I-95 Corridor Coalition

Northeast Rail Operations Study (NEROps)

Phase I Final Report

I-95 CORRIDOR COALITION

July 2007

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Prepared for:
I-95 Corridor Coalition

Sponsored by:

I-95 Corridor Coalition
New York State Department of Transportation
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This report was produced by the I-95 Corridor Coalition, a partnership of state departments of transportation, regional and local transportation agencies, toll authorities, and related organizations, including law enforcement, port, transit and rail organizations, from Maine to Florida, with affiliate members in Canada. Additional information about the Coalition, including other project reports, can be found on the Coalition's web site at http://www.i95coalition.org.

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1.0 Introduction

The I-95 Corridor Coalition is a partnership of state departments of transportation (DOT), regional and local transportation agencies, toll authorities, and related organizations (including law enforcement, transit, port, and rail organizations) from Maine to Florida with affiliate members in Canada. With a population of almost 108 million, the Coalition region is home to nearly 37 percent of the nation's inhabitants and one-third of the nation's jobs, yet only contains 10 percent of the United States' total landmass.[1] Between 1970 and 2005, the total population of the Coalition region increased by almost 30 million, or 37 percent. The U.S. Census Bureau estimates that by 2025, an additional 26 million people will live in the Coalition region, bringing the population total to 134 million.

This population growth, coupled with the significant growth in freight traffic, has begun to manifest itself in the form of capacity and congestion problems at key regional gateways, at important intermodal transfer facilities, and along critical highway and rail corridors. Taken together, these congestion and capacity concerns are beginning to erode the productivity of the region's transportation system and threaten its ability to meet the mobility needs of people and goods throughout the Coalition region. Travel time and cost are increasing, service reliability is decreasing, and the ability of the system to recover from emergencies and service disruptions has been diminished. Layered on top of these regional concerns are three broader trends: a renewed mandate for contingency planning to protect the integrity of freight and passenger transportation systems; continued globalization and an increasing reliance on international trade, which has heightened the importance of a safe, reliable, and secure transportation system and placed increasing pressure on already constrained infrastructure; and recognition that the public and private sectors – acting independently – may not have the necessary resources to fully address rising passenger and freight demands.

The I-95 Corridor Coalition has begun to work with its member states and metropolitan planning organizations (MPO) to address these trends and challenges by helping them to develop strategies to manage transportation system capacity more comprehensively, build system-oriented institutional relationships, and develop system-responsive funding and implementation techniques. The Northeast Rail Operations (NEROps) study is one such effort.

This report documents the first phase of the NEROps study, which investigated the regional rail transportation network in New York State, New England, and Atlantic Canada as a system and identified the major historical factors and emerging trends that are impacting the efficiency of the system today and will continue to impact the ability of the region's freight and passenger railroads to attract additional traffic. Subsequent phases will entail the identification of specific projects, strategies, and initiatives that will allow the Northeastern states and the I-95 Corridor Coalition to address specific

[1] U.S. Census Bureau.

systemwide issues and chokepoints that cross jurisdictional, interest, and financial boundaries. By engaging rail stakeholders in the region, describing key trends and issues affecting freight and passenger rail in the Northeast, and identifying the high-level infrastructure, operational, and policy issues hindering effective freight and passenger rail service in the region, the results of this phase of the NEROps study provide a foundation that will facilitate and guide these future efforts. Specifically, this phase of the study:

- **Describes the various rail stakeholders in the region and how they interact at both the operational and policy levels**. Section 2.0 describes in more detail the rail system in the Northeast region, the various rail stakeholders in the region, and how they work together to meet the region's freight and passenger mobility needs.

- **Describes the trends that have influenced how the rail system in the region has evolved and how it is operated and maintained**. Section 3.0 describes trends and issues affecting freight and passenger rail in the region, focusing on four areas.

- **Identifies and describes physical, operational, and institutional issues, chokepoints, and constraints that, individually or collectively, impact the efficiency of the rail system in the region.** Section 4.0 describes physical and operational chokepoints and constraints, as well as the institutional issues affecting passenger and freight rail movements in the region.

- **Provides recommendations to the Northeastern states and the I-95 Corridor Coalition for addressing freight and passenger rail issues.** Section 5.0 provides next steps for the Northeastern states in developing actions to reduce or eliminate major issues, chokepoints, and constraints and describes how the Coalition could support these activities.

1.1 Prologue – How Did We Get Here?

The goal of this study is to lay the groundwork for the development of a regional rail improvement program that will identify and make recommendations to eliminate significant rail choke points – physical, operational, and institutional – in the region, thereby increasing freight- and passenger-rail service capacity and relieving congestion on the region's rail, highway, and air systems. A critical first step in this approach is to understand how the passenger and freight rail systems evolved in the Northeast, both physically and operationally, as this evolution has a direct bearing on the types of chokepoints, issues, and constraints affecting the system today. The evolution of the rail system in the Northeast is characterized by three distinct eras, described below.

1920s to 1950s

The introduction of rail technology in the mid- to late-19th century freed business and industry from the need to locate near sea, river, and canal ports. Railroads in the Northeast region and elsewhere invested heavily in infrastructure (primarily east-west, but also north-south), and began to open up markets in the interior of the country. By the early 1920s, the rail system in the United States consisted of over 250,000 miles of track,

approximately six percent of which was located in the Northeast. The Northeast region was served by several large railroads at that time, including the Baltimore & Ohio (B&O), the Pennsylvania, the New York Central, the Erie, and the New York, New Haven, and Hartford, each of which operated over extensive, interconnected networks.

Throughout the early part of the 20th century, railroads provided both passenger and freight service and the railroads in the Northeast region handled significant volumes of both people and goods. The region's industrial base, both for raw materials and manufactured goods, combined with its major deepwater and regional seaports, allowed freight rail to thrive. The relatively close proximity of the region's major population centers, particularly New York and Boston, also allowed rail to serve considerable volumes of passenger traffic in the region. Between 1941 and 1945, the railroads served nearly 70 million passenger-miles annually. By the end of this era, however, railroads in the Northeast were beginning to see declining market shares for both passenger and freight movements. Primarily, this was due to two factors: the construction of the interstate highway system and the associated changes in distribution patterns of both people and goods.

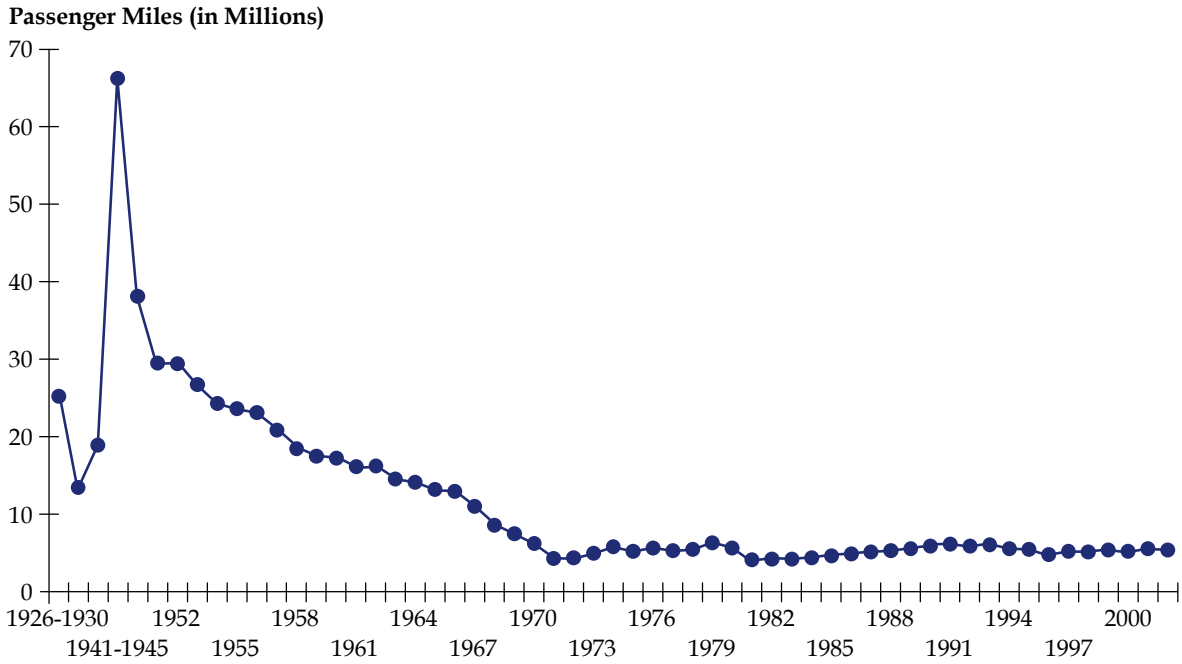
The beginning of the Interstate era in 1956 made trucks and cars significant competitors for freight and passenger movements, respectively. Approaching the 1960s, rail movements in the Northeast started to become less attractive, as the interstate system allowed trucks to provide door-to-door service for freight shipments and highway travel was proving to be more cost-effective and reliable than rail between many origins and destinations. This had two impacts on rail movements in the Northeast. First, and most obvious, rail's market share in the region (and nationally) began to decline. Second, and less obvious, the development of the interstate system allowed population and industry to locate in areas that were not amenable to rail service. The region's population began to radiate away from the urban centers toward suburban areas and industry began to migrate toward cheaper land made newly accessible by interstate highways (but not necessarily located near rail hubs). The construction of the Interstate system, and its associated impacts on land development and use, combined to make it difficult for rail to retain its market share in the region and exacerbated rail's decline in the Northeast, particularly in the 1960s and 1970s.

