	Fare revenue as a % of operating costs	Percentage	Goals #1, #2, #3, #5
	On-time performance	Percentage	Goals #1, #2, #4
	Travel Time	Reduction	Goals #1, #2
	Joint track use with Freight Rail	Delay times	Goals #1, #2, #4
Line Conditions	Line Speeds	Above FRA Track Safety Standards for Passenger Rail	Goal #1, #2, #6
	Capacity	Number of passenger car miles	Goals #1, #2, #4, #5
	Ability to grow new service, use of assets	Qualitative	Goals #1, #2, #5
	Ease of Access to railroad for new commuter service	Qualitative	Goals #1, #2, #4, #5
Connecting Services	Improves passenger connections: MBTA, Amtrak, Bus	Increases efficiency, removes restrictions (qualitative)	Goals #2, #4, #5
	Integration with other services (joint ticketing)	Qualitative	Goals #2, #4
	Accessibility: other services and parking	Qualitative	Goals #2, #4
Operational Costs	Increases/Reduces Operations Cost for new service or consolidates existing service	Operating expenditures per vehicle revenue mile or passenger mile	Goal #2, #3, #5
	If Increase, identify funding source	Source: MBTA, Amtrak, state, or federal	
Environmental	Air Quality Improvements	Change in auto VMT, emissions	Goal #3
Safety	Grade crossing, Signaling, and Positive Train Control	FRA standards	Goal #6
	Enhance passenger rail safety	Qualitative	Goal #6
Access to Stations and Rail Customers	Does passenger rail enhance or harm access?	Qualitative	Goal #2, #5
	Improve commuter access	Qualitative	Goal #2, #5

	(station)?		
Priority route	Major Commuter Route	Located on or not	Goal #2, #5
	Origin/Destination in MA	Percentage	Goal #2, #5
	Designated HSR corridor or feeds to MBTA	HSR or "feeder" (inter-city vs. intra-city)	Goal #2, #5
Environmental	Using advanced technologies	Improves/Reduces emissions	Goal #3
	Permit Violations	Number of violations	Goal #3
	Emissions	Change in emissions	Goal #3
	Supports environmental policy	Qualitative improvement	Goal #3
Economic Development	Economic Benefits (to state and/or localities)	Business output, jobs, income, GSP, and exports	Goal #3, #5
	In economically distressed areas	Qualitative (yes or no)	Goal #3, #5
	Support from EOHED or regional EDC	Documentation	Goal #3, #5
	Market Size	Regional employment, population density, or number of commuters	Goal #3, #5
Other Funding Sources	Federal (FRA/FTA/Amtrak)	Dollar amount, % of Funding	Goals #3, #5
	State Economic Development Funding	Dollar amount, % of Funding	Goal #3, #5
	Private Funding	Dollar amount, % of Funding	Goal #3, #5
	Innovative Funding	Dollar amount, % of Funding	Goal #3, #5

7.1.2 Freight Rail Evaluation Criteria

The freight rail evaluation criteria address freight infrastructure needs including operations, safety, funding, vertical clearance, connections, and conditions. Part of the evaluation should also consider the project implications from both a system wide and rail network perspective.

Table 7-2: Freight Rail Evaluation Criteria

Category	Evaluation Criteria	Metric	Support Rail Goals and Objectives
286,000 lbs rail capacity	Number of miles allowing 286k+ lbs rail cars	Rail miles meeting 286k+ requirement	Goals #2, #3
Vertical Clearance	Reduction of clearance restrictions	Number of Restrictions	Goal #2, #5, #6
	Vertical clearances outside of the state	Number of Restrictions	Goal #2, #5, #6
	Bridges allowing full double stack (20'-8")	Number, meets line requirements	Goals #1, #2, #5
	Bridges allowing phase I double stack (19'-6")	Number, meets line requirements	Goals #1, #2, #5

Access to Industrial Sites	Private investment by business(es)	Level of private dollars invested	Goals #1, #2, #3, #5
	Opportunities to reach new freight customers	Number of lines, industrial sites	Goals #2, #3, #4, #5
	Industrial sites served by rail	Acreage expanded, building sq ft	Goals #2, #3, #4, #5
Connections	Improves Intermodal connections	Increases efficiency, removes restrictions (qualitative)	Goals #2, #3, #4, #5
Freight rail - operations	Direct access to rail customers	Number of shippers and receivers	Goals #1, #2, #3, #5
	Opportunities to increase freight shipped by rail	Tonnage or qualitative ranking (1-5)	Goals #1, #2, #3, #4, #5
	Delays / Congestion	Reduces delay time, point to point travel time	Goal #2, #5
	Sharing delays	Average number of trains delayed: passenger and freight	Goal #2, #5
	Double track routes	Expand, remove restriction	Goals #1, #2, #5
Line Conditions	Line Speeds	Above FRA Track Safety Standards	Goals #1, #2, #5
	Capacity	Number of ton miles or car miles	Goals #1, #2, #5
	Efficient Bridge Traffic Corridors	Maintains traffic flow	Goals #1, #2, #5
Operational Costs	Increases / Reduces Operations Cost	Per unit cost of operating	Goals #2, #3
Priority route	Project on priority route	Located on or not	Goal #2, #5
	Carloads Origin / Destination in MA	Percentage	Goals #2, #4, #5
	Carloads Through Traffic	Maintains efficiency and traffic flow	Goals #2, #4, #5
Safety	Grade crossing	FRA standards	Goals #1, #2, #6
	Hazmat handling	Number of violations	Goals #1, #2, #6
	R.O.W. Structures	Number	Goals #1, 2, #6
Priority route	Project on priority route	Located on or not	Goal #2, #5
	Carloads Origin / Destination in MA	Percentage	Goals #2, #4, #5
	Carloads Through Traffic	Maintains efficiency and traffic flow	Goals #2, #4, #5
Environmental	Using advanced technologies	Improves/Reduces emissions	Goal #3
	Permit Violations	Number of violations	Goal #3

	Emissions	Change in emissions	Goal #3
	Supports environmental policy	Qualitative improvement	Goal #3
Economic Development	Economic Benefits (to state and/or localities)	Business output, jobs, income, GSP, and exports	Goal #3, #5
	In economically distressed areas	Qualitative (yes or no)	Goal #3, #5
	Support from EOHED or regional EDC	Documentation	Goal #3, #5
	Market Size	Regional employment, population density, or number of commuters	Goal #3, #5
Funding	Federal (FRA/FTA/Amtrak)	Dollar amount, % of Funding	Goal #3, #5
	State Economic Development Funding	Dollar amount, % of Funding	Goal #3, #5
	Private Funding	Dollar amount, % of Funding	Goal #3, #5
	Innovative Funding	Dollar amount, % of Funding	Goal #3, #5

7.2 Cost-Benefit Analysis Framework

The investment scenario analysis results presented in Chapter 8 are based on these evaluation criteria and a comprehensive cost-benefit analysis (CBA) supported by economic impact results. The cost-benefit analysis was developed using multiple data sources, transportation and economic models, existing study results of planned infrastructure investment, and leading expert guidance and review of all inputs and assumptions.

The CBA captures economic, transportation, and environmental benefits and costs, evaluating packages of investment projects to help create an integrated freight system. Assumptions regarding the timing and financing of investments are designed for comparison between the investment scenarios. In other words, the likely or optimal mix of private and public funding for individual projects is saved for the implementation and action plan of the Rail Plan. The timing of investments was held fairly consistent across the scenarios to facilitate "apples to apples" comparisons by not unfairly delaying project investments, even if other considerations (political, environmental, etc.) may present implementation challenges. All scenarios examine costs and benefits from 2010 to 2035.

Across all four scenarios, a consistent set of costs and benefits are estimated. Costs include initial capital investments, along with lifecycle operating and maintenance costs over the useful life of the investment. Benefits are focused on direct travel efficiency and cost savings, as well as secondary benefits to environmental emissions, safety, and infrastructure conditions.

Economic benefits include:

- Freight Rail
  - Shipper cost savings which result from shifts to less expensive per ton mile modes (e.g., truck to rail) and/or improved service on existing routes;
  - Congestion relief benefits to freight trucking as highways are improved or freight traffic volumes are diverted to other modes;
  - Freight logistics benefits which result from improved reliability of travel times and supply chain logistics re-organization benefits for freight-dependent businesses; and
  - Near term jobs created during the construction period, and long term jobs created from the operation of the new investment. Although these economic benefits occur in the Commonwealth, they are estimated separately and not included in the CBA.
- Passenger Rail
  - Travel time savings for those automobile drivers who choose to utilize passenger rail and benefit from improved reliability of travel times;
  - Travel time savings to those drivers who continue to drive their automobiles as a result of reduced traffic on the highways and a reduction in travel time; and
  - Near term jobs created during the construction period, and long term jobs created from the operation of the new investment.

Transportation benefits include:

- Freight Rail
  - Congestion relief benefits for autos as highways are improved or freight traffic volumes are diverted to other modes;
  - Highway maintenance costs are reduced in scenarios with greater freight volumes traveling by rail; and
  - Safety benefits result from reduced accidents for scenarios with less truck VMT.

- Passenger Rail
  - Congestion relief benefits to existing drivers as some drivers choose to utilize the expanded passenger rail service;
  - Highway maintenance costs are reduced as some automobile drivers choose to travel by rail and no longer use the highways; and
  - Safety benefits result from reduced accidents when automobile VMT is reduced.

Environmental benefits include:

- Freight Rail
  - Emissions benefits to the environment if freight is diverted from truck to rail, producing fewer emissions per ton mile and greenhouse gases.
- Passenger Rail
  - Emissions benefits to the environment if traffic is reduced as drivers divert to passenger rail and fewer emissions per ton mile are reduced, along with greenhouse gases.

7.3 Commuter Rail Service Objectives

According to the "Service Delivery Policy" approved by the MBTA Board of Directors on January 14, 2009, MBTA service standards establish the minimum or maximum acceptable levels of service that MBTA must provide to achieve its Service Objectives. MBTA believes that these objectives represent the most important characteristics of a "world-class" transit system. They are:

- Accessibility: Services should be geographically available throughout the community and should operate at convenient times and frequencies;
- Reliability: Services should be operated as scheduled;
- Safety: Services should be provided in a safe manner;
- Comfort: Services should offer a pleasant and comfortable riding environment; and
- Cost Effectiveness: Services should be tailored to target markets in a financially-sound and cost-effective manner.

The following details each of these characteristics for MBTA commuter rail service.

Accessibility: Frequency and span of service are important elements to consider when evaluating accessibility.

Span of service refers to the hours during which commuter rail service is accessible. MBTA has established standards that define the minimum period of time that a service will operate. For commuter rail, the minimum span of weekday service is defined as 7:00 am to 10:00 pm and on weekends the minimum span is 8:00 am to 6:30 pm.

Minimum levels of service frequency for MBTA differ depending on whether it is a weekday or weekend. In addition, there are specific definitions of time periods for weekday service. Peak periods are 7:00 am to 8:59 am and 4:00 pm to 6:29 pm during the weekday. The minimum frequency of service is:

- 3 trips in peak direction during AM and PM peak periods
- 180 minutes in each direction, all other periods
- 180 minutes in each direction all day Saturday

On heavily used services, the minimum frequency of service may not meet customer demand. If load levels suggest that additional service is warranted, frequency will be increased to provide a sufficient number of vehicles to accommodate passenger demand.

Reliability: There are a number of factors that can affect reliability of service: accidents, weather, track conditions, vehicle failures, and so forth. Schedule Adherence Standards provide a method for evaluating how reliably services adhere to the published schedules. For commuter rail, these standards measure the percent of trips that depart or arrive within five minutes of scheduled times. They reflect the long distances and wide station spacing of commuter rail. The Schedule Adherence Standard is that 95 percent of all trips departing and arriving at terminals do so within five minutes of scheduled departure and arrival times.

Safety and Comfort: The number of passengers on a vehicle and whether not a seat is available to each rider for most of the trip influences the public's perception of comfort and safety on the train. Vehicle Load Standards establish the average maximum number of passengers allowed per vehicle to provide a safe and comfortable trip. They define the levels of crowding that are acceptable for a particular time period; during the heaviest weekday travel times, some passengers may need to stand.

For commuter rail, the passenger to seats ratio is 110 percent during the early morning, morning peak, midday school, and afternoon peak periods. The ratio is 100 percent during other times of the weekday and on weekends.

In addition to evaluating loads within specific time periods, MBTA also looks at loads at the beginning and end of the service day to determine whether changes in frequency and/or span may be warranted.

Cost Effectiveness: Currently, MBTA has cost-effectiveness service standards for bus only. The MBTA will consider development of cost-effectiveness measures to allow comparative evaluations within the commuter rail system to better support the efficient use of budgeted operating resources.

The Service Standards described above were approved by the MBTA Board in 2009. Prior to the next revision of the Rail Plan, MassDOT is committed to revising and updating these standards.

Table 7-3 shows the MBTA's commuter rail system fares as compared to its peers from a performance perspective. In all three categories of metrics, the MBTA has the lowest operating expenses of the seven commuter rail systems presented in the table. For example, MBTA's Operating Expense per Vehicle Revenue Mile is more than $2 less than comparable agencies, and its Operating Expense per Passenger Mile is equal to or lower than all other agencies evaluated.

Table 7-3: Commuter Rail Agency Comparison

Agency	Operating Expense per Vehicle Revenue Mile	Operating Expense per Vehicle Revenue Hour	Operating Expense per Passenger Mile
Massachusetts Bay Transportation Authority (MBTA)	$10.00	$318.25	$0.29
Metro North Railroad (MNR)	$14.17	$488.82	$0.38
New Jersey Transit (NJT)	$12.25	$362.10	$0.32
Long Island Railroad (LIRR)	$16.50	$490.31	$0.46
Southeastern Pennsylvania Transportation Authority (SEPTA)	$12.14	$326.68	$0.41
METRA	$11.67	$357.40	$0.29
Southern California Regional Rail Authority (SCRRA)	$12.22	$495.44	$0.30

Source: Publicly available information from APTA

7.4 Intercity Passenger Rail Service Objectives

Prior to the next revision of the Rail Plan, MassDOT is committed to revising and updating the commuter standards described previously, as well as developing similar standards for intercity passenger rail service.

7.5 Tourist Railroad's Service Objectives

The MassDOT tourist passenger rail objective is to offer a safe, recreational rail attraction that provides local and regional economic benefits while introducing the public to the history of the rail transportation industry.

Chapter 8 Long Range Service and Investment Analysis and Funding Opportunities

This chapter includes two major sub-sections: 1) a detailed benefit-cost assessment of potential freight and passenger rail investment scenarios; and 2) an assessment of rail funding programs, issues, and opportunities for Massachusetts.

8.1 Investment Scenarios and Evaluation

The investment scenarios described below were developed to address the goals and objectives of the Commonwealth's rail system described in Chapter 1. The potential rail improvements were developed based on:

- Freight and passenger rail volumes by corridor;
- Direct input from railroads and rail customers on current infrastructure conditions and constraints;
- Existing studies of passenger rail investment costs, ridership and benefits;
- Input from regional public meetings and the study's Working Group; and
- Rail improvements planned and proposed in neighboring states.

The rail investment scenarios reflect a combination of near-term and longer-term rail investment strategies. As stated in Section 22705.b.3, in preparing the list of freight and intercity passenger rail capital projects, the following matters should be taken into consideration:

- Contributions made by non-Federal and non-State sources through user fees, matching funds, or other private capital involvement.
- Rail capacity and congestion effects.
- Effects on highway, aviation, and maritime capacity, congestion or safety.
- Regional balance.
- Environmental impact.
- Economic and employment impacts.
- Projected ridership and other service measures for passenger rail projects.

The evaluation criteria described in Chapter 7 are very similar to these factors and were applied to help determine which rail investments should be assessed in terms of benefits and costs. For example, of many potential freight rail improvements, the ones assessed in this chapter were narrowed based on evaluation criteria such as: 286,000 pound rail capacity, vertical clearance, providing access to industrial sites and intermodal connections, operations and line conditions, costs, and safety. Potential passenger rail improvements considered: operations performance (ridership, on-time performance, travel time), current line conditions, connecting services such as intermodal transit facilities, costs, environmental impacts, and safety.

The resulting four rail investment scenarios assessed for the Rail Plan are:

1. **Northern Tier Rail Improvements** – This scenario provides enhanced freight rail corridor connections from the New York border to Ayer, Massachusetts, and from Ayer to Maine. The emphasis of this scenario is on weight on rail (286k), 2nd Generation double-stack capability, improvements to intermodal facilities in Ayer and rail connections to Worcester and Springfield.

2. **Central and Western MA Rail Improvements** – This scenario focuses on providing 2nd Generation double-stack clearance and upgraded weight on rail capacity along the north-south rail linkages on PVRR, NECR, PAS, and P&W railroad corridors. This scenario also includes supporting investments in the highway network (improved truck access to intermodal and aviation facilities, and a full-service truck stop).

3. **South Coast Multi-Modal Freight Improvements** – This scenario examines improvements to rail and transload facilities, as well as highway and port investments, in Southeastern Massachusetts. Specific improvements are targeted at coordinating multimodal investment to provide access the ports for 286k weight on rail from the CSX main line through the region. In addition, this scenario identifies an expected need for new transload facilities in Southeastern Massachusetts that would likely be developed by private carriers and shippers based on market conditions.

4. **Passenger Rail Enhancements** – This scenario includes two more detailed investment analyses – one for Amtrak intercity services and one analysis of MBTA commuter rail improvements. Specific improvements are targeted at increasing capacity and improving track quality along the Downeaster, Northeast Corridor and Knowledge Corridor. Increasing parking and train capacity on both the North and South side of the MBTA Commuter Rail are also included in this scenario.

8.1.1 Freight Investment Scenario Analysis Findings

This section presents findings and analysis for each of the three freight investment scenarios below, including maps that detail the project investments that comprise each scenario. Scenarios are evaluated based on estimates of capital cost, operating and maintenance (O&M) costs, transportation system benefits, freight shipping cost benefits, public benefits, and economic impacts.

Northern Tier Rail Improvements

The Northern Tier Rail Improvements investment scenario consists of:

- 286k weight on rail upgrades to rail corridors connecting to/from the Patriot Corridor, which is planned for a near-term 286k upgrade;
- 2nd Generation double-stack clearance from Mechanicville, New York, to Maine via the Patriot Corridor; and
- Enhanced intermodal facility in Ayer to facilitate truck-rail transfers of containers.

These projects are anticipated to be constructed between 2010 and 2014 at a cost of approximately $100.6 million ($89.4 million in present value terms).

Direct transportation benefits include about 500,000 additional tons of intermodal (IM) tonnage carried by rail, and almost 1 million tons of rail carloads. These transportation benefits lead to a reduction in shipping costs to Massachusetts and external shippers, as well as public benefits due to reduced truck VMT, as shown in the tables below.

Figure 8-1: Northern Tier

Table 8-1: Estimated Annual Transportation Benefits in 2035

IM Freight Rail Volumes (Truck to Rail)	30% increase, 504,000 tons/year
Rail Carloads (Truck to Rail)	9% increase, 387,000 tons/year
Induced Freight Rail Customer Shipping	585,000 tons/year (IM and Carload)
Reduced Truck VMT	6.2 million VMT in MA, 59.4 million VMT in US

Source: HDR calculations

For this scenario, the NPV is $255 million over the forecast time period and the benefit-cost ratio is estimated to be 3.7. That means that each dollar of investment returns $3.70 in benefit to Massachusetts as well as shippers and receivers regionally and nationally. The largest category of benefits in this scenario relate to reduced shipping costs, as increased use of freight rail for goods movement results in lower per ton mile costs to businesses. The second largest category of benefits is for congestion relief to autos and trucks as more future freight growth is carried by the rail system, resulting in improved highway performance. As

estimated, 8.3 percent of benefits are directly related to transportation and environmental with another 91.7 percent of benefits are due to cost savings and other economic benefits.