1960s to 1970s

Despite the new competition from trucks, railroads nationwide were still handling fairly significant volumes of traditional carload traffic. More than 50 railroads were partnering with the trucking industry by providing intermodal, or "piggyback," freight services as the 1960s began. Although many of the same railroads provided passenger services, the majority of their revenue was derived from the long-distance transport of raw materials, particularly coal, minerals, and aggregate products. Railroads in the Northeast, however, were dependent on a much more diverse set of services, which included boxcar freight, commuters, and intercity passengers – markets that were much more vulnerable to the high-speed, interconnected services offered by the Interstate system. Declining boxcar freight was a concern, as railroads typically reaped significant revenues from these high-rate shipments. Declining passenger volumes also were a concern, as some Northeastern railroads derived nearly one-quarter of their overall revenue from passenger services.

By the late 1960s railroads in the Northeast were witnessing serious declines in both freight and passenger demand. Figures 1.1 and 1.2 show the decline in intercity passenger service (as measured by passenger-miles) and freight market share (as measured in ton-miles) for the United States as a whole since the 1950s and 1960s.

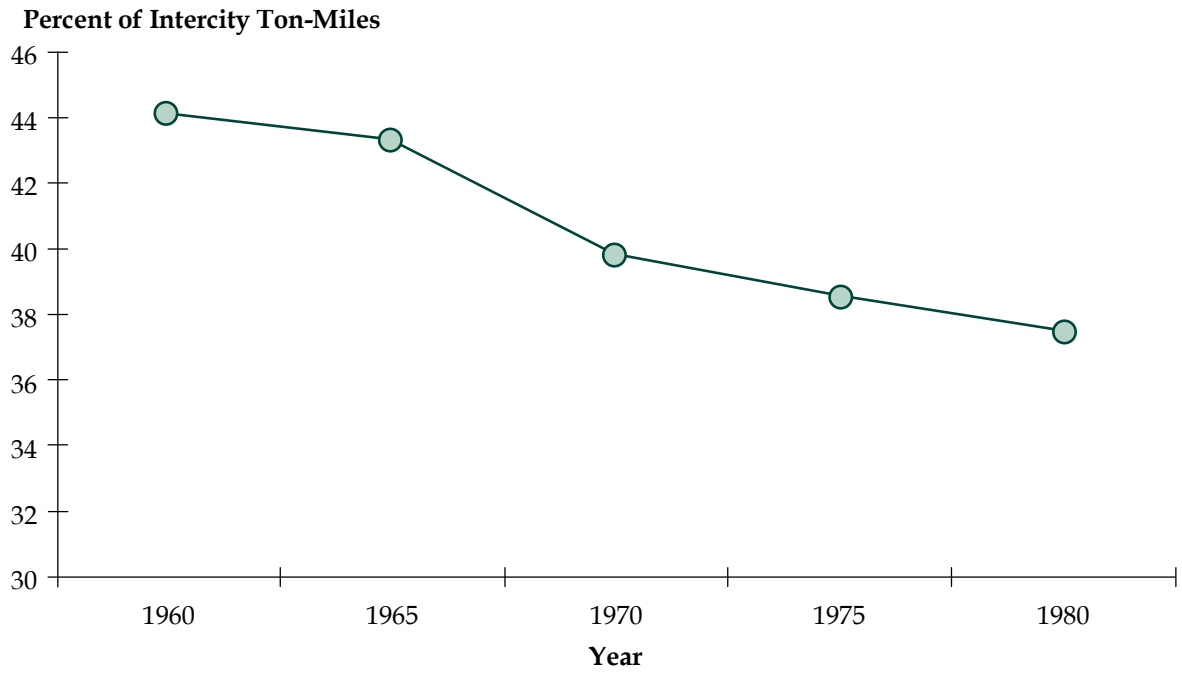
Figure 1.1 Intercity Rail
Passenger Miles



Source: Congressional Budget Office based on data from the Association of American Railroads, the Eno Transportation Foundation, Amtrak, and the National Association of Railroad Passengers.

Note: The first five data points in the figure show five-year annual averages (1926 to 1930, 1931 to 1935, 1936 to 1940, 1941 to 1945, and 1946 to 1950); the subsequent data points show annual totals, beginning in 1951 and running through 2002.

Figure 1.2 Rail Market Share
1960 to 1980



Source: AAR.

Several trends and regional characteristics hastened the decline of rail services and market share of both passenger and freight movements in the Northeast and ultimately contributed to the financial decline of the railroads toward the end of this period.[2] These trends and characteristics included:

- **Deindustrialization of the region**. Many factories began to move south or west to escape the higher union wages that were prevalent in the Northeast region. These relocations further eroded rail's market share in the region, as many of these factories provided the kind of higher-weight/lower-value freight that was most amenable to rail service.

- **Crowded and inadequate freight terminals**. Many yards, corridors, and other facilities in the region were developed in close proximity to (or in some cases, in the middle of) city and town centers, preventing rail from operating efficiently as both population and automobile use in these cities and towns grew. The shipment delays resulting from the inefficient operation of these terminals further contributed to market share gains for trucks.

[2] Routledge Atlas of American Railroads, 1999.

- **Shorter-than-average freight hauls**. The close proximity of major origins and destinations in the region made for shorter-than-average freight hauls (and smaller than average revenues) for many Northeastern railroads. In many cases, these relatively short freight hauls were more amenable to truck movements.

- **Deficits from metropolitan commuter services**. As described above, some Northeastern railroads derived a significant portion of their revenue from passenger services. Competition from the automobile was driving many of these commuter services into "operating" deficit, i.e., they could not fully cover their operational costs from farebox revenues.

Exacerbating matters was the fact that the railroad industry was still regulated at this time by the Interstate Commerce Commission (ICC), which made it difficult for the railroads to respond to increasingly dynamic market conditions by, for example, changing the rates charged to shippers and passengers or abandoning unprofitable services or markets. The combination of dwindling demand for passenger and freight services and the inability to respond effectively to market conditions led many railroads, including many in the Northeast, to defer maintenance, scale back operations, and consider consolidation as a way to reduce costs and avoid bankruptcy.

Many strategic rail assets were lost as railroads in the Northeast deferred maintenance or scaled back their operations during this period. For instance, the rail car-float system across the Hudson River was significantly scaled back, resulting in a tremendous increase in the volume of goods being delivered by rail to New Jersey for subsequent delivery into New York City and Long Island by truck. The financial situation of the railroads also contributed to the decision not to repair and reopen the Poughkeepsie Bridge across the Hudson River after it was heavily damaged in a 1974 fire. After its closure, the closest Hudson River crossing for traffic bound for New York City or New England was in Albany, approximately 140 miles north. The closure of the Poughkeepsie Bridge further contributed to the decline of rail's decreasing market share for east-of-Hudson traffic.

Consolidation was another strategy used by the railroads to avoid bankruptcy. One such consolidation was the Pennsylvania/New York Central/New York, New Haven, and Hartford merger as the Penn Central in 1968. Originally viewed as an innovative solution to the financial woes of three major Northeastern railroads and a way to maintain effective passenger and freight service in the region, the merger ended up a catastrophic failure that already accelerated declining rail service in the Northeast.