Table 8-2: Northern Tier Rail Improvements Cost-Benefit Analysis Summary (2009 Dollars)

Economic Benefits & Cost Category	$ Millions
Shipper Cost Savings	$315.2
Truck Congestion Relief Benefits	$2.2
Freight Logistics Benefits	$1.6
Economic Benefits & Cost Savings:	**$319.0**
Auto Congestion Relief Benefits	$14.9
Reduced Emissions	$1.8
Reduced Accidents	$2.8
Reduced Highway Maintenance and Repair	$9.4
Transportation & Environmental:	**$28.9**
TOTAL BENEFITS:	**$347.9**
Capital Costs	$89.4
O&M Costs	$3.8
TOTAL COSTS:	**$93.2**
Net Present Value (NPV):	**$254.7**
Benefit-Cost Ratio:	**3.7**

Source: EDR Group and HDR calculations

The economic impacts can be summarized into the near term, which covers the construction and maintenance impacts, and long term, which represents the operational impacts of the investments. The construction of the Northern Tier Rail Improvements investments will create approximately 147 short term jobs, and eventually create nearly 100 long term jobs. Cost savings for Massachusetts based businesses will increase business output (or sales) by $23.4 million.

Table 8-3: Total Impacts by Year

Year	Business Output ($ mil.)	Value Added ($ mil.)	Jobs	Wage Income ($ mil.)
2010	$47.1	$27.1	147	$12
2015	$4.2	$1.8	20	$1.2
2020	$8.4	$3.7	39	$2.4
2025	$12.2	$5.1	54	$3.3
2030	$16.9	$7	71	$4.5
2035	$23.4	$9.7	99	$6.3

Cost-Effective Investments Based on Preliminary Analysis

While the focus of this analysis is on the entire investment scenario, preliminary analyses of the individual projects that comprise the scenario provide some indication of the relative benefits of each investment opportunity. For the Northern Tier Scenario, project investments that are estimated to provide the greatest long-term return on investment include:

- Providing 2nd Generation double-stack clearance from Mechanicville, New York, to Ayer and then onto Maine, as well as linking Ayer to Worcester to facilitate greater double-stack network connections for intermodal containers within Massachusetts and beyond. Capital costs for these improvements are estimated to be $39.4 million with more than $30 million of that for the Mechanicville to Ayer segment, which includes the Hoosac Tunnel.
- Extending 286k weight on rail capacity connections from the Patriot Corridor from Ayer to Maine and from Ayer to Worcester. Capital costs for these improvements are estimated to be just over $30 million with about $7 million for the Ayer-Worcester project.

Central and Western Massachusetts Freight Corridors and Connectivity

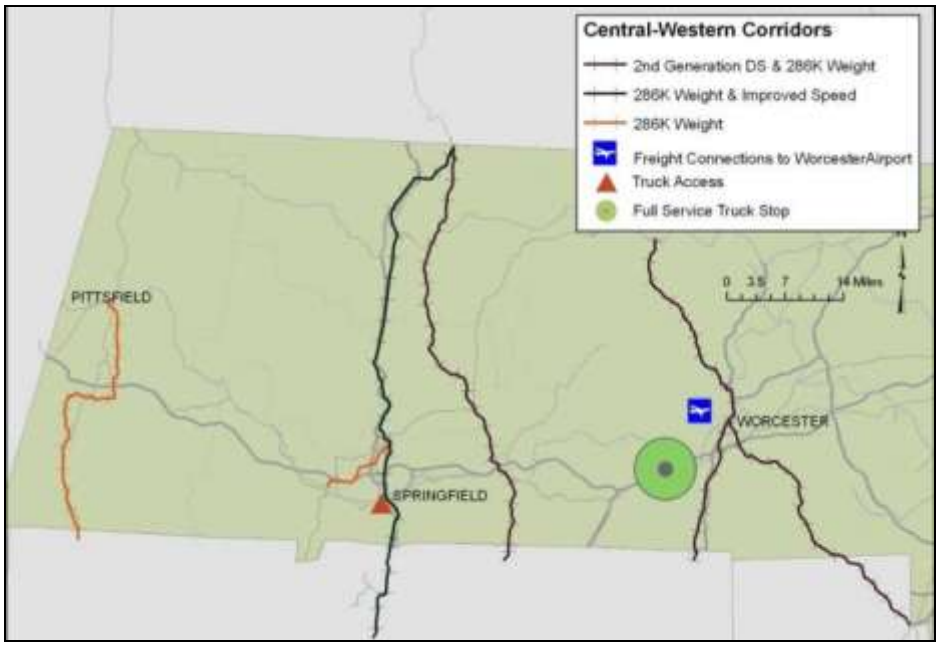
The Central and Western MA Rail Improvements investment scenario consists of:

- Upgrades to 286k weight and 2nd Generation double-stack clearance on north-south rail corridors in the region (NECR and P&W);
- 286k weight and improved speeds on the PAR Connecticut River Line (coordinated with the proposed Knowledge Corridor passenger rail improvements);
- 286k weight upgrade on the PVRR and Housatonic rail corridors; and
- Improved truck access to the West Springfield intermodal facility.

These projects are anticipated to be constructed between 2010 and 2014 at a capital cost of approximately $74.2 million ($66.1 in present value terms). Please note that while the truck access and truck stop investments are deemed as important freight projects in this region of Massachusetts, the costs and benefits of these improvements are not included in the transportation impact and cost-benefit analysis. This is due to a combination of a lack of data on likely benefits and/or the lack of a preferred alternative.[29]

[29] For example, the Worcester Regional Mobility Study is currently assessing the potential alternatives, costs and traffic impacts of improved access to the Worcester Airport. For more information, see http://www.vhb.com/worcesterregionalmobility/.

Figure 8-2: Central-Western Corridors



Transportation impacts due to these improvements are focused on how improved north-south rail corridors, connecting to/from the CSX main line and the Patriot Corridor, can lead to improve freight rail operations, lower costs, and greater future freight volumes handled by rail rather than truck. These rail corridors provide critical goods movement connectivity to regional markets such as Montreal, Providence, and the New York/New Jersey region.

Table 8-4: Estimated Annual Transportation Benefits in 2035

IM Freight Rail Volumes (Truck to Rail)	30% increase, 136,500 tons/year
Rail Carloads (Truck to Rail)	21% increase, 824,900 tons/year
Induced Freight Rail Customer Shipping	442,760 tons/year (IM and Carload)
Reduced Truck VMT	15.5 million VMT in MA, 36.8 million VMT in US

Source: HDR calculations

While these improvements are anticipated to increase intermodal (IM) shipments by more on a percentage basis than bulk carloads, the total increase in freight volumes is larger for carloads since the majority of freight traffic on these corridors is a mix of bulk carload shipments. The total rail tonnage increase is estimated to be almost 1.4 million tons.

For this scenario, the estimated NPV is approximately $143 million over the forecast time period and the benefit-cost ratio is estimated to be 3.1 meaning that benefits are 3.1 times greater than costs. Similar to the Northern Tier Rail Improvements Scenario, the largest category of benefits is due to reduced shipping costs based on greater goods movement by rail. The next largest categories of benefits are for highway congestion relief to autos and reduced highway maintenance and repair due to less truck VMT. Based on this analysis, 75

percent of benefits will accrue from economic benefits and cost savings with 25 percent environmental and transportation benefits.

Table 8-5: Central and Western MA Rail Improvements

Cost-Benefit Analysis Summary (2009 Dollars)

Economic Benefits & Cost Category	$ Millions
Shipper Cost Savings	$131.6
Truck Congestion Relief Benefits	$18.8
Freight Logistics Benefits	$8.2
Economic Benefits & Cost Savings:	**$158.6**
Auto Congestion Relief Benefits	$27.9
Reduced Emissions	$0.8
Reduced Accidents	$5.7
Reduced Highway Maintenance and Repair	$19.2
Transportation & Environmental:	**$53.6**
TOTAL BENEFITS:	**$212.2**
Capital Costs	$66.1
O&M Costs	$3.1
TOTAL COSTS:	**$69.2**
Net Present Value (NPV):	**$143.0**
Benefit-Cost Ratio:	**3.1**

Source: EDR Group and HDR calculations

Since the Central Western investment scenario has the lowest capital costs out of all the scenarios, the near term construction activity will create only 104 jobs and produce $7.8 million in new wages. However, the long term operations and maintenance activity and large cost savings associated with this investment scenario will produce 77 jobs with $4.6 million in annual wages. Business output due to the substantial cost savings will increase by $15.5 million.

Table 8-6: Total Impacts by Year

Year	Business Output ($ mil.)	Value Added ($ mil.)	Jobs	Wage Income ($ mil.)
2010	$30.6	$16.6	104	$7.8
2015	$2.3	$1	12	$0.7
2020	$5.8	$2.7	31	$1.8
2025	$7.7	$3.4	38	$2.3
2030	$12.3	$5.6	63	$3.7
2035	$15.5	$6.9	77	$4.6

Source: EDR Group calculations

Cost-Effective Investments Based on Preliminary Analysis

Keeping in mind that further project-level analysis is likely needed, this scenario's most promising investment projects from a return on investment basis are:

- Providing 2nd Generation double-stack clearance on the P&W, where the key bottleneck is on the Norwich Branch. This is estimated to provide a strong return on investment given a relatively low capital cost ($1.8 million) and relatively strong freight rail market gain (135,000 tons).
- 286k weight on rail upgrades to the PVRR and P&W corridors are estimated to have the next largest benefit compared to cost from a freight rail perspective, followed by the NECR and PAR 286k weight upgrades (keeping in mind that the PAR corridor would also return significant passenger rail benefits if the Knowledge Corridor project to restore the Vermonter goes forward).

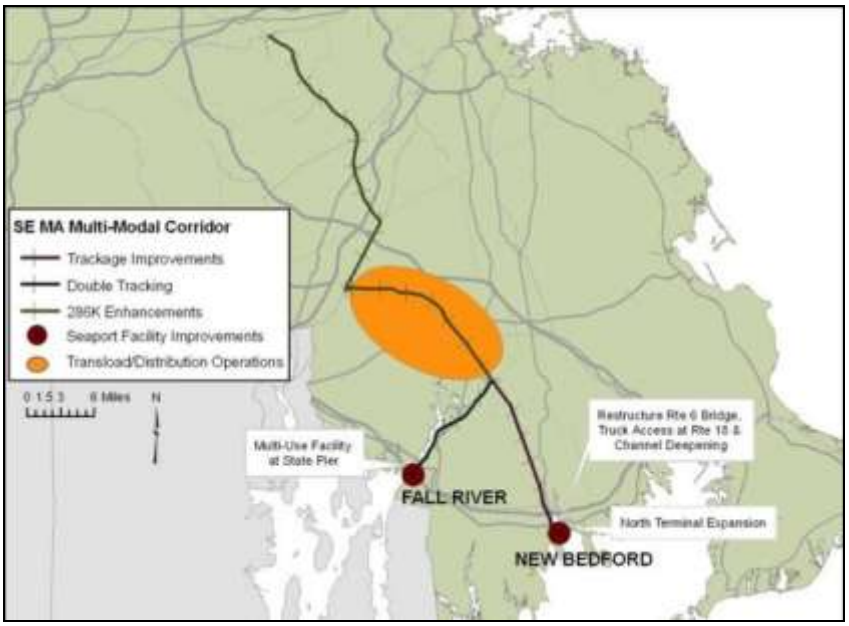
South Coast Multi-Modal Freight Improvements

The South Coast Multi-Modal Freight Improvements investment scenario consists of a number of multimodal investments (see Massachusetts Freight Plan for more detail on the multimodal investments). The rail specific corridor improvements include:

- 286k weight on rail capacity enhancements from the CSX main line south to the Taunton area and other track improvements to Fall River and New Bedford (with timing coordinated with the South Coast Rail project); and
- New transload and distribution center facilities in the region to handle, warehouse, and exchange goods between rail and truck. No specific sites or locations have been identified yet for these potential facilities as this will depend on market opportunities.

These projects are anticipated to be constructed between 2010 and 2018 at a capital cost of approximately $158 million ($126.6 in present value terms), not including O&M costs.

Figure 8-3: South Coast Multi-Modal Freight Improvements



Transportation impacts due to these improvements are expected to lead to greater marine cargo shipping to Fall River and New Bedford, as the ports can leverage better facilities and landside connections to capture future growth in short-sea and coastal shipping. This leads to both shipping costs benefits on a per ton mile basis compared to trucking the full distance, as well as reduced truck VMT. The analysis explicitly considered alternative shipping patterns if these improvements are not made, such as increased freight volumes that would enter the Massachusetts market via ports in New York/New Jersey or Halifax that are then trucked to the region. And the 286k rail improvements are also expected to lead to some increased future goods movement by rail, though it should be noted that even with the gains shown in the table, the vast majority of freight is still expected to be shipped by truck.

Table 8-7: Estimated Annual Transportation Benefits in 2035

Rail Carloads (Truck to Rail)	45% increase, 830,000 tons/year
Induced Freight Rail Customer Shipping	184,600 tons/year (Carload)
Reduced Truck VMT	7.8 million VMT in MA, 21.6 million VMT in US

Source: HDR calculations

For this scenario, the estimated NPV is a gain of $4.3 million, meaning that benefits exceed cost over the forecast time period, and the benefit-cost ratio is estimated at 1.03. The largest benefits include more than $100.9 million in shipper cost savings and $10.8 million in reduced highway maintenance. Highway congestion relief to autos and trucks from the local roadway improvements is an important benefit, as more future freight growth is carried by the marine and rail systems, resulting in less truck VMT and improved highway performance. As estimated, 81 percent of benefits are cost savings from reduced truck highway congestion, freight logistics benefits, and a reduction in shipper costs.

Table 8-8: South Coast Multi-Modal Freight Improvements

Cost-Benefit Analysis Summary (2009 Dollars)

Economic Benefits & Cost Category	$ Millions
Shipper Cost Savings	$100.9
Truck Congestion Relief Benefits	$5.2
Freight Logistics Benefits	$3.8
Economic Benefits & Cost Savings:	**$110.0**
Auto Congestion Relief Benefits	$10.7
Reduced Emissions	$0.7
Reduced Accidents	$3.2
Reduced Highway Maintenance and Repair	$10.8
Transportation & Environmental:	**$25.4**
TOTAL BENEFITS:	**$135.4**
Capital Costs	$126.6
O&M Costs	$4.5
TOTAL COSTS:	**$131.1**
Net Present Value (NPV):	**$4.3**
Benefit-Cost Ratio:	**1.03**

Source: EDR Group and HDR calculations

In the near term, construction activity will create 343 jobs in the Commonwealth and produce $20.1 million in new wages. The long term operations and maintenance activity will produce 50-60 jobs with approximately $3.5 million in annual wages. Business output is anticipated to increase by $11.2 million by 2035.

Table 8-9: Total Impacts by Year

Year	Business Output ($ mil.)	Value Added ($ mil.)	Jobs	Wage Income ($ mil.)
2010	$48.2	28	$343	$20.1
2015	$17.4	9.8	$119	$7
2020	$8.9	4.5	$54	$3.2
2025	$7.3	3.3	$37	$2.3
2030	$11.6	5.4	$61	$3.7
2035	$11.2	4.8	$52	$3.2

Source: EDR Group calculations

Cost-Effective Investments Based on Preliminary Analysis

As this is truly an integrated multi-modal freight improvement scenario for Southeastern Massachusetts, it can be difficult to separate the effects of individual projects within the

broader investment package. However, an examination of the scenario inputs and results indicate that the project initiative within the South Coast Multi-Modal Freight Improvements Scenario that indicates a likely return on investment include:

- Upgrading the rail corridor from Framingham on the CSX main line to the region's core, with coordinated track improvements to Fall River and New Bedford to allow effective shared use rail connections to the ports. These rail improvements are estimated to cost approximately $20 million.

8.1.2 Passenger Rail Investment Scenario Analysis Findings

The Passenger Rail Scenario is divided into two major components:

- **Amtrak Intercity Improvements** including:
  - Five additional round-trips between Boston and New York City on the **Northeast Corridor** as well as travel time and capacity improvements, including double tracking along the Attleboro line.[30]
  - Two additional round-trips between Portland and Boston on the **Downeaster** as well as trackage improvements that will lead to travel time savings along the corridor. Additionally, improvements to the Merrimack River Bridge are included.[31]
  - Seven additional daily round-trips along the newly realigned *Vermonter* service in the **Knowledge Corridor**, one additional round-trip between St. Albans, Vermont, and Springfield, Massachusetts, and six between Greenfield and Springfield. In addition to the additional service, trackage improvements to increase speed along the corridor are also included.[32]

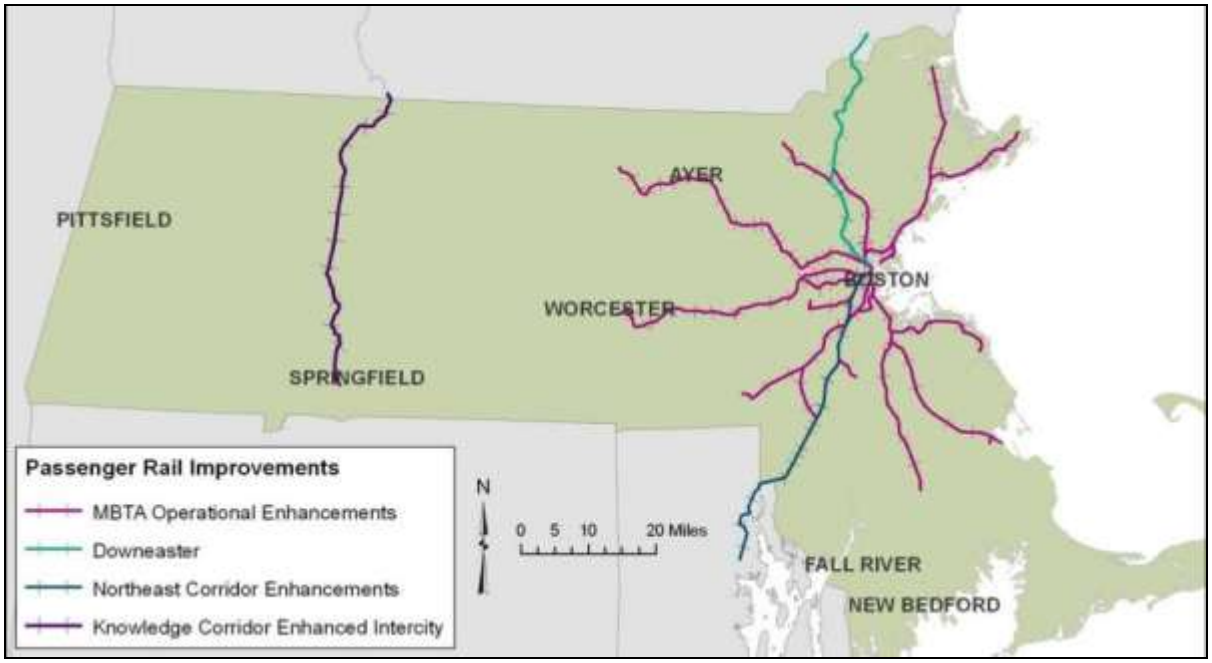
- **MBTA Commuter Rail Enhancements**, separated by North Side and South Side, including:
  - Improvements to parking capacity at Commuter Rail stations that are at or will be at capacity based on projected ridership growth;[33]
  - Additional service on each line, including one additional peak hour train on each line except Rockport/Newburyport, Fitchburg, and Franklin which will include 2 additional peak trains. Additions to the Worcester Line and South Coast Rail project are not included as they are assumed to happen in the baseline;[34] and

[30] Northeast Corridor Infrastructure Master Plan, DRAFT, 10/28/09
[31] FRA HSIPR Track 2 Application submitted by Maine DOT and conversations between MassDOT and HDR.
[32] FRA HSIPR Track 2 Application submitted by MassDOT.
[33] Central Transportation Planning Staff, "Projections of Parking Demand, Kiss-and-Ride Passengers, and Ridership for MBTA Commuter Boat, Express Bus, Commuter Rail and Rapid Transit Services", December 2008.
[34] Central Transportation Planning Staff NEC Plan Results 7/30/08, moderate improvement scenario.