The Pennsylvania Railroad was the largest railroad by both traffic and revenue in the United States throughout the 20th Century and was for a time the largest publicly traded corporation in the world. The Pennsylvania Railroad provided both freight and passenger service in the Northeast, Mid-Atlantic, and across Pennsylvania and Ohio to Chicago, Louisville, and St. Louis. Its archrival, the New York Central, was headquartered in New York and provided freight and passenger services in New York, Pennsylvania, Ohio, Michigan, and New England, as well Ontario and Québec. Recognizing the decline in both passenger and freight revenue in the Northeast, these two competing railroads petitioned the ICC to allow them to merge in 1962. The ICC granted approval in 1966 and

the Supreme Court confirmed it in 1968. The ICC required that the New York, New Haven, and Hartford Railroad also be included in the new Penn Central.

The operations, personnel, and equipment of these three large railroads were slow to integrate, which caused serious service degradations and further enhanced the attractiveness of truck transport, which was increasingly viewed as a cheaper and more reliable alternative to rail in the region. The poor implementation of the merger, coupled with increasing competition from trucks, resulted in mounting debts and operational inefficiencies – by 1970 the Penn Central was losing approximately one million dollars per day.[3] The Penn Central eventually collapsed and declared bankruptcy in 1970, leading directly to the creation of National Railroad Passenger Corporation (Amtrak) in 1971, which relieved the railroads of providing intercity passenger service; and the creation of the Consolidated Rail Corporation (Conrail) in 1976, which took over freight service on the former Penn Central system and several other bankrupt lines.

Amtrak and Conrail

The creation of both Amtrak and Conrail had significant implications for Northeastern railroad operations. The Rail Passenger Service Act of 1970 created Amtrak, which provided intercity rail passenger service along a national network in 1971. Several railroads, including the Penn Central and the Delaware and Hudson Railroad, made a one-time payment (totaling $190 million) to the Federal government to be relieved of all intercity passenger service. Routes were cobbled together from existing freight lines, some of which had not been maintained well enough to support competitive passenger service. This, combined with the fact that farebox revenues on some corridors in the Northeast could not support operating expenses, meant that several states in the region were in danger of not having any intercity passenger rail service at all. However, Amtrak entered into agreements with several states to provide subsidized passenger rail service. Amtrak currently operates 20 state-supported routes in 13 states across the country, including Maine, New York, and Vermont. These states provide 100 percent of the direct operating costs that are not covered by farebox revenues. Many states also have made capital investments in tracks and equipment used by their state-supported trains.[4]

In the aftermath of the Penn Central collapse, it became apparent that there were no potential buyers or bankers willing to purchase or reorganize the bankrupt system, so Congress passed the Regional Rail Reorganization Act of 1973 (3R Act). The purpose of the 3R Act was to identify a rail system that would provide adequate and efficient rail service in the Northeast and Midwest and to reorganize the railroads in the region into an economically viable system that could provide that service. The act established the United States Railway Association (USRA) as a government corporation whose purpose was to design the system required to meet this goal and to prepare a Final System Plan incorporating that design. Finally, the Act established Conrail as a for-profit company that would

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[3] Routledge Atlas of American Railroads, 1999.

[4] Amtrak.

form this system and provide freight and commuter rail services in the Northeast and Midwest.

The USRA struggled to develop a Final System Plan because the new regional rail system required by the 3R Act was to fulfill many and in some cases conflicting goals. Conrail was to be profitable yet provide maximum service; and the Final System Plan was to provide for competition, but whether this had to be rail-to-rail or intermodal competition was not specified. In short, USRA tried to incorporate in its plan the conflicting goals of the 3R Act by creating a system that struck a balance between financial viability of Conrail, maintenance of competition among Conrail and the solvent carriers, and adequate service to shippers.[5]

USRA's Final System Plan was approved in 1976 as part of the Railroad Revitalization and Regulatory Reform Act (4R Act). Unlike traditional mergers, Conrail was only required to assume *portions* of the lines and assets of the bankrupt railroads which would provide them competitive access to key market areas in the Northeast and Midwest. Although the final Conrail system consisted of lines of the Penn Central and five other companies (Erie Lackawanna Railway, Lehigh Valley Railroad, Reading Company, Central Railroad of New Jersey, and Lehigh and Hudson River Railway), not all lines were included in the final system. In fact, to ensure adequate competition for Conrail in the Northeast, approximately 5,700 miles of light-density lines from the bankrupt railroads – including many in the Northeast – were designated for either closure or for continued operation with state and Federal subsidies.

These subsidies were most often provided by the Local Rail Service Assistance (LRSA) program, which was established as part of the 3R Act to assist the Northeastern and Midwestern states to preserve rail freight services on light density lines not included in the Final System Plan. The LRSA Program, which was administered by the Federal Railroad Administration, provided funds for both operating subsidies and capital improvement projects for the excluded lines. The 4R Act expanded the LRSA Program nationally, since there were freight railroads failing in many other regions. As the 1970s came to a close, however, there were indications that Federal LRSA funding would continue to diminish and could possibly be eliminated. In 1980, use of LRSA funds for freight operating subsidies stopped. The diminishment and eventual dissolution of the LRSA program forced states in the Northeast to continue to subsidize light-density freight lines with their own funds or to allow these smaller railroads to go out of business.

Meanwhile, although Conrail's government-fueled rebuilding of its infrastructure and rolling stock allowed it to become a practical transportation option in the Northeast and Midwest, the underlying economic barriers imposed by heavy ICC regulation prevented it from operating efficiently and profitably. It also was saddled with having to provide commuter rail services in the busy Northeast region. By the late 1970s Conrail, like its counterparts throughout the rest of the country, was absorbing significant losses and by

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[5] U.S. Congressional Office of Technology Assessment, *Financial Viability of Conrail*, 1975.

the end of the decade, railroads in the Northeast were again struggling to remain financially solvent and to provide a viable option for shippers and passengers in the region.

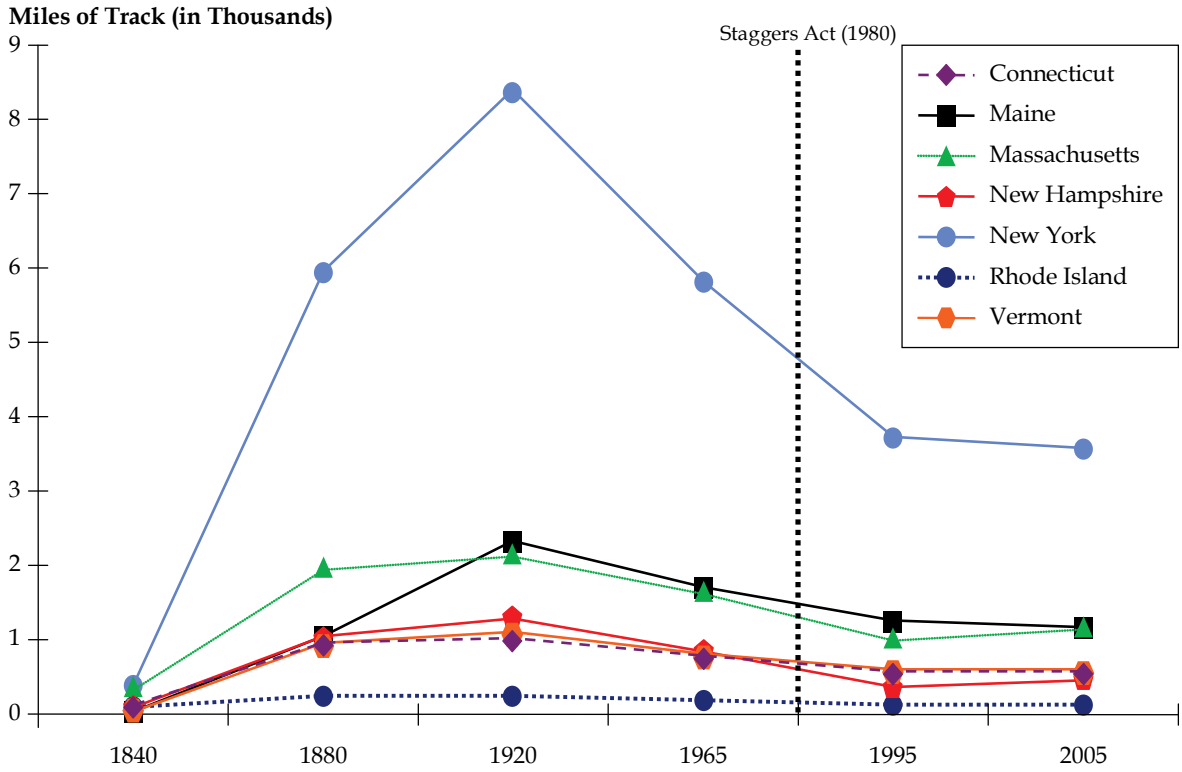
1980s to 1990s

In 1980, Congress passed the Staggers Rail Act, which largely deregulated the rail industry, allowed them more flexibility in setting rates, and permitted them to improve profitability through downsizing and consolidation. As a result of the Staggers Act, railroad operating margins improved by 16 to 20 percent, return on investment approached 8 percent, and rates charged to shippers steadily declined throughout the late 1980s and 1990s.