- Procurement of 15 additional locomotives and 135 new coaches to replace aging rolling stock and add capacity to allow for the additional commuter rail services.[35]

These projects are anticipated to be implemented over various timeframes between 2011 and 2030 at a cost of approximately $1,420.5 million ($1,227.8 million in present value terms) for the Amtrak projects and $729.1 million ($661.8 million in present value terms) for the MBTA projects.

Figure 8-4: Passenger Rail Improvements



User benefits of the Amtrak scenarios include average ridership increase of approximately 1.5 million riders annually. This increase in ridership results in user benefits to the induced users of $3,556.4 million over the forecast period, accounting for the value of travel time savings over highway travel time, as well as the value of time spent on a train as compared to in an automobile. The value of time savings to users remaining on the highway is the second largest category of benefits for the Amtrak improvements, amounting to $1,289.5 million over the forecast period.

Additional benefits include travel time savings for existing users based on the infrastructure improvements, as well as benefits to society from a reduction in emissions, highway maintenance costs, and accidents on the highway. For the Amtrak portion of the Passenger Rail scenario, the NPV is $1,503.9 million over the forecast period with a benefit-cost ratio estimated at 2.1. This amounts to a return on each dollar invested of $2.10 to both the induced users of the service as well as Massachusetts as a whole.

[35] "MBTA Commuter Rail Infrastructure Needs Assessment Study" April 2004.

Table 8-10: Amtrak Passenger Rail Cost-Benefit Analysis Summary (2009 Dollars)

Economic Benefits & Cost Category	$ Millions
Travel Time Savings - Existing Riders	$ 393.80
User Benefits - Induced Riders	$ 3,556.40
Reduced Emissions	$ 161.10
Reduced Highway Maintenance	$ 10.90
Congestion Relief Benefits	$ 1,289.50
Accident Reduction Benefits	$ 601.00
TOTAL BENEFITS:	$ 6,012.60
PV of Total Benefits	$ 2,822.50
Capital Costs	$ 1,420.50
Cumulative O&M Costs	$ 208.00
TOTAL COSTS:	$ 1,628.50
PV of Costs:	$ 1,318.60
Net Present Value (NPV):	$ 1,503.90
Benefit-Cost Ratio (BCR):	**2.1**

For the MBTA Commuter Rail Scenario, user benefits include an average annual ridership increase of approximately 1.4 million, resulting in benefits to the additional riders of $278.4 million over the study period. Though the ridership increases for both Amtrak and MBTA are similar, the benefits associated with the MBTA scenario are smaller than those for the Amtrak scenario. This is because user benefits are based on passenger miles, which are fewer for the commuter level trips than for intercity trips, thus resulting in a smaller user benefit.

The largest share of benefits for the MBTA scenario is to those users remaining on the highway due to the congestion relief in the Greater Boston area, where the Commuter Rail runs. For the Commuter Rail scenario, the NPV is $135.8 million with a benefit-cost ratio of 1.2. This implies a return of $1.20 on every dollar invested.

Table 8-11: MBTA Commuter Rail Cost-Benefit Analysis Summary (2009 Dollars)

Economic Benefits & Cost Category	$ Millions
Travel Time Savings - Existing Riders	$ -
User Benefits - Induced Riders	$ 278.40
Reduced Emissions	$ 15.90
Reduced Highway Maintenance	$ 1.10
Congestion Relief Benefits	$ 1,593.90
Accident Reduction Benefits	$ 29.00
TOTAL BENEFITS:	$ 1,918.30
PV of Total Benefits:	$ 832.10
Capital Costs	$ 729.10
Cumulative O&M Costs	$ 66.70
TOTAL COSTS:	$ 795.80
PV of Costs:	$ 696.30
Net Present Value (NPV):	$ 135.80
Benefit-Cost Ratio (BCR):	**1.2**

Combined, the results of both passenger rail scenarios result in a user benefit to induced riders of $3,834.8 million and $2,883.3 million in congestion relief benefits over the forecast period. The overall NPV is $1,639.7 with a benefit-cost ratio of 1.8.

Table 8-12: Overall Passenger Rail Cost Scenarios Benefit-Cost Results (2009 Dollars)

Economic Benefits & Cost Category	$ Millions
Travel Time Savings - Existing Riders	$ 393.80
User Benefits - Induced Riders	$ 3,834.80
Reduced Emissions	$ 177.00
Reduced Highway Maintenance	$ 12.00
Congestion Relief Benefits	$ 2,883.30
Accident Reduction Benefits	$ 630.00
TOTAL BENEFITS:	$ 7,930.90
PV of Total Benefits:	$ 3,654.60
Capital Costs	$ 2,149.60
Cumulative O&M Costs	$ 274.70
TOTAL COSTS:	$ 2,424.30
PV of Costs:	$ 2,014.90
Net Present Value (NPV):	$ 1,639.70
Benefit-Cost Ratio (BCR):	**1.8**

Cost-Effective Investments Based on Preliminary Analysis

Though the primary focus of the analysis is on the overall benefits of investments, the individual projects provide an indication of the relative benefits of the opportunities. For the Passenger Rail Scenario, the projects that are estimated to provide the greatest long-term return on investment include:

- Providing enhanced level service on the realigned *Vermonter* route, with a capital cost of $32.5 million for improvements to accommodate the additional trains and benefits of approximately $889.4 million over the forecast period.
- The improvements to the Northeast Corridor at a capital cost of $1,278 million for the expanded service, as well as infrastructure improvements at South Station and along the right of way in Massachusetts, provide benefits of $4,735 million over the study period.
- The Downeaster improvements, including the improvement of the Merrimack River Bridge, double tracking, and enhanced service provide a benefit of $388.3 over the forecast period at a capital cost of $110 million.
- The improvements to the North Side of the MBTA Commuter Rail, including additional service along each line, infrastructure improvements and parking improvements provides a benefit of $1,013.7 million over the forecast period at a capital cost of $321.9 million.

8.2 Rail Funding and Financing

Rail funding typically comes from a variety of sources, federal, state, and private interests. Any federal funding grant programs that are rail oriented are discretionary, awarded on a competitive basis, and no state is guaranteed federal funding. There also are federal low-interest and guaranteed loan programs. Some state funding is available for rail improvements, but most freight rail investment remains private.

Because there has not been a consistent and dedicated federal source for financing rail projects, funding for rail infrastructure has sometimes lagged behind other federal transportation investments. Despite the lack of a consistent funding stream for rail projects, there are numerous state and federal funding opportunities available for rail projects. This section of the Rail Plan presents the current financing mechanisms available to support passenger and freight rail improvements and expansion.

8.2.1 Passenger Rail

The Commonwealth of Massachusetts has long provided financial support to the preservation and enhancement of the railroad network. While significant investments have been made in the passenger network for the past half century, there remains a gap between available funding and the needs to maintain the current system in a state of good repair.

In Massachusetts, intra-state passenger and commuter rail is predominantly served by the MBTA and Amtrak.

8.2.1.1 National Railroad Passenger Corporation (Amtrak)

Amtrak is a federally-supported corporation that operates nearly all intercity passenger trains in the United States. Despite that Amtrak earns income from tickets and mail-carrying services, federal support is required to cover its full operating costs.

In 2009, Amtrak's ridership and revenues declined, particularly in the northeast, due to poor economic conditions, general declines in travel, and lower gasoline prices. Expenses also decreased because of lower fuel prices, salaries and wages, and benefits. These reduced expenses offset the lower revenues. Amtrak's fiscal year 2009 operating loss of $468.2 million was 1.4 percent less than budget.[36]

8.2.1.2 Massachusetts Bay Transportation Authority (MBTA)

The MBTA was formed in 1964 to finance and operate most bus, subway, ferry, and commuter rail systems in the Boston area. In 2000, legislation was passed that dedicated 20 percent of the state sales tax to the MBTA to enable the authority to pay for its own capital improvement projects. Titled Forward Funding, this legislation also transferred $3.3 billion of state debt to the MBTA. It was envisioned that this debt would be paid off over time using the sales tax revenue.

At the time the legislation was passed, the Massachusetts sales tax revenue had been growing at an average of 6.5 percent since 1990. The Finance Plan, which was developed by the MBTA to implement the new legislation, projected that dedicated sales tax revenue would grow by three percent per year from FY2001 through FY2008.[37] Since 1990, however, sales tax revenue has grown only an average of one percent per year. The result is the creation of a revenue shortfall for the MBTA.

In FY2008, the MBTA's total revenue was comprised of 31.3 percent[38] in ridership fares, 53.7 percent in sales tax revenue, and 14.9 percent in other system-generated revenues and assessments. The two largest MBTA expenses are wages and debt service from previous capital improvements and other debt transferred to the MBTA. Since 2000, debt service has accounted for 20 to 30 percent of total expenses and to compensate, the MBTA has been restructuring debt for lower principal payments, which has often resulted in larger interest payments.

Despite annual ridership increases, the T still operates on a deficit partly due to the fact that more than 26 percent of the MBTA's budget covers these debt service payments. As mentioned previously, sales tax revenues have fallen short of projections and this has further

[36] Department of Transportation, Office of the Inspector General, http://www.oig.dot.gov/sites/dot/files/November_2009_Amtrak_Quarterly.pdf.

[37] MBTA Review, prepared by David F. D'Alessandro, Paul D. Romary, Lisa J. Scannell, Bryan Woliner, November 1, 2009.

[38] Born Broke: How the MBTA found itself with too much debt, the corrosive effects of this debt and a comparison of the T's deficit to its peers, MBTA Advisory Board, April 2009.

exacerbated the problem. The MBTA now has $8 billion in debt due to capital improvement projects investments and state transferred debt.[39]

The high operating costs for wages, compensation, and debt service have grown over the last 7 years as seen in Table 8-13. This limits the MBTA's ability to fund maintenance activities to retain a state of good repair or progress additional capital improvement projects. From the period 2001 to 2008, the MBTA's interest expense has grown by 39 percent and wages and employee benefits by 33 percent.

Table 8-13: Selected MBTA Operating Expenditures in Millions of Dollars

	2001	2002	2003	2004	2005	2006	2007	2008
Wages and Employee Benefits	291	308	305	321	340	348	354	388
Insurance	69	81	79	89	94	113	58	159
Pensions	30	26	22	39	39	48	31	34
Interest Expense	184	209	198	177	216	199	221	257

Source: MBTA Financial Statements and Required Supplementary Information (2000-2008)

For the Commonwealth, passenger rail projects have typically been funded using federal program funds authorized under the various federal surface transportation acts. The Commonwealth of Massachusetts also has expended state funds for acquisition of hundreds of miles of rail lines and rehabilitation, notably for the commuter rail network serving eastern Massachusetts.

Many decisions about federal funding are subject to annual appropriations, legislative earmarks, and the competitive nature of budgeting. As recently reported by the US DOT and the Government Accountability Office (GAO) the discrepancy between federal investments in highway, air and passenger rail modes is notable. From 1958 to 2008, the federal government has invested $1.3 trillion in the nation's highways, $473 billion in the aviation system, but only $53 billion in passenger rail.[40]

Rail Safety Improvement Act of 2008

The Rail Safety Improvement Act of 2008 Requires Class I railroads, intercity, and commuter railroads to develop safety program. The Act provides Railroad Safety Infrastructure improvement grants for eligible railroads, states and local governments. The legislation provides $1.6 billion for rail safety for FY 2009 through FY 2013. The bill also authorizes $250 million in "Rail Road Safety Technology Grants." All grants and funds will require a 20 percent state match, but priority will be given to projects that seek less than the full 80 percent. For projects to be eligible, they must be in the state rail plan, and 5 percent of the funds are reserved for projects of less than $2 million.

[39] Born Broke: How the MBTA found itself with too much debt, the corrosive effects of this debt and a comparison of the T's deficit to its peers, MBTA Advisory Board, April 2009.

[40] US DOT, Historical Federal investment in Transportation (2009) and GAO, High Speed Passenger Rail: Future Development Will Depend on Addressing Financial and other Challenges and Establishing a Clear Federal Role (March 2009).

The legislation reauthorizes Amtrak and provides a total of $13.06 billion over 5 years, of which $5.3 billion will be for capital improvements, to help bring the Northeast Corridor to a state of good repair and encourage the development of new and improved intercity passenger rail service. In addition, $325 million is allocated for eligible states and Amtrak for projects that are identified by Amtrak as necessary to reduce congestion or facilitate growth. The bill also provides $1.5 billion for the planning and development of high-speed rail corridors including the: Northeast Corridor, Empire Corridor, and Northern New England Corridor. Lastly, the bill establishes a forum at the STB to help complete stalled commuter rail negotiations, helping the rail network operate as efficiently as possible.

8.2.2 Traditional Federal Funding Programs Available for Rail

The following sections detail the traditional federal funding programs available for passenger and freight rail.

SAFETEA-LU

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) is the current federal surface transportation authorization act, which continues many of the policies and programs that originated in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), and the Transportation Equity Act for the 21st Century (TEA-21). SAFETEA-LU authorized the federal surface transportation programs for highways, highway safety and transit through September 30, 2009. The US Congress has yet to advance a new authorization bill, and the Administration has recommended an 18 month extension of the current act to address the deficit in the highway trust fund. SAFETEA-LU continues to include the trademark of flexibility that has characterized the three most recent authorization acts. This flexibility enables the states and MPO to use various federal funding programs for rail projects. Table 8-14 summarizes the SAFETEA-LU funding sources for rail projects.

Table 8-14: SAFETEA-LU Funding Sources for Rail

Federal Funding Programs	Source	Type of Funding
Transportation Infrastructure Finance and Innovation Act (TIFIA)	US DOT - Appropriations	Federal Credit Assistance - Loans and Loan Guarantees
Railroad Rehabilitation and Improvement Financing (RRIF) Program	US DOT - Appropriations	Federal Credit Assistance - Loans and Loan Guarantees
Highway-Rail Crossing Program	Highway Trust Fund	Formula distribution to states
Rail Line Relocation and Improvement Capital Grant Program	Federal Railroad Administration (FRA) Appropriations	Grant Program
Local Freight Assistance (LFRA)	(Not currently funded)	Grant and Loan Program
Projects of National and Regional Significance (PNRS) Program	Title 23 US Code Highway Trust Fund	Grant Program
Freight Intermodal Distribution Pilot Grant Program	Federal Highway Administration (FWHA)	Grant Program
Community Facilities Program	Federal Railroad Administration (FRA)	Loan, Loan Guarantees, and Grant Program
National Highway System	May fund rail projects related to highway construction	Grants (90/10)
Surface Transportation Program	May fund highway projects to accommodate railroad operations	Formula distribution to states

Source: FHWA, "Financing Freight Implements" Washington, D.C: U.S. DOT, January 2007.

Many rail projects have utilized the Congestion Mitigation and Air Quality Improvement (CMAQ), Transportation Enhancements, and the Rail-Highway Crossing (i.e., Section 130) programs. This funding is channeled to the states through US DOT agencies, including the FRA, FTA and the FHWA.

New funding for High Speed Rail Development and other passenger rail programs has emerged in recent legislation such as PRIIA. ARRA, the federal stimulus legislation, also provides funding for passenger rail development.

PRIIA Authorized Capital Assistance

Intercity Passenger Rail Service Corridor Capital Assistance Program

PRIIA creates the framework for a new intercity passenger rail service corridor capital assistance program.[41] Funds are authorized to be appropriated to US DOT to provide grants for capital investments benefiting intercity rail passenger service. Eligible applicants include states (including the District of Columbia), groups of states, interstate compacts, and public agencies with responsibility for providing intercity passenger rail service established by one

[41] [§301]

or more states. US DOT is authorized to use appropriated funds to make grants to assist in financing the capital costs of facilities, infrastructure, and equipment necessary to provide or improve intercity passenger rail operations. This program is modeled on the capital assistance to states, intercity passenger rail service program that the FRA implemented in fiscal year 2008 and has continued to implement in fiscal year 2009.

High-Speed Rail Corridor Development

PRIIA authorizes the appropriation of funds to US DOT to establish and implement a high-speed rail corridor development program [§501]. Eligible applicants include a state (including the District of Columbia), a group of states, an interstate compact, and a public agency established by one or more states with responsibility for high-speed rail service or Amtrak. Eligible corridors include the ten high-speed rail corridors previously designated by the Secretary of Transportation. Grants may be used for capital projects, which are broadly defined to include typical activities in support of acquiring, constructing, or improving rail structures and equipment.

High-speed rail is defined as intercity rail passenger service that is reasonably expected to achieve operating speeds of at least 110 miles per hour. US DOT is authorized to specify grant application requirements, and PRIIA identifies a number of grant selection evaluation criteria, including that the project be part of a state rail plan, that the applicant have the ability to carry out the project, and that the project result in significant improvements to intercity rail passenger service.

Congestion Relief

PRIIA authorizes the appropriation of funds to US DOT to make grants to states or to Amtrak in cooperation with states for financing the capital costs of facilities, infrastructure, and equipment for high priority rail corridor projects necessary to reduce congestion or facilitate ridership growth in intercity rail passenger transportation [§302]. Eligible projects would be those identified by Amtrak to reduce congestion or facilitate ridership growth in heavily traveled rail corridors, those identified by the STB to improve on time performance and reliability, and those designated by US DOT as meeting the purpose of the program and being sufficiently advanced so as to be ready for implementation. US DOT is authorized to establish appropriate grant eligibility, qualification and administration conditions.

Transportation Appropriations Act of 2008

Established by the Transportation, Housing and Urban Development, and Related Agencies Appropriations Act of 2008, the Capital Assistance to States – Intercity Passenger Rail Service Program increases the states' role in intercity passenger rail development by establishing the first-ever federal-state partnership for intercity passenger rail investment similar to those programs that currently exist for other modes of transportation. The program offers discretionary grants to states for funding necessary capital improvements that will improve intercity passenger rail service, as well as maintain existing passenger rail corridors.

FTA New Starts and Small Starts Programs

FTA's New Starts program is funded by the Highway Trust Fund and is highly competitive. It is focused solely on transit investments and has been used primarily for light-rail, bus rapid transit and heavy rail (subway) projects. To a lesser extent, it can be applied for commuter rail projects. This program has demands far exceeding its budget and a lengthy and detailed application process. FTA funding for major commuter rail projects will continue to be available under FTA's New Starts program.

The program has also been augmented with new program criteria for "Small Starts" and "Very Small Starts" to encourage a broader diversity of projects, though that may benefit more bus projects than rail. The New Starts program provides federal funds on a matching basis (80/20 by law, 50/50 in practice) to support transit "guideway" capital investments, including commuter rail. FTA evaluates projects based upon established criteria that include cost-effectiveness, local financial commitment and transit supported land use. It is worth noting that FTA is currently (July 2010) in the process of revising the New Starts program evaluation criteria and is considering placing increased emphasis on economic development and a broader range of benefits beyond cost effectiveness.

Massachusetts has successfully used this program for both commuter rail and transit system improvements and expansions. Most recently, Massachusetts initiated the Fitchburg line commuter rail improvement project with Small Starts funding - $150 million in funding with 50 percent from FTA and 50 percent from the state.

CMAQ Congestion Mitigation and Air Quality Improvement (CMAQ)

The Congestion Mitigation and Air Quality (CMAQ) Improvement program funds projects that may reduce highway traffic congestion and help meet federal Clean Air Act requirements. CMAQ funding may be used for freight and passenger rail projects that accomplish CMAQ goals. Funding is available for projects in areas that do not meet the National Ambient Air Quality Standards (e.g. nonattainment areas), in former nonattainment areas now in compliance (e.g. maintenance areas), and for projects outside air quality non-attainment areas where the air quality benefits of the project accrue to the non-attainment area or maintenance area. CMAQ funds have been used to help fund the operations of passenger rail services – both commuter or intercity. For example, CMAQ funds have been used by Maine to fund operations of the Downeaster rail service. Legislation is pending to allow CMAQ funding to continue beyond three years for this type of operation. CMAQ funding could be an option as Massachusetts considers expansions to intercity passenger rail services for the Vermonter service in the Pioneer Valley (Knowledge Corridor) and the east-west Inland Route.

8.2.3 American Recovery and Reinvestment Act of 2009 (ARRA)

To help stimulate the economy amidst the current economic downturn, the American Recovery and Reinvestment Act of 2009 (ARRA) was created to create and save jobs and stimulate economic activity, while improving the nation's infrastructure through funding "shovel ready" infrastructure projects. ARRA provided $311 billion in appropriations, of which transportation infrastructure received $48 billion. These funds also assisted state and local governments with budget shortfalls during the economic crisis. Eligible projects were required to be "shovel ready" to be considered for quick execution. The following is a break down of the total federal funds available via ARRA for transportation projects:

- $27.5 billion for highway investments;
- $8.4 billion for investments in public transportation;
- $1.5 billion for competitive grants to state and local governments;
- $1.3 billion for investments in the air transportation system; and
- $9.3 billion for investments in rail transportation, including Amtrak, High Speed and Intercity Rail.

Reassuring efforts have been made by the current administration to prioritize rail. For example, the American Reinvestment and Recovery Act (ARRA) made funds available for "shovel ready" transportation projects, including rail improvements. ARRA funds were made available to support the Federal Railroad Administration's High Speed Intercity Passenger Rail (HSIPR) program, as well as the US Department of Transportation's Transportation Investments Generating Economic Recovery (TIGER) grant program. The Commonwealth of Massachusetts has benefited from these grants as described in greater detail below.

Although rail projects are explicitly stated within the stimulus legislation and guidelines for various investment categories, funds allocated for "highway" could also be flexed into projects for both passenger and freight rail. The following rail projects were eligible for stimulus funding:

- Freight Rail: Class I, Class II/III, intermodal yards, port access;
- Rail Transit: commuter rail, light rail, streetcar, metro, and subway;
- Amtrak; and
- State-managed intercity passenger rail (IPR) and High Speed Rail (HSR).

Although there were no funds directly dedicated for *freight rail* in the Stimulus Package, freight rail was eligible to tap into the following funds:

- $27.5 billion allocated for "highway" could have been flexed by State DOTs and MPOs to fund freight and passenger rail;
- The $1.5 billion TIGER surface transportation infrastructure discretionary grants program could be used for freight rail; and
- The $8 billion HSIPR funds could provide indirect benefits to rail networks.

The $8 billion HSIPR in ARRA is considered a down payment on a national network of high speed and intercity passenger rail corridors, and it will likely be continued with an annual appropriation of $1 billion for at least 5 years (as proposed in FY 2010 budget). Completion of this national vision will require the long-term commitment of both the federal government and states.

Rail Projects in Massachusetts awarded ARRA stimulus funding include:

Programmed Funding

Fitchburg Line Improvements – MassDOT and the MBTA are investing just under $200 million for improvements along the Fitchburg Commuter Rail Line, including interlocking work, double-tracking, and other improvements. The funds include $10.2 million in ARRA funds for the first stage of the Fitchburg Commuter Rail Improvement Project; an additional $39 million in ARRA funding for double-tracking; and $150 million in New Starts funding from the Federal Transit Administration to support installation of new switches and signals, to renovate two stations and to reconstruct the existing track on the state's oldest commuter rail line.

Haverhill Line Improvements – The MBTA will use $17.4 million in ARRA funds to install double-tracking and improve the train control systems between Lawrence and Andover. This project will improve reliability and on-time performance for the Haverhill commuter rail line, Amtrak's Downeaster trains as well as freight rail operations.

Discretionary Funding

Knowledge Corridor – The Federal Railroad Administration awarded MassDOT $70 million in the first round of the competitive HSIPR Program to rehabilitate 49 miles of track and construct two stations for the Vermonter train service in Western Massachusetts. This project is complemented by others in Connecticut and Vermont that will improve service on the entire New Haven - St Albans corridor. Pan Am Southern will rehabilitate the line for passenger operation with oversight provided by the MBTA Design and Construction Department. Service is expected to begin in October 2012.

Wachusett TIGER Project – The Fitchburg Commuter Rail Line will also benefit from the TIGER Funded Wachusett Commuter Rail Extension Project which will extend passenger rail service approximately 4.5 miles west of the Fitchburg commuter rail station, construct a new "Wachusett Station" and a new MBTA layover facility.

South Coast Rail Bridges TIGER Project – Massachusetts was awarded TIGER Discretionary funds to reconstruct three structurally-deficient bridges immediately north of the planned Whale's Tooth Station in New Bedford for the South Coast Rail project. The bridge work will cost $20 million and is the first step in the groundbreaking "Fast Track New Bedford" project that will help revitalize New Bedford's waterfront and initiate construction of a key component of South Coast Rail.

8.2.4 Freight Rail

Privately-owned freight rail service providers generally finance rail improvements through a combination of current cash flow or bond and stock issuances. For example, BNSF was a publicly-owned railroad company with stockholders – Warren Buffett and Berkshire Hathaway recently made a $34 billion stock purchase of BNSF. Their investment decision-making is based on expectations of future demand, revenue and costs of improvements. The private ownership structure of freight railroads, combined with the fact that there are restrictions on using public funds for privately-owned infrastructure in Massachusetts, means that freight rail projects have not traditionally been funded by public resources.[42] As a result, alternative sources of funding must be, and have been, pursued.

PPP, which were discussed in Chapter 8 of the Rail Plan, are one opportunity for freight rail funding. These arrangements enable freight railroads to make enhancements and improvements that might not otherwise be financially feasible.

Railroad Track Maintenance Credit

The railroad track maintenance credit is a tax credit for Class II and Class III railroads that was enacted on January 1, 2005, effective for three years, and later extended through calendar year 2009. The credit is for fifty percent of the qualified railroad track maintenance expenditures paid or incurred by an eligible taxpayer during the taxable year with a limit equivalent to $3,500 per mile. Currently, the credit applies to any expenses paid or incurred after December 31, 2004, and before January 1, 2010. Expenditures that qualify for the credit include gross expenditures for maintaining railroad track, which includes roadbed, bridges, and related track structures, that are owned or leased as of January 1, 2005, by a Class II or Class III railroad. Currently legislation (H.R. 1132 and S.461) is being proposed to extend the tax credit through January 1, 2013, as it has been a helpful resource for short line railroads.

Credit Assistance Programs

Current federal law provides two credit assistance (i.e., direct loans, loan guarantee) programs available for rail investments.

Rail Rehabilitation and Improvement Financing (RRIF)

This program enables US DOT to make direct loans and loan guarantees to state and local governments, government sponsored authorities and corporations, and railroads and joint ventures that include at least one railroad. Eligible projects include:

1. Acquisition, improvement or rehabilitation of intermodal or rail equipment or facilities (including tracks, components of tracks, bridges, yards, buildings and shops);
2. Refinancing outstanding debt incurred for these purposes; or
3. Development or establishment of new intermodal or railroad facilities.

[42] Freight Transportation: Strategies Needed to Address Planning and Financing Limitations, prepared by the General Accounting Office (GAO), December 2003.

The FRA can authorize direct loans and loan guarantees up to $35 billion and up to $7 billion for projects benefiting non-Class I carrier freight railroads. Twenty-two loan agreements have been granted since 2002, totaling more than $778 million. The loans can fund up to one hundred percent of a railroad project with a repayment period of up to 25 years and interest rates equal to the cost of borrowing to the government. This program has proved challenging for recipients when they need to provide significant upfront assets to obtain low-interest loans.

Transportation Infrastructure Finance and Innovation Act (TIFIA)

This Act authorizes credit assistance on flexible terms directly to public-private sponsors of major surface transportation projects of national significance to assist in gaining access to private capital markets. TIFIA can provide direct loans, loan guarantees, and lines of credit to support up to 33 percent of a project's cost. TIFIA is restricted to projects costing at least $50 million, with the exception of projects for Intelligent Transportation System (ITS) projects. ITS projects must cost at least $15 million.

State Infrastructure Bank (SIB)

The National Highway System Designation Act of 1995 (Section 350) prompted the creation of State Infrastructure Banks (SIB) by allowing states to set aside up to 10 percent of their federal transportation funding for public-private investments. SIB may offer loan and credit options to help finance infrastructure projects. Money for projects may be loaned at low rates to private investors or may serve as capital reserve for bond and debt financing. The loan may be repaid with revenues generated by the project.

This program may have limited applicability to passenger rail systems, except in cases of shared use with a freight operation. The program has been used in several states to seed revolving loan programs for private railroad improvement projects.

This program could be an effective mechanism for public-private partnerships in Massachusetts as the state would commit an initial amount of fund to create a revolving loan fund to seek out projects with a strong return on investment. The loan payback and interest earned by successful projects could then be used to fund future rail projects in the state.

Capital Grants for Rail Line Relocation Projects

Congress authorized Section 9002 of SAFETEA-LU at $350 million per year for fiscal years 2006 through 2009 for the purpose of funding a grant program to provide financial assistance for local rail line relocation and improvement projects. Congress did not appropriate any funding for this program until FY 2008. The final rule to implement this program was published on July 11, 2008.

States are eligible to apply for grants for construction projects that improve the route or structure of a rail line and 1) involves a lateral or vertical relocation of any portion of the rail line, or 2) is carried out for the purpose of mitigating the adverse effects of rail traffic on safety, motor vehicle traffic flow, community quality of life, or economic development.

States or other eligible entities are required to pay at least 10 percent of the cost of the project. The state or FRA may also seek financial contributions from private entities benefiting from the rail line relocation or improvement project.

Surface Transportation Program

Surface Transportation Program (STP) funds may be used for highway improvements to accommodate rail line operations (clearances, grade separations), as well as for railroad relocations and consolidations, intermodal terminals and the acquisition of abandoned railroad ROWs. STP funds are often used by states to supplement the Section 130 grade crossing funds.

Short Line Railroads Tax Credit

The American Jobs Creation Act of 2004 included a provision to provide tax credits to help regional and short line railroads fund their infrastructure projects. The tax credit will provide small roads 50 cents for every dollar of qualifying track maintenance expenditures, such as cost to improve track, bridges and signals. The tax credit was established for a three-year period starting in 2005 and is capped by the number of miles owned or leased (by a Class II or Class III railroad) multiplied by $3,500 for each of the three years.

The tax credit was extended through 2009 but federal legislation is pending in the current Congress to extend this tax credit program through 2012, and to increase the credit cap to $4,500 per mile. This program is oriented to freight operations, but it may provide for improvements on shared use ROWs, which would also benefit passenger rail.

8.2.5 Commonwealth of Massachusetts Funding Programs Available for Rail

State funding programs are often targeted at critical state infrastructure, preservation of freight infrastructure, and often part of economic development initiatives. Many states have developed programs providing loans and in some cases grants to parties whose activities facilitate improvements to the freight transportation network, particularly to improving freight rail transportation. The programs usually offer reduced interest rates, or other incentives for those projects that improve the infrastructure, enhance economic development related to freight movement, or help maintain and improve the competitiveness and viability of rail as a means of freight transportation. The following programs are currently active in Massachusetts.

Public Works Economic Development (PWED) Program

The Public Works Economic Development (PWED) Program was created by the legislature to assist municipalities in funding transportation infrastructure for the purpose of stimulating economic development. The PWED regulations (7.01 CMR 5.00 et seq.) are "designed to provide eligible municipalities with maximum flexibility and discretion as it relates to project development and implementation" (701 CMR 5.01), but vest in the Secretary of Transportation the responsibility for evaluating and selecting eligible projects that will facilitate economic growth consistent with applicable state policies (701 CMR 5.10).

Governor Patrick's Administration seeks to use this program to champion sustainable economic development and job growth. The program may have applicability to passenger rail interests when shared use ROWs or facilities are involved.

MassDOT's Freight Rail Grant Program

Eligible proponents of freight rail projects include the Commonwealth, as well as regional or municipal/local public entities. Awards are not made to private parties, can only be used for infrastructure/capital investments, and may not be used as operating funds. A proponent's support for a freight rail project must be financial as well as functional. If a proponent is to be a public/private or public/public partnership, the project proponent shall outline the terms of the partnership, including the value of the parties' respective contributions and the effect, if any, on the public applicant's continuing control of the project. The program may have applicability to passenger rail interests when shared use ROWs or facilities are involved.

Highway-Rail Grade Crossings

The Highway Division of MassDOT, manages the Section 130 Highway-Rail Grade Crossing Program as established by the Highway Safety Act of 1973 (23 USC 130). The goal of the Section 130 program is to provide federal financial support in efforts to reduce the incidence of accidents, injuries and fatalities at public rail-highway crossings. States may utilize the Section 130 program, administered by the FHWA, to improve railroad crossings using a variety of methods, including installation of warning devices, elimination of at-grade crossings by grade separation, or by consolidation and closing of crossings. A portion of the safety program funding is also eligible for elimination of crossing hazards, should a state choose to use the funds for this purpose. Funds from other apportionment categories may also be used to improve crossing safety. For example, any repair, construction or reconstruction of roads and bridges affected by a project would be eligible under normal funding categories. A corridor approach to improving railroad crossing safety promotes greater efficiency in addressing these issues and has been encouraged by FHWA. The program has been used by both passenger and freight operators since its inception.

8.2.6 Rail Funding Programs in Other States

The following are a number of state programs that provide financing options for public and private rail initiatives. The vast majority of the loan and grant programs require a public benefit from the project to justify the use of public funds for rail investment. The major functions of these programs are to preserve existing infrastructure, assist capital improvement projects, and provide economic development. These programs provide potential examples or best practices for Massachusetts to consider.

8.2.6.1 Industrial Rail Access Program (IRAP)

An Industrial Rail Access Program (IRAP) is created to provide financial assistance to improve industrial access to rail. These programs aim at preserving freight rail service, stimulating economic development through new or expanded freight rail service, and increasing the use of rail transportation.

An IRAP program would provide funding assistance for the construction or improvement of railroad tracks and facilities to serve industrial or commercial sites where freight rail service is currently needed or anticipated in the future. The funding program can allow financial assistance to localities, businesses and/or industries seeking to provide freight rail service between the site of an existing or proposed commercial facility and common carrier railroad tracks. Implementing an IRAP program would enhance industrial development opportunities and encourage freight shipment by rail to help reduce roadway congestion and emissions. The program is a logical extension of existing Massachusetts programs to complement economic development such as the Public Works Economic Development (PWED) and the Massachusetts Opportunity Relocation Expansion (MORE) programs. Equally, Massachusetts' current Freight Rail Funding Program is similar in many ways to an IRAP program except that the program's enabling legislation restricts private companies from using public funds for improvements; Despite its similarity in structure, it should be noted that the existing program has many existing financial obligations, and its funding is often restricted due to limited bond cap space. By allowing private companies to use public funds through a new IRAP program, these funds could be greater utilized for improvements to privately-owned rail in Massachusetts, providing public benefits by boosting economic development opportunities and encouraging use of the rail system. By allowing private companies to use public funds or enter into partnerships with public entities, there is an opportunity to leverage private investment for rail infrastructure improvements providing more funding than would otherwise be available to help encourage additional investment.

Each state's IRAP program varies in terms of budget and the percent of local and private funds that are required; Table 8-15 below shows various IRAP programs by state. For each program, eligible parties must apply for IRAP funds, and funds are awarded based on a number of criteria. For example, Maine's IRAP application process follows the former Local Rail Freight Assistance Program methodology created by the FRA, where projects are rated in ten separate categories.

Table 8-15: Industrial Rail Access Programs by State

State	Program Name	Match	Budget	Comments
Maine	Maine Industrial Rail Access Program (IRAP)	50% Minimum	$1 million total program (2007)	
New York	New York State DOT Industrial Access Program (IAP)		$1 million or 20% annual appropriation	60% Grant, 40% loan. Interest free 5 years.
North Carolina	Rail Industrial Access Program	50% Minimum		Grant program.
Pennsylvania	Pennsylvania Rail Freight Assistance Program (RFAP)	30% Minimum	$700k per project	$250,000 construction or 70%.
Virginia	Virginia Rail Industrial Access Program (RIAP)	1 to 1 match above $300,000	$300,000 unmatched funds per project. No more than $450,000 to any one county, town, or city in one FY.	Funds cannot be more than 15% of recipients' capital outlay.
Wisconsin	Freight Rail Infrastructure Improvement Program		$3 million per project.	Loans require minimum of 2% annual interest.

Source: "Financing Freight Improvements"

All applications for Maine's IRAP funds are rated in the following ten separate categories: job creation, new investment, intermodal efficiency, private share of cost, decrease in air emissions, decrease in highway maintenance costs, decrease in highway congestion, transportation and logistics savings, improvements in rail service, and the project benefit-cost ratio.[43] The requirement framework encourages improvements to rail infrastructure through competitive applications, and it results in funding assistance to projects with the greatest benefits. A comparison of state IRAP Programs, infrastructure, and freight data are provided below in Table 8-16.

Table 8-16: IRAP Program Comparison

State	Miles Operated	Tons (thous)	Rail Budget (Mil$)	$/mile	$/ton
Vermont	568	9,993	$8.6	$15,070	$0.9
New York	3,622	76,717	$20.0	$5,522	$0.3
Maine	1,165	7,381	$2.1	$1,844	$0.3
Pennsylvania	5,095	208,979	$38.5	$7,556	$0.2
Virginia	3,223	174,935	$15.3	$4,734	$0.1
TOTAL	13,373	478,005	$84.5		
Massachusetts	1,079	17,942			

Source: "Financing Freight Improvements", State DOTs, Transearch Database, FAF2, and Calculations HDR

[43] Maine DOT: http://www.maine.gov/mdot/freight/irap.php

8.2.6.2 Public-Private Partnerships

A number of states have instituted policies and programs that encourage Public Private Partnerships (PPP) to help leverage private investment into rail infrastructure. There are two distinct forms of PPP arrangements: one where private entities lease public infrastructure and one where investment in infrastructure is shared by public and private entities, regardless of ownership.

There are a number of state and federal programs that have been created to make public funds available to private railroads. Although public funds will benefit the private sector, public investment comes with restrictions and eligibility requirements. Projects generally have to provide measurable economic benefits, require matching funds, and in the case of rail may require accommodation of additional passenger service. The following are examples of existing PPP arrangements:

- Alameda Corridor – a $2 billion 20 mile rail expressway connecting Ports of Los Angeles and Long Beach to rail yards near Los Angeles. Allowed for faster more efficient freight flows;
- Chicago Region Environmental and Transportation Efficiency Program (CREATE) – a partnership between the State of Illinois, City of Chicago, and the freight and passenger railroads. The program will upgrade track connections and expand routes, meaning faster connections and operations. The first stage of construction is underway now at $330 million;[44]
- Heartland Corridor – this project is a partnership between the Federal Highway Administration and a private railroad that will raise bridge and tunnel heights to allow double stacking between the East Coast and Chicago;
- Texas PPP Legislation – recent legislation allows PPP agreements through Comprehensive Development Agreements (CDA) for project development and execution for transportation corridors with rail; and
- Virginia Department of Rail and Public Transportation - accepts solicited and unsolicited proposals for highway development from private entities to construct, improve, maintain, and operate.
- CSX Boston/Worcester Line – The MBTA acquired the property rights of the Boston to Worcester rail line from CSX, increasing the potential for additional commuter service. As part of this transaction, the Commonwealth and CSX will increase the vertical clearances of bridges along the railroad main line between I-495 and the New York State line to accommodate double-stack freight trains. The Commonwealth will assume responsibility for raising highway bridges, while CSX will be responsible for lowering tracks.