By the end of 1981 and during the years that followed, Conrail, like the rest of the railroad industry, made significant financial gains, which was hastened by the Northeast Rail Services Act (NERSA) of 1981. NERSA relieved Conrail of its obligation to provide commuter rail service on the Northeast Corridor, allowing these services to be provided by state or metropolitan transit or transportation authorities. NERSA also encouraged Conrail to improve its profitability and granted the railroad unusually strong powers to reduce its cost structure. For instance, NERSA provided for an accelerated abandonment process, which allowed Conrail to abandon any line within 90 days unless an offer of financial assistance was offered. In addition, NERSA amended labor protection laws for Conrail, making it easier for the railroad to reduce the size of its work force and limit pay increases for railroad personnel. Although these elements of NERSA allowed Conrail to remain viable, it also significantly impacted the physical extent of and services offered by freight rail in the Northeast.

Although the Staggers Act allowed the railroads to more quickly and effectively abandon some lines, mergers, consolidations, and abandonments had been occurring in the industry since the 1920s, as railroads worked to build and connect networks, access profitable markets, and rationalize their systems. As can be seen in Figure 1.3, the Northeast region lost approximately 51 percent of its rail system between 1920 and 1995.

Figure 1.3 Active Rail System Mileage in the Northeast Region



However, the downsizing made easier by the Staggers Act helped lead to the revitalization of the regional and local railroad industry, particularly in the Northeast, where many branch lines were spun off by the larger railroads and turned into new, smaller railroad companies. At the end of the 1990s, there were over 40 such firms in the region. The rise of shortline and regional railroads helped improve rail's overall market share, which approached 10 percent in the Northeast (as measured by intercity ton-miles) in the mid-1990s.

Although the Staggers Act helped improve productivity, volume, and overall market share of the railroads, revenues actually declined significantly between 1980 and 1995, as railroads competed with trucks for intercity freight traffic by lowering their rates significantly. Although traffic volume was up, revenues were down and the resulting financial pressure drove the larger railroads to undertake a new round of mergers in the early to mid-1990s. With the combination of the Staggers Act and NERSA allowing Conrail to become more succesful, two of its eastern competitors, CSX and Norfolk Southern (NS), engaged in a takeover battle to control the railroad and expand their own systems. In 1997, the two competing railroads struck a compromise agreement to jointly acquire Conrail and split most of its assets between them. The buyout was approved by the Surface Transportation Board (successor agency to the ICC) and took place on August 22, 1998. Operations under CSX and NS began June 1, 1999.

The sale and division of Conrail had significant implications in the Northeast. It involved the splitting of a system that had been fully integrated over a 20-year period into two parts (NS and CSX) and then reintegrating those parts into two different systems with disparate operating philosophies. This was an enormously complicated operating challenge that was not fully met. The result was serious service degradation for shipments entering and departing the region on the new NS/CSX system, which hindered the ability of rail to compete effectively with other modes.

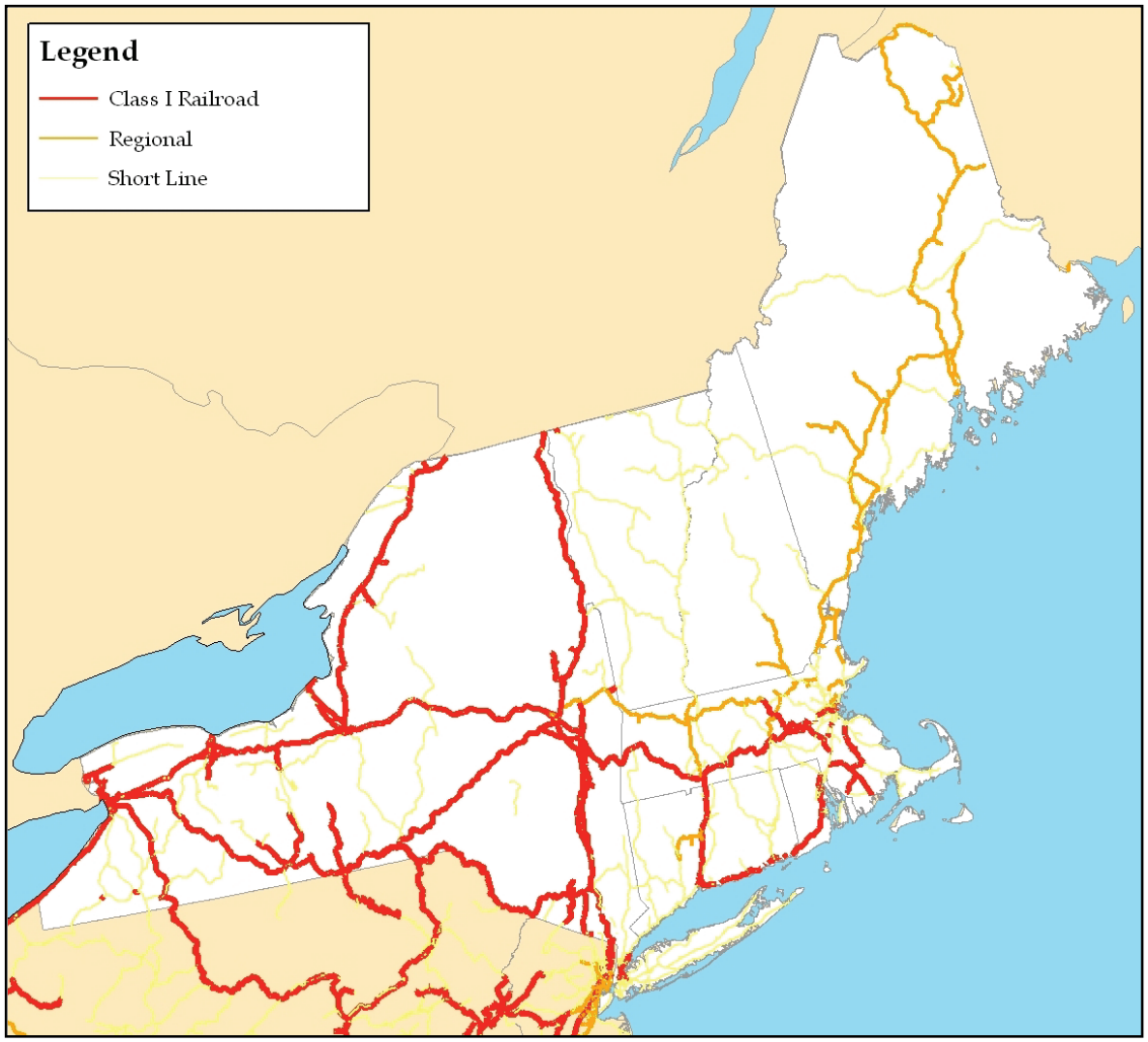
1.2 Railroads in the Northeast Today

Today, both the passenger and freight railroads are important elements of the overall transportation picture in the Northeast. Gains in efficiency and productivity have allowed the freight railroads to become increasingly competitive with trucks, particularly for commodities such as transportation equipment, paper and wood products, chemicals, food products, and consumer goods. These railroads also provide critical connections between the region's deepwater seaports and inland markets. In addition, passenger railroads – both commuter and intercity – have continued to play an important role in meeting the mobility needs of passengers throughout the region.

Like rail systems in other parts of the country, the Northeast rail system's infrastructure is increasingly incapable of handling modern rail equipment and volumes. As will be discussed later in this report, 286,000-pound railcars, the new industry standard, are not able to utilize significant portions of the rail system in the Northeast, due to a combination of infrastructure age and deferred maintenance. In addition, the evolution of rail service and infrastructure in the Northeast over the last 100 years has resulted in a system that has additional unique physical and operational characteristics – as well as unique challenges and opportunities. Today, the Northeast rail system is typified by:

- **A heavy reliance on regional and shortline freight railroads**. The Northeast rail system is shown in Figure 1.4. More so than in most other regions in the United States, freight rail in the Northeast is more reliant on regional and shortline railroads. There currently are five regional and nearly 40 shortline railroads operating in the region. CSX railroad serves Connecticut, Massachusetts, and New York. Norfolk Southern operates in New York. However, there is no direct Class I service to and from northern New England (Maine, New Hampshire, and Vermont), although Class I service can be accessed through interline or haulage agreements. As will be described later in this study, regional and shortline railroads have unique infrastructure, operational, and institutional constraints that affect overall system efficiency, reliability, and viability in the region.