Partnerships allow private and public entities to pool resources together to make key infrastructure investments possible. For example, financing through public entities may allow for low interest loans that the private sector would not otherwise have access to, or key

[44] "Working together: Public-Private Partnerships", Association of American Railroads (AAR), January 2009.

investments by both parties in land and rail could lead to improved access to intermodal/distribution facilities resulting in economic benefits.

The public sector has fairly limited experience with PPP arrangements and must be careful when defining contractual terms to ensure that private interests are not out-weighing those of the public. Currently, PPP agreements are not standardized and they vary between each project and program. Effective PPP should provide positive public and private benefits, and offer equitable cost sharing arrangements between the parties.[45]

8.2.6.3 Preservation and Improvement

Preservation efforts for rail infrastructure can entail a number of actions by either public or private entities. Generally, preservation related projects include improvements and maintenance of existing lines, land acquisition, ROW, and rehabilitation of facilities. Most states evaluate potential projects based upon public benefits to safety and the economy, job creation/retention, improved service to industrial and agricultural customers, elimination of grade crossings and reductions in highway congestion. The following highlighted programs from other states provide grant or loan assistance for preservation and improvements to the existing rail infrastructure. Table 8-17 displays the major rail and preservation programs by state.

Table 8-17: Rail Preservation and Improvement Programs by State

State	Program Name	Program Details
Illinois	Rail Freight Program[46]	Provides assistance to communities, railroads, and shippers. Funding comes in the form of low-interest loans and grants. Funds provided by the IL General Fund and loan repayments.
Michigan	Rail Loan Assistance Program[47]	Provides no-interest loans up to $1 million to railroads, localities, EDC's, and freight rail users. Recipients must match 10% of project cost and demonstrate public benefits.
Mississippi	Local Government Revolving Loan Program[48]	Low interest loans up to 15 years at 1% less than Federal Reserve Discount Rate. Loans are from Mississippi Development Authority to counties or municipalities.
Ohio	Ohio Rail Development Commission[49]	Assists companies considering new rail infrastructure. Grants provided on basis of job creation/retention. Loans are 5 years with interest of 2/3 prime rate.
Virginia	Rail Preservation Grant Program[50]	Provides grants or loans for short line operations. Funds require 30% match. Local gov't, authorities, agencies, and non-public sector are eligible. Loans only available to large railroads.

[45] "Devising an effective PPP Strategy – Point of View – Public Private Partnerships – Industry Overview" Railway Age, Resor and Blaze, Dec 2002.
[46] "Financing Freight Improvements," FHWA 2007.
[47] "Financing Freight Improvements,"FHWA 2007.
[48] "Mississippi Freight Rail Service Projects Revolving Loan/Grant Program (RAIL) Guidelines" Mississippi Development Authority.
[49] "Financing Freight Improvements", FHWA 2007; http://www.dot.state.oh.us/divisions/rail/Pages/default.aspx
[50] Virginia Department of Rail and Public Transportation (DRPT): http://www.drpt.virginia.gov/activities/railfunding.aspx.

State	Program Name	Program Details
Wisconsin	Freight Railroad Preservation Program[51]	Grants for preservation and rehabilitation of publicly owned lines, purchase of abandoned lines. Grants account for 80%, and available to public agencies and private sector.

Source: Refer to Footnotes 27 - 32 on this page.

One of the larger preservation and improvement programs is the *Minnesota Rail Service Improvement Program,* which consists of five components that draw funds from the state general fund and general obligation bonds. The first component is the Rail Line Rehabilitation Program which provides low or no-interest loans for up to 70 percent of costs to railroads for the preservation and rehabilitation of rail lines. The second component is the Rail Purchase Assistance Program which provides funds for the purchase of regional rail lines. Criteria to receive funding include showing that the rail can have profitable operations, benefits exceeding costs of purchase and rehabilitation, and having capable operators. The third program component is the Rail User and Rail Carrier Loan guarantee Program, which guarantees up to 90 percent of loans to shippers and carriers for rail rehabilitation and capital improvements. The fourth component is Capital Improvement Loans of up to the lesser of $200,000 or 100 percent of costs for facility improvements, track connections and loading, unloading and transfer facilities. The final component is the Rail Bank Program, which is used to acquire and preserve rail lines for future transportation needs.[52]

8.2.6.4 Infrastructure Banks

In addition to preservation programs, certain states have created infrastructure banks that can provide low interest loans to private entities and governments for land acquisition, multimodal facilities, and other infrastructure improvements. The advantage of the infrastructure bank is the ability for the state to issue low interest loans from a revolving "bank" fund, where new loans can be issued from the repayment of previous loans.

The Washington Rail Bank funds small capital rail projects that improve freight movement by providing interest-free loans of up to $250,000. These interest-free loans must be matched by at least 20 percent of funds from other sources. Typical projects are strategic multimodal centers; purchases of rolling stock; improvements to terminals, yards, wharves, or docks; communication operating system improvements; siding track, rail grading, tunnel bore improvements; and bridges, trestles, culverts and other elevated or submerged structures.[53] Pennsylvania's Infrastructure Bank grants loans at one-half the prime lending rate for up to 10 years for all types of transportation infrastructure projects. Borrowers can be municipalities, counties, transportation authorities, economic development agencies, non-profit organizations, and private corporations.[54]

[51] "Freight Railroad Preservation Program Application Instructions," Wisconsin Department of Transportation, http://www.dot.wisconsin.gov/localgov/aid/frpp.htm.
[52] "Financing Freight Improvements," FHWA 2007.
[53] "Freight Rail Investment Bank Program Application Packet" WSDOT.
[54] Pennsylvania Infrastructure Bank" http://www.dot.state.pa.us/penndot/bureaus/pib.nsf/homepagepib?readform.

8.2.6.5 Tax Exemptions

Another method for leveraging private investments into rail can be achieved by granting tax exemptions. Through these arrangements the railroad infrastructure investment can be achieved, and the Commonwealth does not absorb the financial risk involved with the capital expenditures. Connecticut state law grants tax exemptions to qualifying passenger and freight railroads. Eligible railroads receive an exemption on gross earnings taxes for rail improvement and preservation projects the railroad undertakes. To be considered for the tax exemption, the projects must be railroad track or facility projects involving maintenance, rehabilitation or construction, or rehabilitation or acquisition of equipment that is used exclusively in Connecticut. Additionally there are provisions for the preservation of light density freight lines where the revenue and variable cost of the line creates the potential for abandonment.

Chapter 9 Investment and Policy Recommendations

This chapter summarizes the Rail Plan analysis from all preceding chapters into a set of investment and policy recommendations.

9.1 Rail Investment Priorities – High Return Projects

As described in the goals and objectives of the Rail Plan in Chapter 1, Massachusetts is committed to supporting and expanding the use of rail for passenger trips and goods movement. To accomplish that, the Commonwealth seeks to prioritize and help fund rail improvement projects with a strong anticipated public return on investment. The Rail Plan divides prioritized investment opportunities into near-term and long-term rail investment projects. Near-term projects are current initiatives with identified sources of funding and partnerships with private and public rail stakeholders to ensure implementation. Long-term rail investment projects are comprised of the investment opportunities assessed in Chapter 8 with the highest expected return on investment over the next 30 years. Specific funding strategies have not yet been identified for those projects, however, it is expected that MassDOT will work with the relevant private and public rail owners and stakeholders to determine the most feasible and implementable funding and operating plans.

9.1.1 Near-Term Rail Investment Projects

Massachusetts has four major near-term rail investment projects that it is actively engaged in, with identified funding, and longer-term rail service objectives.

Knowledge Corridor Passenger Rail

As discussed earlier, Massachusetts has received a $70 million HSIPR award to restore the Vermonter to the Connecticut River Line to provide more direct, faster, and more reliable train service to the Pioneer Valley. The awarded project will provide new train stations in Northampton and Greenfield as well as restored and improved rail tracks and infrastructure. The project will go through final design in 2010 and early 2011 with construction starting as early as 2010 with implementation of service on the restored corridor in 2012. As discussed in the investment scenario analysis, mid to long-term improvements could include a new train station in Holyoke as well as the potential to increase the number of trains traveling north of Springfield.

The HSIPR application requested $75.1 million, which included track improvements to service the realignment of the Amtrak Vermonter as well as a bike tunnel in Northampton to connect bike paths on either side of the railroad. As part of the application, five major categories of benefits associated with the project were estimated: benefits to existing riders, benefits to new riders, freight benefits, and congestion relief benefits, and health benefits of the bicycle tunnel.

Two-thirds of the benefits from the project accrue to remaining highway users who improve their travel time as roadway congestion is reduced. One-third of the benefits related to the bicycle tunnel are health related. Total benefits of the project are estimated to be $373.8 million with a Present Value of $118.6 million. The present value of costs is $69.0 million. The Net Present Value is $51.7 million, resulting in a benefit-cost ratio of 1.8.

South Coast Rail Bridges

MassDOT was awarded a $20 million TIGER award to support the reconstruction of deteriorated bridges in New Bedford. These bridges are critical components of the rail link from the Port in downtown New Bedford to the north-south rail lines in Southeastern Massachusetts, and ultimately, the connection into the larger national freight rail network. Governor Patrick announced that construction will begin in fall 2010. In the near-term, these projects will enable continued freight rail operations from the downtown, including the rail transport of environmentally hazardous dredge material from the city's harbor. The freight rail bridges would also benefit efforts at the port to improve marine terminal facilities and expand cargo volumes. Longer-term, the improved rail bridges are critical to providing passenger service to New Bedford as envisioned in the South Coast Rail project.

The South Coast Rail project will rehabilitate four structurally-deficient railroad bridges, which currently allow trains to travel at a maximum of 5 miles per hour. Presently, 1,300 carloads per year of PCB-contaminated dredge spoils are hauled from the New Bedford Harbor over the bridges. An additional 500 carloads of freight also depend on the bridges. Through the rehabilitation of these bridges, freight rail service will continue and provide the following benefits: shipper and freight logistics cost savings; roadway congestion relief; reduced accidents; and a reduction in highway maintenance costs.

The benefit-cost ratio for the project is between 0.5 and 1.3, depending on the discount rate and connectivity to the Port. The analysis also indicates that the project will reduce fuel consumption by 292,000 gallons of gas per year, and avoid 7,700 trucks traveling through New Bedford each year carrying environmentally-contaminated materials. In addition to these benefits, these rail bridge projects are a necessary component of the planned South Coast passenger rail project to connect Boston to New Bedford and Fall River.

South Coast Rail

The reconstruction of the rail bridges in New Bedford will be completed in 2012. The larger South Coast Rail project will also be advancing toward an open date of 2016 or 2017. The next steps for the project are to:

- Co**mplete the state and federal environmental review process.** The Draft Environmental Impact Statement is expected to be released by the U.S. Army Corps of Engineers in fall 2010. It will be a joint federal and state document and will also serve as the Draft Environmental Impact Report. Shortly thereafter, the Corps will issue a finding on what the best alternative route is. The Army Corps will then prepare a Final Environmental Impact Statement.
- **Secure the necessary permits.** Local, state and federal permits are required to construct the project. Permitting activities are ongoing and will overlap with the environmental review phase. We expect all permits to be obtained by the end of 2012.
- **Line up funding.** MassDOT will issue a finance plan for the project after the Army Corps has selected the preferred alternative. The financing will likely be a mix of

state, federal and other funds for construction. A plan for obtaining the necessary operating funds will also be developed.

- **Catalyze economic development and facilitate the preservation of natural lands.** Through the continued implementation of the *South Coast Rail Economic Development and Land Use Corridor Plan*, the Commonwealth will be partnering with the Regional Planning Agencies and the region's cities and towns to get in place plans, zoning, and investments that target growth to new train stations, downtowns and village centers and that preserve farms, fields and forests.
- **Green all aspects of the project.** The Commonwealth is committed to designing and building a model green project. We expect to reduce greenhouses gases through encouraging smart growth development and discouraging urban sprawl, create modern, energy-efficient stations with integrated green energy technologies, like parking lots roofed with solar panels, and use recycled, reused, and local materials in the creation of the rail line to reduce waste.
- **Continue to gather ideas from the residents and leaders on how to design the best project possible.**

CSX Operating Agreement Transaction

CSX and MassDOT have agreed to a major transaction that is in the process of being implemented as stipulated in the parties' operating agreement terms. The key implications of this $100 million transaction include:

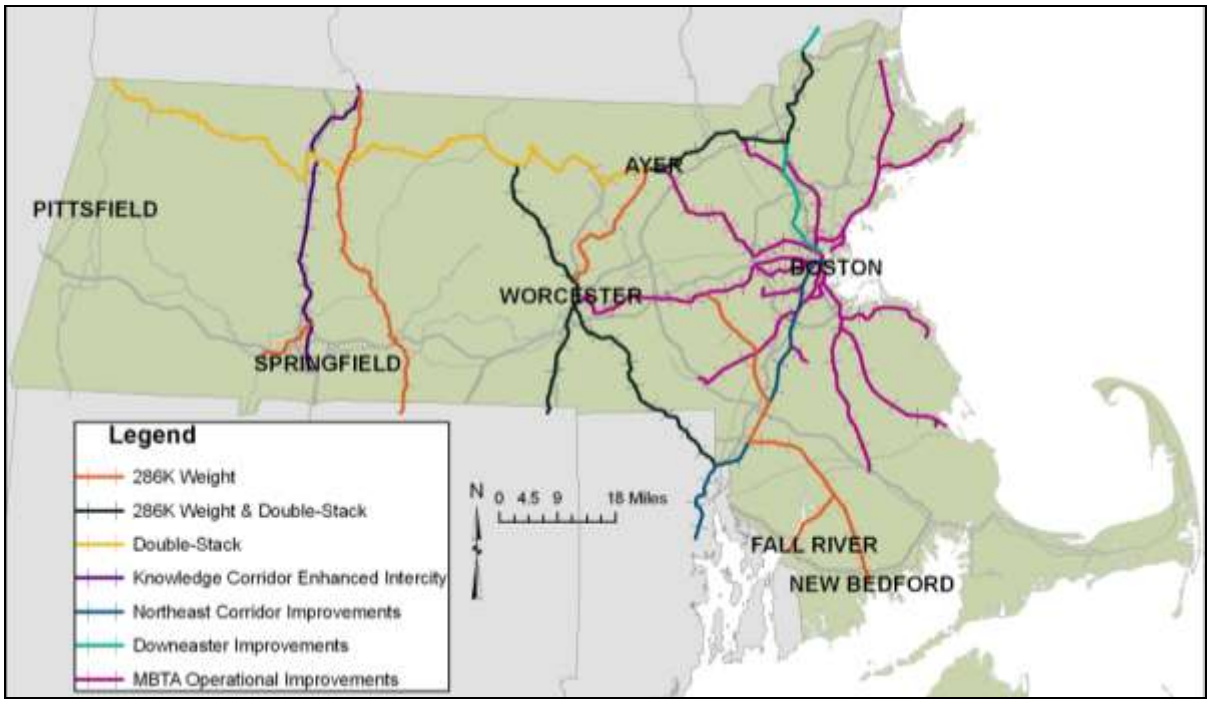
- MassDOT gains ownership of the Boston Line from Worcester to Boston and the Grand Junction Branch. This allows MassDOT and MBTA to have control and priority over rail schedules in this key commuter and intercity passenger rail corridor with planned expansions of passenger service between Worcester and Boston including the potential for service to North Station.
- MassDOT gains ownership of the Fall River and New Bedford rail lines to help facilitate the potential implementation of the South Coast Rail Project.
- CSX will relocate most (if not all) of its Beacon Park Yard intermodal rail yard activities to Worcester and plans to expand its intermodal facility in Worcester.
- CSX and MassDOT agree to complete work by August 15, 2012 to allow for 2nd generation double-stack freight rail from the New York/Massachusetts state line to Westborough. This will provide an uninterrupted double-stack clearance rail corridor from Chicago to Worcester for more competitive rail shipping.

9.1.2 Long-Term Rail Investment Projects

For each of the rail investment scenarios in Chapter 8, individual projects demonstrated strategic benefits paired with high return on investment (ROI). The projects from each scenario that are estimated to provide the best return on investment and strategic transportation advantages were selected to create a set of recommended projects. These multimodal projects enhance current rail service and capitalize on current infrastructure to facilitate network level efficiencies. Freight rail improvements include both 286k weight on

rail capacity and double-stack clearance improvements. The high return projects are shown in the map below (Figure 9-1).

Figure 9-1: Rail Investment Projects with the Highest Estimated Return on Investment



The freight rail projects with the highest estimated ROI include:

Project Name	Investment
Mechanicville to Ayer	Double-stack
Ayer to Maine	Double-stack & 286k
Worcester to Ayer	286k
NECR (VT border to CT border)	286k
PVRR Westfield to Holyoke	286k
P&W (Worcester Connections)	Double-stack & 286k
Framingham to Taunton (CSX)	286k
Taunton to New Bedford & Fall River (MC)	286k

Please note that "double-stack improvements" refer to 2nd generation double-stack improvements with a vertical clearance of at least 20'8".

The passenger rail projects with the highest estimated ROI include:

- Providing enhanced level service on the realigned *Vermonter* route, with a capital cost of $32.5 million for improvements to accommodate additional trains and faster speeds.
- The improvements to the Northeast Corridor at a capital cost of $1.3 billion for the expanded service, as well as infrastructure improvements at South Station and along the right of way in Massachusetts.
- The Downeaster improvements, including the improvement of the Merrimack River Bridge, double tracking, and enhanced service at a capital cost of $110 million.
- The improvements to the North Side of the MBTA Commuter Rail, including additional service along each line, infrastructure improvements and parking improvements at a capital cost of $321.9 million.

Priority Rail Routes and Corridors

As discussed in the evaluation criteria (Chapter 7), priority routes represent the most critical passenger and freight rail corridors in the state in terms of serving local, regional, and intercity/interstate passenger and goods movement. Based on the near-term investment projects and scenario analysis findings of corridor projects with the highest return, the Rail Plan has identified priority rail routes with recommended infrastructure capacity and services:

CSX Main Line from the New York border to Worcester – This route, already carrying the largest amount of freight volumes, is planned for double-stack vertical clearance by August 2012. It has capacity for 315,000 pound rail cars consistent with major Class I railroad lines and has the potential to provide more competitive rail shipping options from the Chicago and New York/New Jersey areas. A planned expansion of the Worcester intermodal facility will further increase the capacity and competitiveness of this route.

PAS Patriot Corridor from the New York border to Ayer and on to Maine – This route is already being upgraded to 286,000 pound railcar capacity to Ayer with the newly formed Pan Am Southern. The investment scenario analysis suggests that this corridor should be consider for further improvements: a) providing double-stack clearance to Ayer; and b) providing 286,000 pound capacity beyond Ayer into Maine to help serve northern New England rail opportunities.

P&W and NECR Regional Rail Corridor Upgrades – As described above, north-south connecting corridors along the NECR and P&W railroads are also expected to generate a positive return on investment with a 286,000 pound upgrade to the NECR and combined double-stack clearance and 286,000 capacity on the P&W routes to/from Worcester.

South Coast Rail Improvements – In the near-term, the reconstructed New Bedford bridges will bring improved freight rail service to the region. In the longer-term, upgrading the CSX branch line from Framingham to Taunton to 286,000 pound capacity will help to leverage the freight and distribution activity in the region, while the South Coast Rail passenger rail project extending MBTA commuter rail to New Bedford and Fall River is scheduled for operations in 2016.

Northeast Corridor (NEC) – This is the most heavily traveled intercity passenger rail route in the U.S. and is planned for a range of corridor and station improvements as outline in the NEC Master Plan. Massachusetts continues to view this as a top priority for passenger rail in the state.

Knowledge Corridor Passenger Rail – Awarded $70 million in HSIPR funding to relocate the Vermonter to the Connecticut River Line, this rail corridor will also benefit from coordinated improvements and funding awards in Vermont and Connecticut as well as Connecticut's planned New Haven-Springfield service. In addition, the recently completed feasibility study for this corridor found the strongest return on investment from upgrading the infrastructure and services consistent with 4-5 daily trains, similar to the Downeaster service frequency.

Downeaster Corridor Upgrades – Already viewed as a national best practice, this passenger rail corridor envisions other track and service upgrades to keep ridership on a growth path. Most notably in Massachusetts, this includes rehabilitation of the Merrimack River bridge crossing.

Inland Route – Massachusetts and Vermont are initiating a planning study to develop high speed and intercity passenger service along two routes from Boston to New Haven via Springfield and from Boston to Montreal. This study would identify a set of improvements necessary to operate high-speed passenger rail service along the route. The preferred improvements would be determined based on identified corridor constraints, economic development opportunities and estimated ridership. Completing this plan will then allow the identified improvement projects to compete for future rounds of federal funding. It is expected that this planning feasibility study will be initiated in the second half of 2010.

Priority Rail Projects

PVRR 286,000 pound Upgrade – This relatively short rail corridor serves a large number of rail customers in the Westfield/Springfield area. An upgrade to 286,000 pound capacity with a connection to the restored Connecticut River Line in Holyoke would further enhance this rail corridor.

MBTA Commuter Rail Upgrades – As assessed in Chapter 8, there are a number of potential MBTA commuter rail upgrades that provide a positive return on investment. These improvements are focused on: a) rolling stock replacement; b) positive train control (PTC)

upgrades; and c) targeted capacity improvements for both station parking and rail corridor infrastructure.

West Springfield Intermodal Connector – West Springfield's Union Street Bridge project and related access road to the CSX intermodal terminal is an example of a critical need to connect rail and freight facilities with the highway system. This project, by improving access to and from the surrounding highway system (e.g., I-91 and I-90) will enable the long-term capacity expansion at the terminal while limiting the traffic impacts to the surrounding neighborhood and community.

South Station Expansion Project – As recommended in the Northeast Corridor (NEC) Master Plan, expansions to South Station are planned and needed to accommodate anticipated growth in Amtrak high speed and intercity train volumes as well as expected growth in MBTA's commuter rail service. Expansion would involve additional platforms to efficiently handle more trains such as the Acela service, the Inland Route, and South Coast Rail Project.

9.2 Policy Recommendations

A number of policy issues and recommendations have been identified in the areas of land use development, and funding and financing to best utilize the existing rail transportation system in the state and to support potential investments.

9.2.1 Land Use Development

Because freight movement takes place within a land use context, manufacturers and distributors of goods are located throughout Massachusetts in a variety of settings. Companies make market decisions regarding where to locate their facilities. Key considerations in these decisions are the availability of sites of the requisite size, the availability and quality of freight transportation, and proximity to markets and labor. The significant concern for freight-intensive uses is that other land uses that are not freight dependent often are considered the highest and best use for most developable land in the state. These other land uses tend to predominate in the real estate market and are typically the target of most economic development initiatives. In addition, freight-intensive uses have size and activity characteristics that are often perceived as incompatible with other land uses. The result of this combination of economic development focus and perceptions is that land served by rail and originally zoned for freight-intensive uses is being rezoned for other uses.

The following items are specific recommendations for further development and action.

Freight-Intensive Land Use Policy

A policy on freight-intensive land uses should be adopted by MassDOT and the Executive Office of Housing and Economic Development that articulates the Commonwealth's interest in preserving land for freight-intensive uses and developing parcels in a manner that does not foreclose rail access. This policy would define freight-intensive use and set forth criteria for determining if a parcel is of strategic importance for these uses. The policy and its criteria would be used to:

- Develop a statewide inventory to identify major parcels of strategic statewide importance suitable for intermodal centers, distribution/assembly centers, or freight villages, as well as in evaluating local industrial-incentive areas (described below) that are proposed by municipalities. As mentioned earlier, the current list of Priority Development Sites does not include any sites expected to include freight-intensive uses, and this action would thus create a limited number of strategic statewide sites for freight-intensive use.
- Explicitly include freight-intensive uses as eligible elements of Chapter 43D Priority Development Sites, and as qualifying uses under the Growth District Initiative. This could be addressed by having the Interagency Permitting Board under Chapter 43D make a simple revision to its guidelines to address freight-intensive use. Maintaining rail access would become a requirement for such parcels under both programs.

This policy would be considered in MEPA review in a manner similar to the Commonwealth's ten sustainable development principles and would be instrumental in pre-review under MEPA (described below). This aspect of the policy should be articulated through development guidelines for parcels with rail access. The guidelines could also be adopted by local planning boards as part of their subdivision regulations where applicable.

Statewide Inventory of Sites

In order to target specific sites for a freight-intensive use policy, MassDOT and EOHED in collaboration with its partners, including MassDevelopment and MassEcon, should identify approximately five sites of at least 10 acres suitable for large-scale freight uses such as intermodal and/or large distribution facilities. The inventory should also identify a second tier of smaller sites that have good multi-modal transportation access and can support freight-intensive uses that contribute to the Massachusetts economy. MassEcon has begun similar work by engaging with the Massachusetts Railroad Association to qualify rail-served sites from their SiteFinder database. Completing this work with input from the railroads and economic development officials would provide a strong foundation the inventory of sites.

Freight-Intensive Land Use Development and Preservation

Many parcels of the size, location, amenities, and access characteristics suitable for rail freight operations are currently threatened by development that would preclude their use. For one, many of these parcels are simply being converted or rezoned to non-industrial use. Others are being reduced to a size that is not adequate for freight uses due to "encroachment" of other land uses. Still others are being isolated by development that blocks access to the freight transportation network. Similar issues occur on waterfront parcels in or near ports although these areas often enjoy greater regulatory protections, such as Designated Port Areas and Chapter 91 regulations, than rail-accessible parcels.

Planning for freight-oriented land use and recognition of the essential role that freight and logistics support plays in a modern and sustainable 21st century economy are largely discounted at the local level, and have often been undervalued at the broader state and regional levels. Current MGL Chapter 40 programs do not include explicit considerations for the range of freight activity required to support and sustain these development trends.

A successful program to emulate for freight-intensive land use preservation is the existing MGL Chapter 40L, Agricultural Incentive Areas. MassDOT recommends that legislation be adopted to allow for an "Industrial Incentive Area" statute. The new statute would keep land use responsibility at the local level, giving the state and municipalities the option to designate industrial land suitable for freight-intensive uses as an "Industrial Incentive Area." Once the statute has been adopted and the parcel designation has been approved by a 2/3 vote of the municipal legislative body, sale, or conversion to non-industrial use would require notice from the owner, and the municipality (or state) would have a first option to purchase the property at its appraised full market value. Like Chapter 40L, the rationale is that designation of a parcel as an incentive area allows land to remain in a desirable land use under private ownership, but allows the public sector to acquire a parcel before its use is changed.

Pre-Review of Freight-Intensive Development Under MEPA

MEPA is relatively flexible in working with project proponents to facilitate development. In particular, a major freight-intensive development such as a freight village or a distribution site with multiple parcels or phases could be reviewed through a Generic EIR that anticipates key impacts related to the development. This would streamline the environmental process as individual parcels or phases could be quickly and easily reviewed if their characteristics fit within the envelope of impacts established by the GEIR. Depending on the specific situation, a series of Notices of Project Change could be used to address these implementation stages. Alternatively, a Special Review Process could be employed that characterizes impacts and appropriate mitigation commitments for the overall development, with expedited review of successive implementation stages as final development plans are solidified for the parcels within the overall master plan.

9.2.2 Rail Funding and Financing

A critical element of improving the state's freight transportation infrastructure is determining practical and innovative mechanisms to finance improvements. Key recommendations include:

- Greater consideration of goods movement in funding allocations
- Strategic multi-modal investments in projects of statewide significance
- Creation of an industrial rail access program (IRAP)
- Increased public-private partnership opportunities and funding
- Continued strategic pursuit of competitive federal funding opportunities

Greater Consideration of Freight in Transportation Funding Decisions

As demonstrated herein, there is a significant need for infrastructure improvements targeted at goods movement, along with significant public benefits of more efficient, cost-effective, and environmentally-friendly freight. Traditionally, transportation funding decisions, have only considered freight in an indirect manner. This study has compiled significant data on freight activity for all key facilities and developed a series of data-oriented measures to track freight system performance in Massachusetts. MassDOT will incorporate these key infrastructure condition and performance metrics developed as part of the decision-making process for future transportation investments.

Strategic Multi-Modal Investments

The recent reorganization of the transportation agencies in Massachusetts completes the evolution of state transportation from a highway-focused organization to a true multi-modal transportation agency. Consistent with this evolution and supported by the analysis findings in this plan, there are significant public benefits to be achieved from multi-modal investments in rail and intermodal facilities. The state's traditionally modest direct funding to these non-highway modes is increasingly falling behind other states regionally and nationally. This could be accomplished through a new dedicated funding mechanism within the state budget, and/or targeting specific multi-modal investment projects that are expected to generate significant public benefits.

Industrial Rail Access Program (IRAP)

Rail sidings for industrial use are costly to construct, particularly compared to roadway based connections that are inherently a component of an industrial facility. An IRAP would provide funding assistance for the construction or improvement of railroad tracks and facilities to serve industrial or commercial sites where freight rail service is currently needed or anticipated in the future. The funding program can allow financial assistance to localities, businesses, and/or industries seeking to provide freight rail service between the site of an existing or proposed commercial facility and common carrier railroad tracks. The program is a logical extension of existing Massachusetts programs to complement economic development such as the Public Works Economic Development (PWED) and the Massachusetts Opportunity Relocation Expansion (MORE) programs.

The benefits of IRAP programs in Maine, New York and other nearby states currently place Massachusetts at a competitive disadvantage for locating industrial companies on rail-served sites. They typically are funded at modest levels (less than $5 million/year) and require significant matching funds from the private sector. Massachusetts' current Freight Rail Funding Program is similar in many ways to an IRAP program except that the program's enabling legislation restricts private companies from using public funds for improvements. in addition, the program has many existing financial obligations, and limited bond capacity. By allowing private companies to use public funds through a new IRAP program these funds could be greater utilized for improvements to privately-owned rail in Massachusetts, thus boosting economic development opportunities and encouraging use of the rail system.

IRAP requirements should include a competitive grant process with at least 50 percent matching funds and projects should demonstrate quantitative and qualitative economic benefits such as job creation and retention, and increased state/local tax revenue from the benefiting businesses with mitigation for any impacts on passenger rail services.

Increased Use of Public-Private Partnerships

A major theme of the Rail Plan is that targeted and prioritized freight transportation investment results in both public and private sector benefits for the state. To realize the benefits projected in the Rail Plan, the state can more proactively partner with the private sector on mutually beneficial projects by sharing the upfront capital costs. This is especially true for the rail system where policy constraints have limited the ability of the state to engage in true shared investment for shared benefit arrangements. Other states are increasingly

using rail funding mechanisms to cover critical corridor and intermodal facility improvements that emphasize private sector matching funds and prioritization of projects based on quantitative evaluation criteria and cost-benefit analysis.

One good example of a consortium project in the western region of the Commonwealth is the Lowe's Flatbed Distribution Facility in the Westfield Industrial Park, which is 200,000+ square feet and employs more than 125 people. This project is a partnership between Lowe's and the Pioneer Valley Railroad (PVRR). The upgrades to the extensive track structure used in the facility cost $750,000 and were paid for by Lowes. PVRR is refunding Lowe's investment through a per car allowance. Partnerships like this one could be further promoted with the help of the Commonwealth, if restrictions on public funding were clarified.

Competitive Federal Funding Programs

The American Recovery and Reinvestment Act (ARRA) of 2009 led to new, competitively funded programs such as TIGER (Transportation Investment Generating Economic Recovery) Grants and the High Speed Intercity Passenger Rail (HSIPR) program. While these programs were designed specifically to provide economic stimulus, their success and the overwhelming demand for these funds suggest that similar future rounds of Federal funding and application requirements are likely. Lessons learned from those programs for maximizing funding success are:

- Projects need an existing planning and feasibility analysis
- Positive cost-benefit analysis and identified sustainable benefits are needed to demonstrate a strong return on investment,
- State and local stakeholder support and funding contributions are needed for a project Multi-modal transportation strategies linking freight and transit will do well in programs such as TIGER
- Projects with coordinated regional and multi-state elements are positively considered

As Massachusetts was successful in recent TIGER and HSIPR funding applications, it should continue to position its key state and regional transportation investment efforts to be prepared for potential Federal funding opportunities.

It should be noted that the federal government is currently considering the implementation of dedicated rail funding sources as part of the new transportation authorization bill. These efforts may provide the state with additional funds for use in rail infrastructure projects in the future. Although expanded federal support would be beneficial to the Commonwealth's rail infrastructure, local sources of funding will continue to be required.

9.2.3 Passenger Rail Operations and Sustainable Development

Passenger rail is a critical component of the Commonwealth's transportation system with strong commuter rail and intercity services and ridership. To complement the existing system and potential enhancements, Massachusetts should consider some supporting policy initiatives to maximize the use and benefits of passenger rail in Massachusetts.

MBTA Commuter Rail Strategic Master Plan

It is recommended that the MBTA and MassDOT develop a Strategic Master Plan for the commuter rail system to guide the investment and expansion over a 30-year time horizon. Over the past 20 years, the MBTA's commuter rail system has undergone significant expansion including the Greenbush project and the planned South Coast Rail Project. This planning study will guide the strategic consolidation of this expansion for consistency with improvements in complementary transit modes and expected economic and residential development growth. It will also prioritize efforts to bring the system to a state of good repair. Looking forward, there are a number of related intercity rail initiatives such as corridor service development plans for the Downeaster, Capital Corridor, Inland Route, as well as the Northeast Corridor planning effort which will share MBTA rail lines to reach Boston. The proposed MBTA Master Plan will enable the successful integration of commuter and intercity services through a coherent planning process.

Increase MBTA Rail Ridership through Operations and Service Improvements

As documented in the Rail Plan, MBTA commuter rail ridership has grown over the past decade but the rate of growth is less than the Amtrak intercity services and less than projected by the MBTA five years ago. Potential operating improvements to increase ridership include promoting reverse commutes and providing better access to jobs. As job opportunities continue to grow throughout the metropolitan Boston area, rather than only in the downtown area, the commuter rail system needs to find ways to better serve the diversity of employment clusters such as found near the I-495 corridor. In addition, the state is pursuing an economic development strategy to improve job opportunities in Gateway Cities such as Lowell, Lawrence, Brockton, New Bedford, and Fall River. Connecting these economic development strategies to cities that are already served by the MBTA (or are planned for service) could strengthen MBTA ridership to traditional downtown areas outside of the core Boston area. In addition, coordinating shuttle services from rail stations with major employers in the suburbs could also help lessen highway congestion, provide greater mobility and increase ridership.

Enhance Transit-Oriented Development and Sustainable Development at Train Stations

Another potentially powerful mechanism to enhance passenger rail ridership is to continue focusing sustainable development strategies near existing and planned train stations. This is consistent with the broader transit-oriented development (TOD) initiatives nationwide which are currently culminating in an unprecedented partnership between the U.S. DOT, the Department of Housing and Urban Development (HUD) and the EPA. The livable and sustainable communities planning grants, supported by TIGER grant selection criteria, are direct signals of the direction of federal policy focused on integrating transportation, land use, development, energy efficiency, and environmental considerations.

In Massachusetts, two prime examples of this kind of initiative are: 1) the Massachusetts Sustainable Development Principles, which emphasize compact mixed use, transportation

choices, and job and residential opportunities[55]; and 2) the recently developed South Coast Rail Economic Development and Land Use Plan that stresses pre-planning for new train station locations to help achieve the benefits of TOD.[56] In particular, the South Coast Rail Corridor Plan has many useful recommendations in terms of zoning, open space, allowable densities with examples that show a diverse range of potential rail-focused mixed use development alternatives by community. This kind of initiative could be applied to either MBTA commuter rail stations or intercity train stations such as the new stations planned for Northampton and Greenfield along the Vermonter. Achieving sustainable development surrounding train stations will lead to increased ridership as well as other development, transportation, and environmental benefits.

[55] http://www.mass.gov/Agov3/docs/smart_growth/patrick-principles.pdf
[56] http://www.southcoastrail.com/

APPENDIX A:

RAILROAD YARDS IN MASSACHUSETTS

Table A-1: Existing Freight Railroad Yards and Facilities in Massachusetts

CITY/TOWN	NAME OF FACILITY	GENERAL FUNCTION	OTHER INFORMATION
Pan Am Railroad (Boston & Maine)			
Boston/Somerville	Valley area	Merchandise Freight	Former B&M yards in Boston no longer exist. PAR/PAS currently uses tracks behind CRMF for one local freight train serving area. Cars for Boston Sand & Gravel handled directly to their facility
Lawrence	Lawrence Yard	Merchandise Freight	PAR/PAS yard in northeastern Mass.
Lowell	Turnout Yard	Merchandise Freight	Several tracks near Gallagher Transportation Center used for block swapping and local freight
North Billerica	Shop Yard	Merchandise Freight	A number of consignees use various tracks in the old yard where the former B&M shops are located
Ayer	PAS Auto Site	Automotive	Inactive. Leased by CSXI, but CSXI moved traffic to Framingham, CP Yard
Ayer	Hill Yard	General Freight	Supports, intermodal and merchandise traffic
Ayer	Intermodal Yard	Intermodal	Intermodal terminal handling mostly containers and some trailers
Ayer	SanVel Site	Potential Automotive	Possible future use as an auto unloading facility. Formerly used to load concrete ties, unused for years.
Lunenburg	East Fitchburg Yard	Merchandise Freight	Primarily plastic resin transload and some local freight
Gardner	Gardner Yard	Merchandise Freight	Interchange with Providence and Worcester RR
Deerfield	East Deerfield Yard	Merchandise Freight	Major classification yard, locomotive servicing, work equipment and repair tracks
Holyoke	Mt. Tom Plant	Northeast Utilities Coal Yard	Coal yard for receiving unit trains of coal for Northeast Utilities Mt. Tom Generating Station
CSX			

Everett/Chelsea	NEP Yard	Merchandise Freight	Small yard supporting local customers, including Boston Market Term. & New England Produce Center
Boston-Allston	Beacon Park Yard	Intermodal	Intermodal terminal handling both trailers and containers
Boston-Allston	Beacon Park Yard	Merchandise Freight	Includes bulk Trans-flo facility (mostly sweeteners and edible oils) and general freight
Boston-Allston	Beacon Park Yard	Solid Waste Transfer	Transfers solid waste in sealed containers from truck to rail. Mostly commercial waste
Boston-Allston	Beacon Park Yard	Locomotive Servicing/RIP Tracks	Basic locomotive servicing and freight car running repairs
Boston-Readville	Readville Yard	Merchandise Freight	Supports local freight distribution along Northeast Corridor and connecting lines
Middleborough	Middleborough Yard	Merchandise Freight	Supports local freight distribution in southeastern Massachusetts, and Mass Coastal interchange
Braintree	S. Braintree Yard	Merchandise Freight	Storage and Interchange with Fore River Railroad
Framingham	North Yard	Merchandise Freight	Supports local freight distribution in eastern Massachusetts
	Nevins Yard	Merchandise Freight	Supports local freight distribution in eastern Massachusetts
	Auto Facility	Automotive	Unloads auto carriers to truck for distribution
	CP Yard	Automotive	Supports Auto facility and also used for storage
Walpole	Walpole Yard	Merchandise Freight	Small yard to support local freight distribution in east central Massachusetts
Westborough	Auto Facility	Automotive	Currently inactive-auto business moved to East Brookfield. Used for storage and local service
Worcester	Worcester Yard	Intermodal	Intermodal terminal handling mostly trailers - major user is United Parcel Service
Worcester		Transloading Terminal	Transfers plastic resins (pellets) from rail car to trucks, operated by Delaware Express
East Brookfield	Auto Facility	Automotive	Major auto unloading facility replacing Westborough and most of

			Framingham
Palmer	Palmer Yard	Merchandise Freight	Small yard used for interchange to New England Central RR and Massachusetts Central RR
West Springfield	W. Springfield Yard	Merchandise Freight	Supports local freight distribution and interchange to Connecticut Southern Railroad
West Springfield		Intermodal	Intermodal terminal handling both trailers and containers
Pittsfield	North Adams Junction	Merchandise Freight	Yard for local service and interchange with HRRC
Providence and Worcester Railroad			
Worcester	South Worcester Yard	Merchandise Freight	General freight yard includes locomotive service and repair facility as well as car repair
Worcester	Stackbridge	Intermodal	Intermodal terminal handling containers - mostly international - operated by Intransit Container
Worcester	Wiser Avenue	Intermodal	Intermodal terminal handling containers - mostly international - operated by Intransit Container
Worcester	Greenwood Yard	Transloading Terminal	Transfers various dry and liquid bulk commodities to truck for local distribution
New England Central Railroad			
Palmer	Palmer Yard	Merchandise Freight	General freight yard for local distribution
Massachusetts Central Railroad			
Palmer	Palmer Intermodal	Freight	General Freight Yard
Ware	Ware Yard	Transloading Terminal	Bulk transfer facility, mostly plastic resins
Massachusetts Coastal Railroad			
Fall River	Fall River Yard	Merchandise Freight	Small yard near the State Pier used for switching several consignees in the area

New Bedford	New Bedford Yard	Harbor clean-up operation	Rebuilt yard support potential business and to allow moving by rail dredged soil from harbor clean-up operation
Pioneer Valley Railroad			
Westfield	Westfield Yard	Merchandise Freight	General freight yard for interchange with CSX and local distribution
		Transloading Terminal	Bulk transfer facility, mostly plastic resins
Housatonic Railroad			
Pittsfield	North Adams Junction	Merchandise Freight	HRRC access to CSX yard for interchange with CSX and local distribution
Fore River Railroad			
Quincy	Fore River Yard	Merchandise Freight	Small yard at old ship yard area used to serve Twin River Technology plant and MWRA fertilizer
Grafton & Upton Railroad			
Grafton	North Grafton Yard	Merchandise Freight	Small yard for CSX Interchange and transload operation

APPENDIX B:

SUMMARY OF KEY RECENT

FREIGHT AND PASSENGER STUDIES

SUMMARY OF KEY RECENT FREIGHT AND PASSENGER STUDIES

As part of the development of this Plan, the consultant team reviewed a number of different local and national studies to better understand existing issues as well as best practices from other areas. The following summaries are based on three particularly relevant rail studies to Massachusetts, helping to guide the development of the plan.