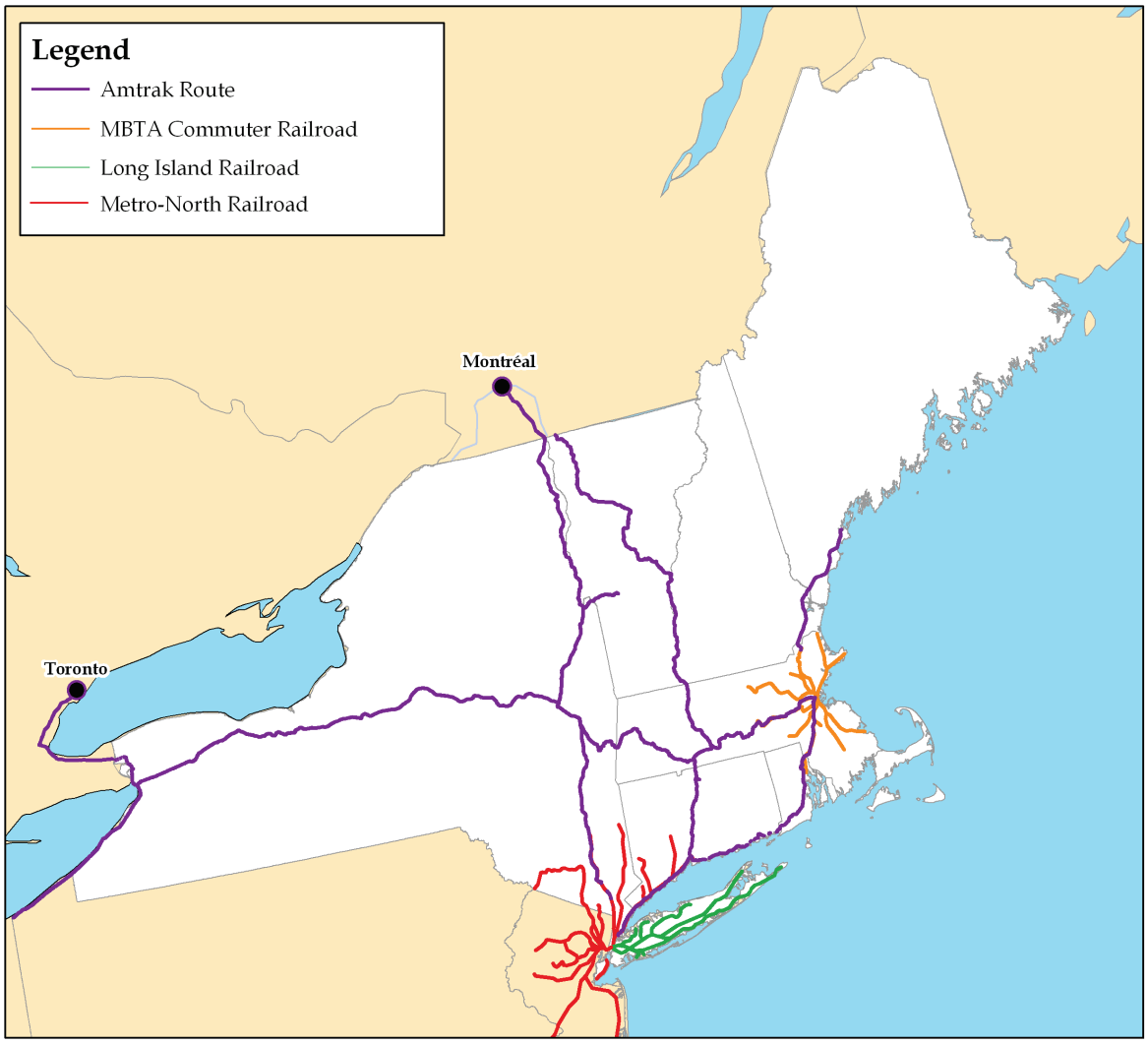
Figure 1.4 Northeast Region Freight Rail System



- **The presence of several intercity regional and commuter passenger railroads.** The Northeast region includes several urbanized areas with significant regional and commuter passenger rail activity. Commuter railroads shown in Figure 1.5 include the Metro-North Railroad in New York and Connecticut, the Shore Line East Commuter Rail Service in Connecticut, the Massachusetts Bay Transportation Authority Commuter Railroad in the Boston metropolitan area, and the Long Island Railroad, many of which were formed in the wake of NERSA. In addition, Amtrak operates several intercity rail corridors in the region, including the Downeaster service between Boston and Portland, Maine; the Empire Corridor, which operates between Buffalo/Niagara Falls and New York City; the Ethan Allen Express, which runs between New York City and Rutland, Vermont; the Adirondack, which runs between New York City and Montreal; the Lake Shore Limited, which connects New York City

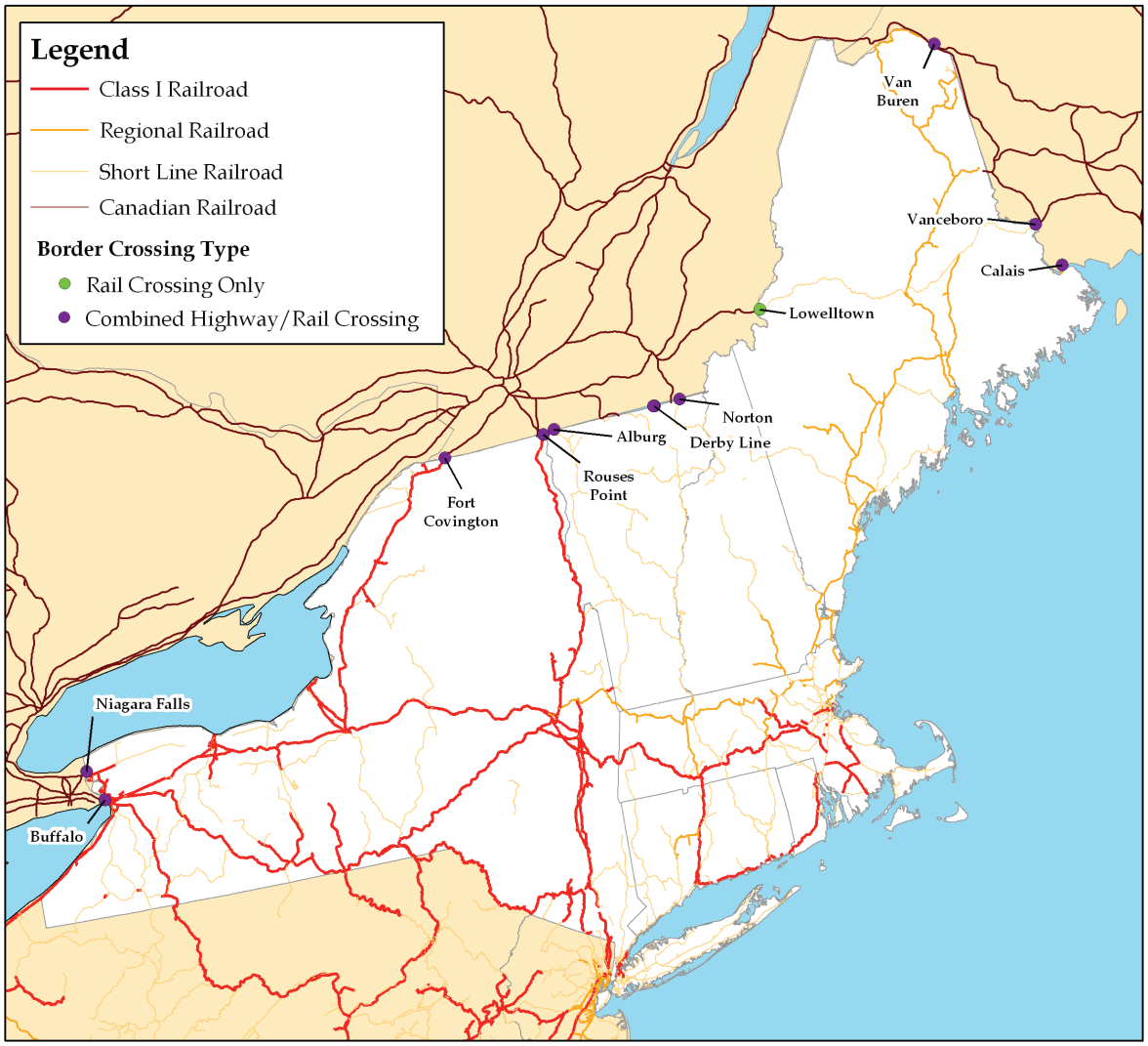
and Boston with Albany, Buffalo, and Chicago; the Maple Leaf, which connects New York City and Toronto; the Vermonter, which connects Washington, D.C., New York, New Haven, Springfield and key stations in Vermont; and the Northeast Corridor from New York to Boston, one of the highest volume routes on the Amtrak system. The Shore Line East Commuter Rail Service also is operated by Amtrak for Connecticut DOT. Many of these corridors serve both freight and passenger movements and are subject to a variety of operational and institutional agreements among states, Amtrak, the commuter railroads, and the freight railroads.