"Identification of Massachusetts' Freight Issues and Priorities" (1999)

Identification of Massachusetts' Freight Issues and Priorities was prepared for the Massachusetts Freight Advisory Council (MFAC), in an attempt to improve communication between private and public interests, encourage participation, and advise the Agencies of Massachusetts related to freight. The study provides an extensive description of the Massachusetts freight industry structure and then presents and ranks the issues identified by the freight community in an attempt to increase the efficiency of the current freight transportation system.

Key Issues

This report focused on categorizing the key issues of the Massachusetts' freight system by each mode and geography. The report identified the truck network and airports including bottlenecks and stakeholder concerns. Port operations were discussed by the 9 major ports in Massachusetts. The issues and priorities identified can be categorized into five topics:

- Access plans and projects
- Regulatory actions
- Policy coordination and change
- Informational projects
- Other issues

Within these categories, specific issues were identified, ranked by importance, and grouped by the region to which they pertained. Public outreach concerns were included in the issues identified. The issues ranked with high importance include:

- Statewide – Administrative coordination, completion of ongoing highway projects, consistency of enforcement and regulations, double stack rail clearance, and improved communication between industry and agencies.
- Western Massachusetts – Pittsfield-MassPike connection feasibility study.
- Central Massachusetts – Worcester Regional Airport access.
- Southeastern Massachusetts – Air freight at New Bedford Airport, roll-on/roll-off ferry terminal in New Bedford, truck informational signs.
- Northeastern Massachusetts – Central artery/Ted Williams Tunnel project, hazardous materials movement, Logan Airport access, real estate development in South Boston, trucking access to South Boston industrial areas.

Goals and Strategies

The areas for Strategic Regulatory action were identified, while most of these actions were related to the truck mode, some could be applied to freight overall. The overarching strategic regulatory action that could be applied to all forms of freight transport was a call for consistency between federal, state, and local regulations relative to the transport of hazardous materials.

Since such a large effort was made to involve stakeholders and shippers, the major finding was that participant comments reflected issues that would improve an already functioning transportation system. For the most part comments reflect a concern for refining existing facilities and institutional arrangements, as well as a desire to ensure continued planning to meet the future demands necessary to remain competitive in the global market.

Recommendations

Most of the issues presented suggest the refinement and improvement of existing facilities as well as improving communication and coordination statewide. The overall recommendation is to maintain an inventory for planners and to aid prioritizing infrastructure investments for the future. In addition to prioritization the following efforts were recommended:

- Work towards administrative coordination and consistency of Enforcement and Regulations between multiple jurisdictions (local, state, and federal) especially in the handling of hazardous materials.
- Maintain and expand outreach through contact between the freight industry and public agencies. Maintain a single point of contact for the freight industry.
- Reduce constraints on trucking industry: issuing overweight permits, truck exclusion rules, MassPike Tolls, and diesel fuel taxes.

"Massachusetts Rail Trends and Opportunities" (July 2007)

The Massachusetts Rail *Trends and Opportunities* study from July 2007, prepared for the Massachusetts Executive Office of Transportation and Public Works, presents an overview of the Massachusetts rail network with freight related trends, challenges and opportunities both within the state and throughout the country to help frame both immediate and long-term policy decisions relating to infrastructure and service.

Key Issues

The study correlates rail growth with the level of investment in the national rail system and how well railroads will be able to absorb growth in the competitive transportation market. Future planning is necessary to ensure that operations can coexist while still meeting shipper needs. The major issues identified were the overall constraints of the existing system, and are representative of New England's history and density:

- Land or funding constraints leading to shared use corridors
- Capital expenditures increasing but still cannot accommodate demand which can lead to diversion to other modes or congestion at bottlenecks
- Service problems and lack of equipment that could reduce role of rail

Goals and Strategies

The major strategies were split into four main categories. First, public ownership of the rail network will result in the greater role of the public in preserving and managing the rail system. Second, the infrastructure system constraints and bottlenecks need to be identified, addressed, improvements programmed, and progress documented. Third, coordinate efforts to improve coordination and communication between administration and stakeholders. Lastly, preserve the existing system by allocating sufficient resources effectively.

The specific strategies included:

- Increasing track capacity to allow for passing trains
- Increasing yard capacity for intermodal transfers
- Improving grade crossing safety and implementing federal train horn regulations
- Focus on the preservation of key corridors and Class I service
- Securing capital funding to address critical long-term needs
- Identifying resources to fund and promote projects that meet System Preservation and Sustainability goals
- Explore options for Public/Private Partnerships and other innovative financing mechanisms
- Address growth in traffic congestion through strategic, multimodal management
- Establish a role for EOT within the dynamic that may include evaluating options for removing or mitigating any negative operations or financial impacts

Recommendations

Any policy must consider the regional and national freight rail connections, federal rail policy, the whole freight market, passenger rail, and funding availability. The major recommendations included:

Network Rationalization

- Play a meaningful role in decisions that impact operations and infrastructure, identify critical freight rail corridors and evaluate the system as a whole. Attempt to improve rationality and functionality.

Infrastructure

- Prioritize investments according to a set of objective project evaluation criteria. These criteria may include threshold ratings for various factors such as age of asset, remaining useful life, operational impact, and cost effectiveness.

- Consider expansion and improvement in the context of the commonwealth's freight rail funding and economic development funding programs.
- Conduct an initial assessment to establish a range of investments to preserve the status quo, enhance rail service, and improve the relative position of freight rail in the transportation network.

Grade Crossings

- Continue to work with MBTA and MassHighway to develop a coordinated, programmatic approach for identifying and resolving safety concerns. Supplement this with private input and include operational, financial, and liability considerations that impact private railroads and public entities responsible for the highway/road crossings.

Vertical Clearance & Capacity

- Create an internal reporting mechanism to evaluate the current status of issues on vertical clearance, chokepoints, and decision making.
- EOT may want to consider working with private operators and neighboring states to designate critical high density corridors for weight capacity improvements.

"Northeast Rail Operations Study" (July 2007)

The Northeast Rail Operations Study (NEROPS) was commissioned by the I-95 Corridor Coalition, which is a partnership of state departments of transportation, regional and local transportation agencies from Maine to Florida, including some members in Canada. The "Northeast Rail Operations Study" addresses many characteristics of the regional transportation network describing the regional Stakeholders and operations, trends influencing growth and operations, the constraints (bottlenecks) of the system, and provides recommendations to the Northeastern states to address freight and passenger rail.

Key Issues

Several intercity passenger and commuter railroads operate in the Northeast, often by different entities. The major issues and obstacles to passenger and commuter rail include the growing demand for service, evolving markets and logistic patterns, continued financial challenges of the railroad industry, and regional growth constraints. For much of the Northeast, operations have combined passenger and freight on the same corridors which can often create operational and institutional constraints. In terms of capacity many smaller railroads cannot accommodate 286,000-pound railcars, and therefore cannot handle larger trains. Additionally, demand for freight is on the rise as port-rail connections are more desirable due to increased trade and demand for port-rail and other multi-modal operations.

Today the Northeast is characteristic of:

- Presence of several intercity corridors serving both passenger and freight movements;
- Integrated cross-border operations;
- Mature transportation infrastructure, access limitations, and challenges to add capacity;
- Large and diverse set of regional stakeholders; and
- Institutional challenges that impact the ability of states, MPOs, Railroads, and stakeholders to improve system performance.

Limited Funding for Capital Investments is becoming a problem as Rail carriers perform and plan key investments, however, demand for passenger and freight service is outpacing improvements. Regional providers receive less outside investment than the larger railroads. Additionally growth and distribution patterns are straining the performance of all Modes due to congestion.

The infrastructure and operations are limited by the Northeast's aging rail inventory and low bridge clearances along certain routes which cannot support both passenger and freight traffic, while existing yards and terminals are unable to meet expanding demand. Many of these issues are exacerbated by multiple jurisdictions and state borders that are associated with the rail network which makes programming and implementation of Rail Projects difficult to incorporate into the traditional transportation and programming processes.

Goals and Strategies

The major goals and strategies involved cooperative efforts at maintaining the current infrastructure and effectively addressing the issues with informed decision making. The cooperative efforts should include working as a region to:

- Develop a better understanding of planned rail improvements.
- Identify gaps where further investment would improve regional operations.
- List and prioritize regional rail improvements and evaluate estimated costs and potential benefits of the program.
- Identify potential institutional mechanisms that could be used to finance and implement a regional rail improvement program.
- Develop and apply methods to better quantify public benefits of rail investments.

For Amtrak and the Northeast Corridor, the key proposals should be:

- Separate Amtrak infrastructure and operating responsibilities to different companies.
- Rail operations transferred Multi-state Northeast Corridor compact.

- Avoid loss of Amtrak services: dispatching, track access, and financial maintenance of rail facilities.

Recommendations

The major recommendations are centered on communication, partnerships, and overall rail awareness. First, the legislators and other transportation decision-makers must be educated on the importance of passenger and freight rail to the region. Stakeholders and authorities should actively participate in regional and national rail planning and policy efforts (for example AASHTO). Efforts to better integrate freight and freight rail issues throughout the transportation planning and programming process should be made. Additional participation should be made in developing and refining approaches to address Amtrak issues in the region.

APPENDIX C:

TRADE FLOW ANALYSIS DETAILS

Commodity Code Map: SCTG and STCC Commodity Categories

Category	SCTG Number	SCTG (FAF)	STCC Number	STCC (TRANSEARCH)
Farm Products	1	Live animals/fish	1	Farm Products
	2	Cereal Grains	9	Fresh Fish or Marine Products
	3	Other agricultural products	20	Food and Kindred Products
	4	Animal Feed	21	Tobacco Products, Excluding Insecticides
	5	Meat/seafood		
	6	Milled Grain Products		
	7	Other foodstuffs		
	8	Alcoholic Beverages		
	9	Tobacco Products		
Stone and Sand	10	Building Stone	32	Clay, Concrete, Glass, or Stone
	11	Natural Sands		
	12	Gravel		
Minerals and Ores	13	Nonmetallic Minerals	10	Metallic ores
	14	Metallic Ores	14	Nonmetallic Ores, Minerals, Excluding Fuels
	31	Nonmetal Mineral Products		
Coal	15	Coal	11	Coal
Fuel and Gas	19	Coal- n.e.c.	13	Crude Petroleum, Natural Gas or Gasoline
	16	Crude Petroleum	29	Petroleum or Coal Products
	17	Gasoline		
	18	Fuel Oils		
Chemicals, Pharmaceuticals and Fertilizers	20	Basic Chemicals	28	Chemicals or Allied Products
	21	Pharmaceuticals		
	22	Fertilizers		
	23	Chemical Products		
Plastics and Rubber	24	Plastics/Rubber	30	Rubber or Miscellaneous Plastics Products
Wood and Furniture	25	Logs	8	Forest Products
	26	Wood Products	24	Lumber or Wood Products, Excluding Furniture
	39	Furniture	25	Furniture or Fixtures
Paper	27	Newsprint/paper	26	Pulp, Paper, or Allied Products
	28	Paper articles	27	Printed Matter
	29	Printed Products		
Textiles and Leather	30	Textiles/leather	22	Textile Mill Products
			23	Apparel, Other Finished Textile Products, Knit Apparel
			31	Leather or Leather Products
Base Metals	32	Base Metals	33	Primary Metal Products
	33	Articles- Base Metal	34	Fabricated Metal Products
Electronics and Machinery	34	Machinery	35	Machinery, Excluding Electrical
	35	Electronics	36	Electrical Machinery, Equipment or Supplies

Transportation Equipment	36 37	Motorized Vehicles Transportation Equipment	37	Transportation Equipment
Precision Instruments	38	Precision Instruments	38	Instruments, Photographic Goods, Optical Goods, Watches, or Clocks
Miscellaneous Manufacturing Products	40	Misc. Manufacturing Products	19 39	Ordnance or Accessories Miscellaneous Products of Manufacturing
Waste and Scrap	41	Waste/Scrap	40 48	Waste or Scrap Materials Not Identified by Producing Industry Waste Hazardous Materials or Waste Hazardous Substances
Mixed Freight and Unknown	42 43	Mixed Freight Unknown	41 42 43 44 45 46 47 49 50	Miscellaneous Freight Shipments Shipping Containers Mail or Contract Traffic Freight Forwarder Traffic Shipper Association Traffic Miscellaneous Mixed Shipments Small Packaged Freight Shipments Hazardous Materials or Substances Secondary Traffic

STCC Commodity Examples

STCC Code	Commodity Description	Examples
1	**Farm Products**	**Live animals, fruits, vegetables, etc**
	Raw cotton, Grail, Seeds, Fruits, Bulbs, Vegetables, Livestock, Dairy Farm Products, Live Poultry	
8	**Forest Products**	**Natural rubber and other gums**
	Barks or Gums and other Miscellaneous Products	
9	**Fresh Fish or Marine Products**	**Fresh salmon, fish, etc.**
	Fresh Fish or Whale Products, Marine Products, Fish Hatcheries	
10	**Metallic ores**	**Aluminum, crude iron, copper, etc.**
	Iron, Copper, Lead, Zinc, Gold, Silver, Bauxite, Chromium, Other Miscellaneous Ores	
11	**Coal**	**Coal**
	Anthracite, Bituminous Coal, Lignite	
13	**Crude Petroleum, Natural Gas or Gasoline**	**Petroleum Oil, Natural Gas**
	Crude Petroleum, Natural Gas, Natural Gasoline	
14	**Nonmetallic Ores, Minerals, Excluding Fuels**	**Sulfur, Rock Salt, Rough Stone**
	Dimension Stone, Broken Stone, Gravel or Sand, Clay Ceramic, Crude Fertilizer Mineral, Water	
19	**Ordnance or Accessories**	**Guns, Missiles**
	Guns, Guided Missiles, Ammo, Tracked Combat Vehicle or Parts, Military Fire Control Equipment	
20	**Food and Kindred Products**	**Fresh or Frozen Meat, Processed or Preserved Foods**
	Meat, Processed Poultry or Eggs, Processed Butter or Milk, Cheese, Dehydrated or Pickled Vegetables, Canned Food, Pet Food, Candy, Bread, Alcohol, Nuts	
21	**Tobacco Products, Excluding Insecticides**	**Cigarettes, Cigars**

	Cigarettes, Cigars, Chewing Tobacco, Stemmed or Re-dried Tobacco	
22	**Textile Mill Products**	**Yarn, Cloth, Blankets, Batting**
	Cotton Fabrics, Knit Fabrics, Woven Carpets, Yarn, Thread, Felt and Lace Goods	
23	**Apparel or Other Finished Textile Products or Knit Apparel**	**Garment Bags, Cotton Clothing**
	Clothing, Millinery, Caps, Fur, Robes, Coats, Canvas Products, Curtains	
24	**Lumber or Wood Products, Excluding Furniture**	**Logs, Wood Chips, Particle Board**
	Primary Forest Materials, Lumber, Cabinets, Treated Wood Products, Ladders	
25	**Furniture or Fixtures**	**Venetian Blinds, Baby Furniture**
	Chairs, Tables, Sofas, Buffets, Beds, Dressers, Cabinets or Cases, Lockers, Blinds and Shades	
26	**Pulp, Paper, or Allied Products**	**Packaging, Writing Paper**
	Pulp, Paper, Fiber, Envelopes, Paper Bags, Wallpaper, Sanitary Paper Products, Containers	
27	**Printed Matter**	**Books, Newspaper**
	Newspapers, Periodicals, Books, Greeting Cards, Blank Books	
28	**Chemicals or Allied Products**	**Carbon Dioxide, Dyes, Paint, Printing Ink**
	Industrial Chemicals, Industrial Gases, Dyes, Plastic mater or Synthetic Fibers, Drugs, Soap, Specialty Cleaning Preparations, Explosives, Adhesives, Paints, Fertilizers	
29	**Petroleum or Coal Products**	**Asphalt, Coal Gas, Tar Paper**
	Petroleum Refining Products, Liquefied Gases, Asphalt Paving Blocks or Mix	
30	**Rubber or Miscellaneous Plastics Products**	**Floor or Ceiling Covers, Boots or Shoes**
	Tires, Rubber or Plastic Footwear, Reclaimed Rubber, Plastic Hose or Belting	
31	**Leather or Leather Products**	**Leather Cattle, Leather**
	Leather, Industrial Leather Belting, Boot or Shoe Cut Stock, Leather Footwear, Leather Gloves, Leather Luggage or Handbags	
32	**Clay, Concrete, Glass, or Stone Products**	**Slate, Carved Granite, Ceramics, Glass Products**
	Flat Glass, Cement, Ceramic Floor or Wall Tile, Refractories, Porcelain Electric Supplies, Concrete Products, Gypsum Products, Abrasive Products, Gaskets or Packing, Mineral Wool	
33	**Primary Metal Products**	**Wire Rods, Pipe, Castings, Nails and Screws**
	Blast Furnace, Primary Iron or Steel Products, Steel Wire or Nails, Iron or Steel Castings, Alloy Castings or Basic Shapes, Metal Forgings	
34	**Fabricated Metal Products**	**Shipping Canisters, Cans, Solar Panels**
	Metal Cans, Cutlery, Tools, Hardware, Plumbing Fixtures, Heating Equipment, Metal Doors, Sheet Metal Products, Bolts, Nuts, Screws, Metal Stampings, Steel Springs, Valves or Pipe Fittings	
35	**Machinery, Excluding Electrical**	**Scales, General Industrial, Production Machinery**
	Steam Engines, Farm Machinery or Equipment, Elevators or Escalators, Conveyors or Parts, Industrial Trucks, Machine Tool Accessories, Textile Machinery or Parts, Printing Trades Machinery, Industrial Pumps, Ball Bearings, Typewriters or Parts, Refrigeration Machinery	
36	**Electrical Machinery, Equipment or Supplies**	**Electric Motors, Telephones, Circuit Breakers**
	Electric Measuring Instruments, Switchgear, Motors of Generators, Welding Apparatus, Household Cooking Equipment, Household Equipment, Electric Lamps and Lighting Fixtures, Electronic Tubes, Storage Batteries or Plates, Radio or TV Receiving Sets	
37	**Transportation Equipment**	**Automobiles, Chassis, Motorcycles, Airplanes**
	Motor Vehicles, Truck Trailers, Aircraft, Ships or Boats, Railroad Cars, Motorcycles	
38	**Instruments, Photographic Goods, Optical Goods, Watches, or Clocks**	**Camera Stands, Dental Goods, Syringes**
	Scientific Equipment, Optical Instruments or Lenses, Mechanical Measuring or Control Equipment, Surgical or Medical Instruments, Orthopedic or Prosthetic Supplies, Dental Equipment or Supplies, Photographic Equipment of Supplies, Ophthalmic or Opticians Goods, Watches or Clocks	
39	**Miscellaneous Products of Manufacturing**	**Potpourri, Needles, Pianos**

	Jewelry, Silverware, Musical Instruments, Games, Dolls, Sporting Goods, Pens and Pencils, Carbon Paper, Brooms, Morticians Goods, Matches	
40	**Waste or Scrap Materials Not Identified by Producing Industry**	**Construction Debris, Scrap**
	Ashes, Metal Scrap, Wood Scrap, Paper Waste, Chemical Waste, Misc. Waste	
41	**Miscellaneous Freight Shipments**	**Otherwise Unclassified Shipments, Special Commodities**
42	**Shipping Containers**	**Empty Shipping Equipment**
	Shipping Containers, Semi-trailers Returned Empty, Empty Equipment on Reverse Route	
43	**Mail or Contract Traffic**	
	Includes USPS by Rail and Air, UPS and FedEx Overnight Air	
44	**Freight Forwarder Traffic**	**Third Party Logistics Providers**
	Dispatches Shipments via Asset Based Carriers and Books or Arranges for those Shipments	
45	**Shipper Association Traffic**	
46	**Miscellaneous Mixed Shipments**	
	Fak Shipments and Mixed Shipments Under Multiple STCC Codes	
47	**Small Packaged Freight Shipments**	
	Small Packaged Shipments	
48	**Waste Hazardous Materials or Waste Hazardous Substances**	
	Waste Flammable Liquids, Flammable or Combustible Liquids, Waste Solids, Waste Corrosive Materials, Other Waste Materials	
49	**Hazardous Materials or Substances**	**Chemicals, Acyclic Alcohols, Liquid Plastics**
	Flammable, Combustible, Poisonous, Radioactive, Corrosive or Otherwise Regulated Materials	
50	**Secondary traffic**	
	Includes UPS and other ground mail shipments	

SCTG Commodity Codes and Examples

SCTG Code	Commodity Description	Examples
	Live Animals and Fish	**Bovine, Swine, Poultry, Fish**
1	Beef, Chicken, Pork, Tuna, Salmon	
	Cereal Grains (including seeds)	
2	Wheat, Corn, Rye, Barley, Oats, Grain Sorghum	
	Other Agricultural Products	**Vegetables, Fruit and Nuts, Other Agricultural Products**
3	Potatoes, Lettuce, Frozen Vegetables, Oranges, Raisins, Shelled Nuts, Raw Cotton, Sugar Cane	
	Animal Feed and Products of Animal Origin, N.E.C.	
4	Straw, Inedible Flours, Raw Hides, Pet Food, Solid Residues of Cereals, Eggs	
	Meat, Fish and Seafood, and their Preparations	
5	Meat, Poultry, Fish, Aquatic Invertebrates, Preparations, Extracts and Juices of Meat/Fish	
	Milled Grain Products and Preparations, and Bakery Products	**Milled Grain Products, Bakery Products and Preparations of Cereals, Flour, Starch or Milk**
6	Flour, Malt, Milled Rice, Pasta, Breakfast Cereal, Baked Products, Rice Preparations	
7	**Other Prepared Foodstuffs, and Fats and Oils**	**Dairy Products, Processed or Prepared Vegetables, Fruit or Nuts, n.e.c., and Juices, Coffee, Tea and Spices, Animal or Vegetable Fats and Oils, Sugar Confectionary and Cocoa Products, Edible Preparations- n.e.c.**

	Milk, Cheese, Potato Chips, Jam, Tea, Coffee, Corn Oil, Glucose, Chocolate, Tomato Sauce, Soft Drinks	
8, 9	**Alcoholic Beverages and Tobacco Products**	
	Beer, Wine, Spirits, Cigarettes, Denatured Ethyl Alcohol, Tobacco Products n.e.c.	
10, 11, 12	**Stone and Sands, except Metal Bearing Sands**	
	Building Stone, Limestone, Gravel, Crushed Stone n.e.c.	
13	**Non-Metallic Minerals N.E.C.**	
	Table Salt, Sulfur, asbestos, Pumice, Clay, Non-Metallic Minerals n.e.c	
14	**Metallic Ores and Concentrates**	
	Iron, Copper, Nickel, Zinc, Lead, Uranium, Thorium, Titanium, Ores n.e.c	
15	**Coal**	
	Bituminous Coal, Anthracite, Lignite, Agglomerated Coal	
16, 17, 18	**Crude Petroleum, Gasoline, Fuel Oils, and Aviation Turbine Fuel**	
	Crude Petroleum Oil, Gasoline, Aviation Turbine Fuel, Diesel	
19	**Coal and Petroleum Products, n.e.c.**	
	Lubricating Oils, Kerosene, Natural Gas, Propane, Butane, Other Coal Products n.e.c.	
20	**Basic Chemicals**	**Inorganic & Organic Chemicals**
	Chlorine, Carbon Dioxide, Organic Dyes, Inorganic Pigments	
21	**Pharmaceutical Products**	
	Anything for Medical Use	
22	**Fertilizers**	
	Animal, Vegetable, Chemical and Mineral Fertilizers	
23	**Chemical Products & Preparations n.e.c.**	
	Inks, Perfumes, Insecticides, Glues	
24	**Plastics and Rubber**	**Plastics and Rubber in Primary Forms, Articles of Plastic, Articles of Rubber**
	Natural Rubber, Plastic Utensils, Cellulose Derivatives, Tires, Rubber Hoses	
25	**Logs and Other Wood in the Rough**	
	Logs for Pulping, Logs for Lumber, Fuel Wood	
26	**Wood Products**	
	Wood Chips, Treated/Untreated Lumber, Shingles, Wood Packing, Plywood	
27	**Pulp, Newsprint, Paper and Paperboard**	**Pulp of Fibrous Cellulosic Materials, Paper and Paperboard, in Large Rolls or Sheets**
	Wood Pulp, Newsprint in Large Rolls/Sheets, Toilet or Facial Tissue, Uncoated Paperboard in Rolls	
28	**Paper or Paperboard Articles**	
	Toilet Paper, Paper Bags, Wallpaper, Envelopes, Stationary Paper	
29	**Printed Products**	
	Books, Brochures, Newspapers, Periodicals, Postcards	
30	**Textiles, Leather and Articles of Textiles or Leather**	**Textiles and Articles of Textiles, Leather and Articles of Leather**
	Yarns, Thread, Knitted Fabrics, Carpets, Textile Clothing, Leather Footwear, Leather Apparel	
31	**Non-Metallic Minerals Products**	**Hydraulic Cements, Ceramic Products, Glass and Glass Products, Other Non-Metallic Mineral Products**
	Ceramic Pipes, Porcelain Items, Glassware, Asphalt Shingles, Gypsum, Concrete	
32	**Base Metal in Primary or Semi-Finished Forms and in Finished Basic Shapes**	

	Iron, Steel and Copper Bars, Rods and Wire, Lead Powder, Lead Bars	
	Articles of Base Metal	**Pipes, Tubes and Fittings, Structures and Structural Parts, Hand Tools, Cutlery, Interchangeable Tools for Hand- or Machine-Tools, Hardware, and Industrial Fasteners, Other Articles of Base Metal**
33	Iron and Steel in Primary Forms or Powders, Pipes, Tubes, Doors, Cutlery, Railroad Construction Material	
	Machinery	**Turbines, Boilers, Internal Combustion Engines, and Other Non-Electric Motors and Engines, Other Mechanical Machinery**
34	Internal Combustion Engine Parts, Turbo-Jets, Turbo-Propellers, Nuclear Reactors, Fans, Refrigerators	
	Electronic and Other Electrical Equipment and Components, and Office Equipment	
35	Electric motors, electric cooking appliances, telephones, computer software, TVs, capacitors, lighting	
	Motorized and Other Vehicles	**Vehicles, Motor Vehicle Parts**
36	Automobiles, Tractors, Bicycles, Brakes, Motorcycles	
	Transportation Equipment n.e.c.	**Railway Equipment, Aircraft and Spacecraft, Ships, Boats and Floating Structures**
37	Railway Locomotives, Aircraft, Spacecraft, Pleasure Boats, Commercial Ships	
	Precision Instruments and Apparatus	
38	Eyewear, Photocopying Machines, X-Ray Machines, Surgical Instruments, Measuring Instruments	
	Furniture, Mattresses and Mattress Supports, Lamps, Lighting Fittings, and Illuminated Signs	
39	Mattresses, Household/Office Furniture, Lamps, Illuminated Signs or Nameplates	
	Miscellaneous Manufactured Products	
40	Arms, Munitions, Ammunition, Toys, Sporting Equipment, Clocks, Jewelry, Art, Antiques, Pearls, Brooms	
	Waste and Scrap	
41	Metal Slag, Ash and Residues, Sawdust and Wood Waste, Paper Waste, Glass Waste	
	Mixed Freight	
43	Grocery/Convenience Store Items, Restaurant Supplies, Office Supplies, Plumbing Supplies, Miscellaneous	

Forecast Comparison

Since TRANSEARCH and FAF^2 use two different commodity classification systems (STCC and SCTG respectively), commodity categories were reconciled into aggregate general commodity categories that were comparable between the two datasets. Once the 2007 base years for both the FAF^2 and TRANSEARCH were reconciled into this comparable commodity framework the forecasts could be estimated. The comparison of the commodities as well as a description of each category's commodity composition can be found in Appendix C. Also for comparison purposes, the mode category "pipeline and unknown" was removed from the FAF^2 data since pipeline movements are not included in the TRANSEARCH database.

Forecasts

- The first forecast is the TRANSEARCH forecast created by Global Insight. The forecast includes 2007 as a base year and projects to years 2020 and 2035. The commodity categories are aggregated for comparison to the forecasts derived from the FAF^2 database. Similar to the 2007 data, the TRANSEARCH forecasts include *all* goods movement in Massachusetts, including through-traffic. Later in the report (Section 3.3.3), through traffic will be excluded to compare the forecast with those calculated from the FAF^2 data.

- The second forecast used the FAF^2 Provisional 2007 data to calculate the compound annual growth rate for each aggregated commodity category between the years 2002 and 2007. These historical growth rates were then applied to the 2007 TRANSEARCH data to obtain inbound, outbound and internal commodity movement estimates by mode for the year 2035.

- The third forecast calculated a compound annual growth rate between the year 2002 and 2035 from the FAF^2 for each of the aggregated commodities. Like the first forecast, the compound annual growth rates were calculated and then applied to the 2007 TRANSEARCH aggregated commodity tonnage to generate tonnage estimates for 2035.

Forecast

The different forecast methodologies provided a possible range of total freight tonnage growth of between 70 percent and 109 percent by 2035. The TRANSEARCH forecast, being the most conservative estimate, predicts a 70 percent growth in freight movements in Massachusetts from 2007 to 2035. For 2007, TRANSEARCH estimates a total of 224.8 million tons with an origin or destination in Massachusetts, and 382.4 million tons in 2035. The FAF^2 data shows an increase from 211.9 million tons in 2007 to 442.1 million tons in 2035 for a growth of 109 percent. Applying the FAF^2 2002-2035 growth rate to the 2007 TRANSEARCH data generates a 96 percent growth rate, increasing tonnage from 224.8 million to 441.5 million. Using the FAF^2 2002-2007 growth rate and applying it to the TRANSEARCH data results in tonnage increasing 108 percent from 224.8 million tons in

2007 to 467.5 million tons in 2035. The results are presented in Table C-1 below. Thus, regardless of the forecast method or data source, freight flows are expected to increase significantly in Massachusetts over the next 20 to 30 years.

Table C-1: Growth Rates from Each Forecast Method

Method	Percentage Growth 2007-2035
TRANSEARCH	70%
FAF[2] Projected Growth Rates	96%
FAF[2] Historical Growth Rates	108%

Forecast Comparison, Excluding Through Traffic

The table below depicts the 2007 freight tonnage by commodity compared to the reconciled aggregate commodity forecasts for the year 2035, with the highest growth commodity levels indicated in bold. Despite the differences in the individual forecasts, the major commodities that will be shipped throughout Massachusetts are Mixed Freight/Unknown, Gasoline and Fuel, Minerals and Ores, Stone and Sand, Food Products and Chemicals and Pharmaceuticals. Additionally, Table C-1 shows the total percentage growth from 2007 to 2035 using each of the three comparable forecasts, with the highest growth rates indicated in bold. Given the industry mix in Massachusetts, it is logical that these commodities would have the highest tonnages. In terms of percentage growth, Electronics and Machinery, Precision Instruments, and Transportation Equipment are anticipated to grow significantly. Many of the commodities with the highest percentage growth in freight tonnage correspond to industries that have seen growth in Massachusetts.

Table C-2: Projected Future Freight Movements in MA by Aggregated Commodity, Excluding Through Traffic (millions of tons)

		2002-2007 Growth Rate	2002-2035 Growth Rate	TRANSEARCH
Commodity	**2007**	**2035**	**2035**	**2035**
Farm Prods/food/beverages	26.7	**37.3**	**49.2**	**38.4**
Stone and Sand	23.8	**55.3**	**36.8**	**32.5**
Minerals and Ores	33.4	**62.5**	**55.6**	**52.6**
Coal	0.8	**106.6**	0.6	0.9
Gasoline, Fuel	40.3	**68.1**	**72.0**	**64.3**
Chemicals/Pharmaceuticals/Fertilizer	21.7	**37.0**	**46.3**	**28.8**
Plastics/Rubber	3.0	4.4	6.1	5.5
Wood/furniture	6.1	6.9	8.9	9.6
Paper	8.3	10.3	10.1	13.1
Textiles/leather	1.4	1.5	0.9	0.8
Base Metals	11.0	14.0	18.9	17.0
Electronics/Machinery	3.8	5.5	10.5	12.8
Transportation Equipment	2.6	3.3	5.9	5.3
Precision Instruments	0.6	1.2	2.0	2.1
Miscellaneous Mfg Products	0.6	0.7	2.4	1.6
Waste/Scrap	2.9	4.5	7.1	5.7
Mixed Freight/Unknown	37.5	**48.4**	**108.2**	**91.4**
Total	**224.8**	**467.5**	**441.5**	**382.4**

Source: Global Insight TRANSEARCH database (excluding through traffic) 2008 and FAF[2]

Table C-3: Projected Future Freight Movements in MA by Percentage Growth, Excluding Through Traffic

Commodity	2002-2007 Growth Rate (%)	2002-2035 Growth Rate (%)	TRANSEARCH Growth Rate (%)
	2035	2035	2035
Farm Prods/food/beverages	40%	84%	44%
Stone and Sand	**132%**	55%	37%
Minerals and Ores	87%	66%	57%
Coal	**13225%**	-25%	13%
Gasoline, Fuel	69%	79%	60%
Chemicals/Pharmaceuticals/Fertilizer	71%	**113%**	33%
Plastics/Rubber	47%	**103%**	83%
Wood/furniture	13%	46%	57%
Paper	24%	22%	58%
Textiles/leather	7%	-36%	-43%
Base Metals	27%	72%	55%
Electronics/Machinery	45%	**176%**	**237%**
Transportation Equipment	27%	**127%**	**104%**
Precision Instruments	**100%**	**233%**	**250%**
Miscellaneous Mfg Products	17%	**300%**	**167%**
Waste/Scrap	55%	**145%**	97%
Mixed Freight/Unknown	29%	**189%**	**144%**
Total	**108%**	**96%**	**70%**

Source: Global Insight TRANSEARCH Database (excluding through traffic) 2008 release and FAF[2].

Freight Forecasts by Mode

The table below shows the percent of freight originating, terminating, or traveling within Massachusetts by mode according to the FAF[2]. Rail percentage share declines over time, but the overall tonnage carried increases.

Table C-4: Freight Modal Share for Total Origin, Destination, and Internal Movements

	2007	2020	2035
Rail	3.2%	3.1%	2.6%
Truck	95.5%	95.9%	96.1%
Air	0.1%	0.1%	0.1%
Water	0.5%	0.1%	0.0%
Other	0.7%	0.9%	1.1%
Total	**100.0%**	**100.0%**	**100.0%**

Source: FAF[2] 2002 data and 2007 provisional data release

Table C-5: Freight Modal Share 2007, 2020, 2035 Excluding Through Traffic

	FAF[2]			TRANSEARCH		
Mode	**2007**	**2020**	**2035**	**2007**	**2020**	**2035**
Rail	3.2%	3.1%	2.6%	5.0%	5.0%	5.1%
Truck	95.5%	95.9%	96.1%	87.2%	87.6%	88.1%
Air	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%
Water	0.5%	0.1%	0.0%	6.2%	5.9%	5.4%
Other	0.8%	0.9%	1.2%	1.5%	1.4%	1.1%

Source: FAF[2] 2007 Provisional data and 2002 data, Transearch forecast.
NOTE: The TRANSEARCH data excludes Through Traffic and FAF[2] data excludes "Pipeline and Unknown" data.

Comparing the FAF[2] and TRANSEARCH modal forecasts for goods moving internally or with an origin or destination in Massachusetts, (Table C-5), TRANSEARCH shows a lower truck share but higher rail and water modal dependence. FAF[2] shows a decrease in rail dependence over the period from 2007 to 2035 while TRANSEARCH shows an increase, from 4.97 percent to 5.14 percent.[57] This indicates that Massachusetts is expected to utilize rail more for goods with an origin or destination in the state.

Rail tonnage is expected to increase between 61 and 76 percent between 2007 and 2035.[58]

[57] Note that rail dependence is expected to decrease when including through traffic - from 6.45% to 6.13% - though the share of freight moved by rail is larger when through traffic is included. This indicates that more freight passing through Massachusetts relies on rail, which is to be expected since rail trips are usually long-haul, bulk commodities.

[58] FAF[2] predicts that tonnage will increase by 68.8% from 6.9 million to 11.6 million tons. TRANSEARCH including through traffic predicts that tonnage will increase 61% over the period, from 17.9 million tons to 28.9 million tons. Interestingly, when excluding through traffic from the TRANSEARCH database for comparison to the FAF[2] data, tonnage is expected to increase 76% from 11.2 million tons to 19.7 million tons. This indicates that much of the increase in rail tonnage can be attributed to goods with an origin or destination in Massachusetts.

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