Figure 1.5 Northeast Region Intercity and Commuter Railroads



- **Significant cross-border operations**. The United States and Canada are each other's largest trading partner, swapping goods valued at over $300 billion in 2005.[6] A significant amount of cross-border trade occurs by rail. The value of rail traffic traveling between the two countries has grown by over 10 percent since 1995. The Canadian and American rail networks and operations are highly integrated, and the Northeast region is home to several rail border crossings, shown in Figure 1.6. These 11 crossings handled over 20 percent of rail freight traffic (as measured by tonnage) across the entire U.S.-Canada border.

Figure 1.6 Border Crossings in the Northeast Region



[6] U.S. Census Bureau, Foreign Trade Statistics, 2005.

- **Mature transportation infrastructure and access limitations**. The Northeast region's rail infrastructure is some of the oldest in the country. This characteristic is complicated by they fact that, unlike many other regions in the United States, much of the Northeast already was developed when the railroads were building infrastructure in the late 19th and early 20th centuries. This is particularly true in coastal areas, which most often were the centers of industry and population of the region. Unlike much of North America, where towns and industry grew around newly constructed rail facilities, the opposite happened in the Northeast – in many cases, rail facilities were constructed around existing populations and industry. Consequently, there are some major markets in the region, most notably New York City and Boston, whose access to freight rail services is limited and whose population density and land use characteristics makes it difficult and expensive to add rail capacity.

- **A large and diverse set of regional stakeholders**. As described earlier, the rail system in the Northeast region is made up of several large freight carriers and commuter railroads, many small freight carriers, and one intercity passenger railroad. As a result, rail stakeholders in the Northeast are a broad and diverse group, including representatives from seven states, the Class I, regional, and shortline railroads serving the region, Amtrak, MPO, economic development agencies, transit authorities, and others.

Although the passenger and freight rail systems in the Northeast region are generally stable and productive and are an important part of the transportation mix in the region, the system is still suffering from significant physical chokepoints, operational constraints, and institutional issues. These issues and constraints, many of which can be traced directly to the way in which the system evolved in the region, currently are preventing rail from fully meeting the mobility needs of passengers and cargo into, out of, through, and within the region. The remaining sections of this report describe these issues and constraints, how they impact the different rail stakeholders in the region, and how the Northeastern states can work individually and collectively to address them.

2.0 Overview of Northeast Rail Operations

The rail transportation system in the Northeast plays an important role in moving both passengers and goods into, out of, through, and within the region, helping to enhance overall transportation system efficiency as well as regional economic competitiveness and vitality. Freight rail is a key component of international supply and distribution chains, providing access to major international gateways and international and domestic trade corridors. Intercity passenger and commuter rail service in the region, more so than most other parts of the country, is a critical component of the overall transportation system, connecting major employment and population centers as well as major metropolitan areas throughout the region.

On its surface, the ownership, maintenance, and operation of the freight and passenger rail systems in the Northeast may appear to be straightforward, consisting of a number of freight and passenger railroads operating over a single interconnected system. However, in reality the rail system in the Northeast consists of a patchwork of rail networks, some privately owned, some publicly; a number of operators, providing a wide range of services to an array of customers; a number of complex interline/access agreements and strategic partnerships among different railroads that impact how goods and passengers move within the region; and a variety of institutional relationships among states, railroads, transit authorities, and other entities that can impact the ability of rail to operate efficiently in the region.

To more fully appreciate how the rail system in the Northeast works to meet the mobility and service needs of its customers – as well as the types of issues, chokepoints, and constraints that may hinder the ability of the system to perform efficiently – it is critical to understand the rail environment and the rail stakeholders that operate within the region. The following sections will set the stage for the discussion of key trends, chokepoints, issues, and constraints that follow in Section 3.0 by describing the different rail operators in the Northeast region, the services they offer, the roles they play in the intermodal movement of people and goods in the region, the ways in which they interact with each other, and the types of issues they are most concerned with.

2.1 Rail Operators in the Northeast

As described earlier, the Northeast region has a number of characteristics that make rail operations unique and challenging. There is a heavy reliance on smaller railroads to handle the region's freight traffic; commuter, intercity, and cross-border operations play a much more significant role than elsewhere in the country; and the transportation systems, populations, and industry profiles of the region are closely entwined. The combination of these characteristics results in a rail operating environment that consists of a wide range of stakeholders who serve a wide variety of needs. Rail operators in the Northeast region consist of the Class I, regional, and shortline railroads; commuter railroads; transportation authorities; and Amtrak. The remaining sections provide a definition of each of these players, describe

how they are involved in or impact rail operations in the region, how they relate or interact with other rail stakeholders, and their general issues and concerns.

Class I Railroads

Currently, seven Class I railroads (defined as railroads with annual revenues exceeding $277.7 million) operate in the United States. Four firms operate within the Northeast region: Norfolk Southern (NS), CSX, Canadian National (CN), and Canadian Pacific (CP). These Class I railroads serve as wholesalers of long-distance, line-haul freight service in various parts of the region. That is, they link Northeastern markets and gateways with the national rail system (and vice versa), allowing shippers and manufacturers in the region to more effectively access markets outside the Northeast. All Class I's, along with their infrastructure and rolling stock (i.e., locomotives and railcars) are part of for-profit corporations with publicly-traded stock.

The Class I railroads in the Northeast region are focused primarily on a handful of major markets. First, they provide access to major consumer markets on the east coast (e.g., New York and Boston) for imports arriving through major seaports on the west coast of the United States and Canada. They also provide access to these seaports, gateways, and consumer markets for domestic shipments and U.S. exports. Imports and exports of automobiles is another important market for the Class I's in the region, centered primarily at the Port of New York and New Jersey and the Port of Boston. Unit trains, which move large volumes of a single commodity such as coal or grain, are another important market for the Class I's. Finally, the Class I's in the Northeast region provide long-haul service for goods imported into the region's main load center port, the Port of New York and New Jersey.

Given this business model, Class I railroads typically do not focus on locally generated traffic; rather, their two primary concerns are maintaining (or improving) efficient access to the region's deepwater seaports, primarily the Port of New York and New Jersey, and maintaining (or improving) efficient movements into and out of the region. Consequently, they typically focus their investment on high-density, longer-distance line-haul business along key corridors connecting major markets. Operationally, these railroads tend to target large blocks of traffic, in order to take advantage of the economies of scale offered by long-distance rail transportation. Investment decisions by the Class I's, particularly infrastructure investments, are made very carefully for two reasons. First, as publicly traded companies, the Class I railroads are held accountable by their shareholders. Second, rail infrastructure investments are not fungible, i.e., it is difficult to redeploy or reuse rail infrastructure (e.g., tracks) once it is in place. As a result, the Class I's are much more likely to invest in motive power or rolling stock (which can be redeployed easily) than they are in infrastructure improvements.

The Class I railroads work closely with regional and shortline railroads via interline or haulage agreements, through which two different railroads agree to haul each others' freight or equipment over certain segments of track. These agreements, which allow the regional and shortline railroads (and their customers) to access the national rail network, are particularly important in the Northeast region, as Maine, New Hampshire, and Vermont currently do not have direct Class I service.

Class I's also must interface with public sector rail stakeholders. While the Class I's interact with state DOTs and MPOs, their perspectives differ significantly. The Class I railroads, as described above, are primarily interested in long-haul services, coordinating infrastructure and operational improvements at a system-level, and ensuring short-term returns on investments. State DOTs and MPOs, however, are focused on projects and strategies that improve statewide or metropolitan mobility and often conduct planning and programming activities on longer timeframes (typically 20 to 30 years). This is particularly true in the Northeast region which, with the exception of New York, consists of several small states in close proximity to one another. The nature of Class I rail movements, which are typically national in scale, mean that investments in the rail system within one state may have significant benefits well outside the state. For instance, a rail infrastructure investment in New York may primarily benefit rail movements in Chicago. This issue, which will be discussed in more detail later in this report, can make it difficult for states to justify spending limited transportation funds on Class I rail infrastructure improvements.

Regional and Shortline Railroads

Regional and shortline railroads also are a critical component of the rail system in the Northeast region. Within the region, there are five regional railroads, defined as those that operate at least 350 miles or with annual revenue greater than $40 million; and nearly 40 shortlines, defined as line-haul railroads that operate less than 350 miles and have annual revenues less than $40 million.[1] Regional railroads typically maintain larger networks that span multiple states as compared to their shortline counterparts, which typically own and manage smaller networks and often operate within a single state. Regional railroads often handle some amount of "overhead" traffic, i.e., traffic that neither originates nor terminates on their system, though this is rare for shortlines. Though they typically handle significantly less volume than Class I's, regional and shortline railroads account for 61 percent of the total track mileage and a significant percentage of the total freight shipped in the Northeast.

As described above, several states in the region do not have direct access to Class I services, making the shortline and regional system a vital backbone for shippers and manufacturers in those states. Like the Class I's, these railroads primarily are private sector entities, but are often able to operate in conditions where the Class I's cannot, taking advantage of different labor-cost structures, profitability targets, and business models. In many cases, regional and shortline railroads were formed through competitive bids for track spun-off by the larger railroads.

Unlike the Class I's, regional and shortline railroads regularly serve locally generated traffic, oftentimes gathering or consolidating smaller blocks of traffic from individual shippers for transfer to the larger national or regional rail system. This is a critical service in the Northeast region, as many of these smaller shippers or manufacturers do not generate the volumes of traffic that would be attractive to the Class I's. Without the

[1] Association of American Railroads.

ability of the regional and shortline railroads to provide this service, many of these shipments would likely occur by truck. Major commodities handled by the shortline and regional railroads in the Northeast region include bulk food products, lumber, coal, and scrap metal and many of these smaller railroads serve the region's smaller, niche ports, such as the Port of Quonset-Davisville (Rhode Island), Searsport (Maine), New Haven (Connecticut), New London (Connecticut), and others. Regional and shortline railroads in the Northeast help ensure that rail service is available for shippers and ports and who serve these kinds of heavy or bulky commodities. Without regional and shortline rail service, some shippers might close or relocate, taking jobs and tax revenue with them.[2]

Clearly, the Class I railroads are important partners for the region's shortline and regional railroads. In many states, DOTs and MPOs are important partners, as well, and shortline and regional railroads have a much different relationships with these agencies than their Class I counterparts. First, in most cases state DOTs and these smaller railroads operate within similar jurisdictional boundaries, in many cases. Shortline and regional railroads handle significant volumes of locally generated and/or locally terminated traffic, providing the first and last service miles in the "door-to-door" collection and distribution of rail cars. As such, they manage networks that are often fully contained within a single jurisdiction.

Investments in these systems can have tangible benefits to statewide or regional mobility and have important economic development or vitality benefits, making them more attractive to many states. Regional and shortline railroads often provide access to rural areas and agricultural areas, helping to ensure these regions can access more distant markets and remain economically viable. In addition, existing land around or in close proximity to shortline and regional railroads are increasingly being targeted for industrial redevelopment activities. In fact, many state DOTs manage rail access or infrastructure funding programs targeted at maintaining or improving the infrastructure or operations of these smaller railroads and in some cases are coupling these programs with economic development incentives to attract employers. Because of their size and revenue streams, many shortline and regional railroads are dependent on these types of funding programs to maintain their viability, and some of the shortline and regional railroads in the Northeast region even operate along publicly owned and maintained track infrastructure.

Intercity Passenger and Commuter Railroads

Several commuter railroads operate within the Northeast region. Commuter railroads are those that are designed to transport passengers from their residences to their job sites, and typically provide service between a central city, its suburbs, and/or another central city. Metro-North, which provides service in New York and Connecticut; the Long Island Railroad, which serves New York; Shore Line East Commuter Rail Service, which operates in Connecticut; and the Massachusetts Bay Commuter Railroad (MBCR), which provides service in Massachusetts and Rhode Island, are the commuter railroads in the region. Many of these railroads are governed by public authorities – the Metropolitan

[2] AASHTO Freight Rail Bottom Line Report.

Transportation Authority (MTA) and the Connecticut DOT oversee Metro-North and the MTA also oversees the Long Island Railroad; and the Massachusetts Bay Transportation Authority (MBTA) oversees the MBCR. In addition, the Shore Line East Commuter Rail Service is overseen by Connecticut DOT. Intercity rail service consists of long-distance rail transportation between cities. Amtrak is the sole provider of intercity rail service in the region.

Unlike the freight railroads, which in most cases own their infrastructure and operate their own trains, passenger rail in the region is often owned and operated by different entities. In fact, some commuter rail systems utilize the rail networks of several different entities. For example, Metro-North Railroad operates over infrastructure owned by the Connecticut DOT and the MTA. The MBTA commuter rail system, which is operated for the MBTA by the MBCR, uses its own infrastructure, as well as infrastructure owned by CSX and Amtrak. In addition, Amtrak operates over its own infrastructure along with infrastructure owned by CSX, Pan-Am Railway (formerly Guilford), Canadian Pacific, MTA, Connecticut DOT, and others. In addition to sharing infrastructure, commuter railroads operating in the Northeast also maintain operational relationships with the freight railroads and Amtrak. For example, although MBTA (through MBCR) dispatches most of its own trains, some MBTA trains are dispatched by Amtrak personnel (for trains operating on the NEC between Boston and Providence), by CSX (along the Worcester line between Back Bay and Worcester), and by Pan-Am Railway for trains operating north of Boston. Conversely, many freight railroads in the region, particularly those operating on the NEC or on the Metro-North system, are dispatched by commuter rail operators.

Because the freight and passenger rail systems and operations in the region are so closely entwined, they also are tightly managed. Peak times for passenger demand on commuter rail systems are typically the weekday morning (6:00 a.m. to 9:00 a.m.) and evening (4:00 p.m. to 7:00 p.m.) commute hours. Most commuter railroads in the region also provide more limited service later in the evening and on the weekends. In addition, Amtrak operates approximately 90 intercity trains per day and 650 per week over some portion of the route between Boston and Washington, D.C.[3] These intercity and commuter trains share infrastructure with each other, along with many of the freight carriers in the region, further complicating movement of both passengers and freight throughout the region. Examples of integrated commuter, intercity, and freight operations are provided in Table 2.1 below.

[3] Amtrak National Fact Sheet, 2006.

Table 2.1 Examples of Commuter and Intercity Passenger Rail Services

Service	Travel Lane	Track Ownership	Operator	Trains per Day	Operating Times (Peak)
Routes that Serve Intercity and Commuter Movements					
Amtrak Northeast Corridor (includes Regional and Acela Service)	Boston-New York	Amtrak, Connecticut DOT, MBTA, and MTA	Amtrak	54	3:15 a.m.-1:00 a.m. (N/A)
Metro-North New Haven Line	New York-New Haven	MTA and Connecticut DOT	Metro-North	100+	4:00 a.m.-1:30 a.m. (4:00-9:00 a.m. and 4:00-8:00 p.m.)
MBTA Providence-Stoughton Line	Providence-Boston	Amtrak, MBTA	Amtrak	30+	5:00 a.m.-1:00 a.m. (5:00-8:30 a.m. and 3:45-6:30 p.m.)
Routes that Serve Intercity and Freight Movements					
Connecticut Shoreline East	Stamford-New Haven-New London	Amtrak, Connecticut DOT	Amtrak	11	5:30 a.m.-11:00 p.m. (N/A)
Amtrak Ethan Allen Express	Rutland-New York	CSX, CP, Clarendon, and Pittsford	Amtrak	2	7:00 a.m.-8:30 p.m. (N/A)
Routes that Serve Commuter and Freight Movements					
MBTA Haverhill/ Reading Line	Haverhill-Boston	MBTA and Guilford	Massachusetts Bay Commuter Railroad (MBCR)	23	5:30 a.m.-1:00 a.m. (5:30-9:00 a.m. and 4:30-6:15 p.m.)
MBTA Worcester Line	Worcester-Boston	MBTA and CSX	Massachusetts Bay Commuter Railroad (MBCR)	21	6:00 a.m.-1:00 a.m. (6:00-8:30 a.m. and 4:00-6:30 p.m.)
Long Island RR Montauk Branch	Montauk-New York	MTA	LIRR	20+	1:00 a.m.-midnight. (4:00-9:00 a.m. and 4:30-7:30 p.m.)

Freight railroads utilizing corridors owned by commuter railroads must adhere to tight operating windows, which are typically provided in the "off-hours" for passenger service, i.e., late in the evenings or overnight. Sharing infrastructure and operations in this way, when coupled with strong demand for passenger and freight service in the region, can make managing and operating the system efficiently a significant challenge. As will be described in more detail later in this report, efficient management of shared lines requires a delicate balance of effective communications and dispatching, adherence to curfews and delivery windows, and tight coordination among both passenger and freight railroads. When this balance is disrupted, the performance of all system users is affected.

Clearly, the intercity and commuter railroads in the Northeast region maintain complex and interconnected relationships with each other and the freight railroads in the region. They also maintain institutional relationships with state DOTs and other entities in the region. For instance, the MBTA, MTA, and Connecticut DOT own portions of the Amtrak NEC in Massachusetts, New York, and Connecticut that serve both intercity and commuter trains. These entities – not Amtrak – bear the primary responsibility for maintaining and improving the tracks, stations, signal and power systems, bridges, grade crossings, yards, and terminals on these portions of the regional network. Amtrak compensates these states for use of their rights-of-way, just as these (and other) states make payments to Amtrak for use of its right-of-way.

In addition, several states in the Northeast region have provided funding to Amtrak to either improve or continue to provide intercity passenger service. For instance, Amtrak's Downeaster service from Boston to Portland reflects joint investment in track and station improvements by Maine, New Hampshire, Massachusetts, and the local governments, in partnership with Amtrak and the Federal government. The State of Maine helps defray the operating cost of this service. Vermont owns substantial portions of rail rights-of-way as part of the State's rail preservation program. The State invests in track, signal, bridge, and grade crossing improvements in the State used by Amtrak's Vermonter and Ethan Allen Express service to link Vermont with New York City and points south. Vermont also helps defray the operating costs of these trains.[4] Amtrak requires state support in order to maintain operations for these services, which were not originally included in its basic system.

[4] Coalition of Northeast Governors, *State Support for Intercity Passenger Rail*, 2002.

3.0 Key Passenger and Freight Rail Trends

Although several historical and evolutionary factors (described in Section 1.0) have influenced the structure, operations, and efficiency of the Northeast rail system, rail infrastructure and operations in the Northeast also are being affected by several current trends and issues. These trends and issues, which have transportation, domestic and international trade, financial, and demographic components, are dynamic in nature and are having important implications on the ability of rail to meet freight and passenger mobility needs in the region. This section focuses on four key trends affecting the Northeast rail system, including:

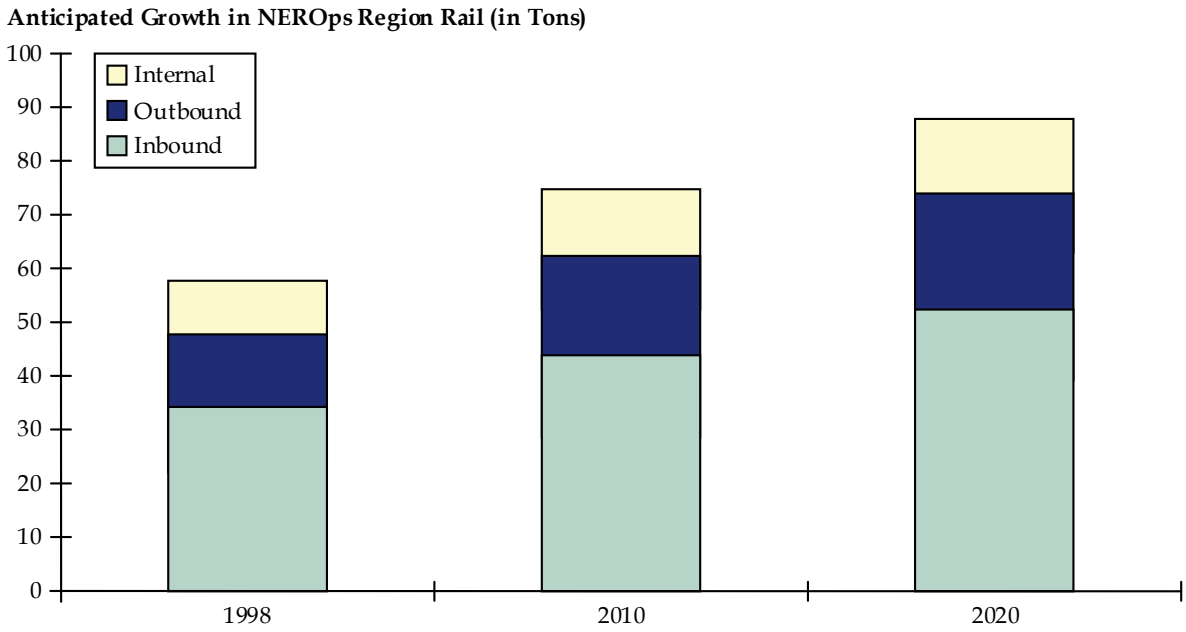
- Growing demand;
- Evolving markets and logistics patterns;
- Continued financial challenges of the railroad industry; and
- Regional population and growth patterns.

In many cases, these trends and issues have contributed significantly to the physical, operational, and institutional chokepoints and constraints that will be described in greater detail in Section 4.0. Understanding these key trends and issues – and how they affect passenger and freight rail operations in the Northeast region – is a critical step in both identifying major chokepoints and constraints and in developing strategies to address them. This section describes in detail these passenger and freight rail trends and describes implications for railroads, shippers, and states in the Northeast region.

3.1 Trend Number One – Growing Demand

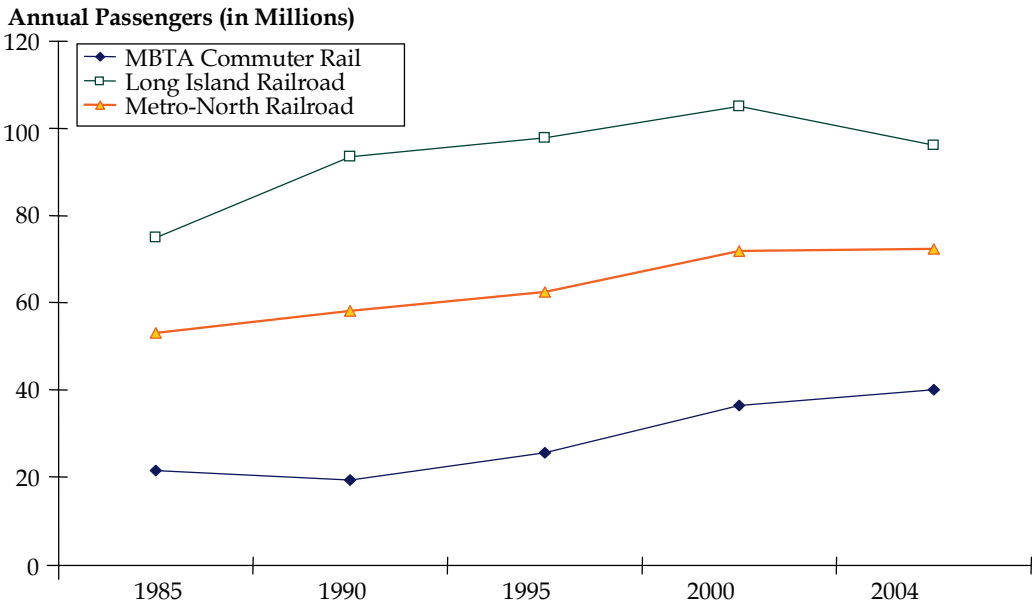
As was discussed in Section 1.0, the overall capacity of the freight and passenger rail system (as measured by track miles) in the Northeast region has declined significantly over the last several decades. In recent years, however, the demand for freight and passenger service on that system has increased and is expected to continue to increase over the near term. Figure 3.1 shows the expected increase in freight rail traffic moving into, out of, and within the Northeast region between 1998 and 2020. Overall, freight movements are expected to increase by nearly one-third during this time period. Figure 3.2 and Figure 3.3 show how demand for passenger transportation on the region's commuter rail systems and along Amtrak's Northeast Corridor has grown since 1985 and 1991. While specific projections for all intercity and commuter rail systems are not yet available, trends indicate that overall passenger rail movements, both commuter and intercity, also will grow significantly by 2020.

Figure 3.1 Growing Demand for Freight in the Northeast Region



Source: FHWA Freight Analysis Framework.

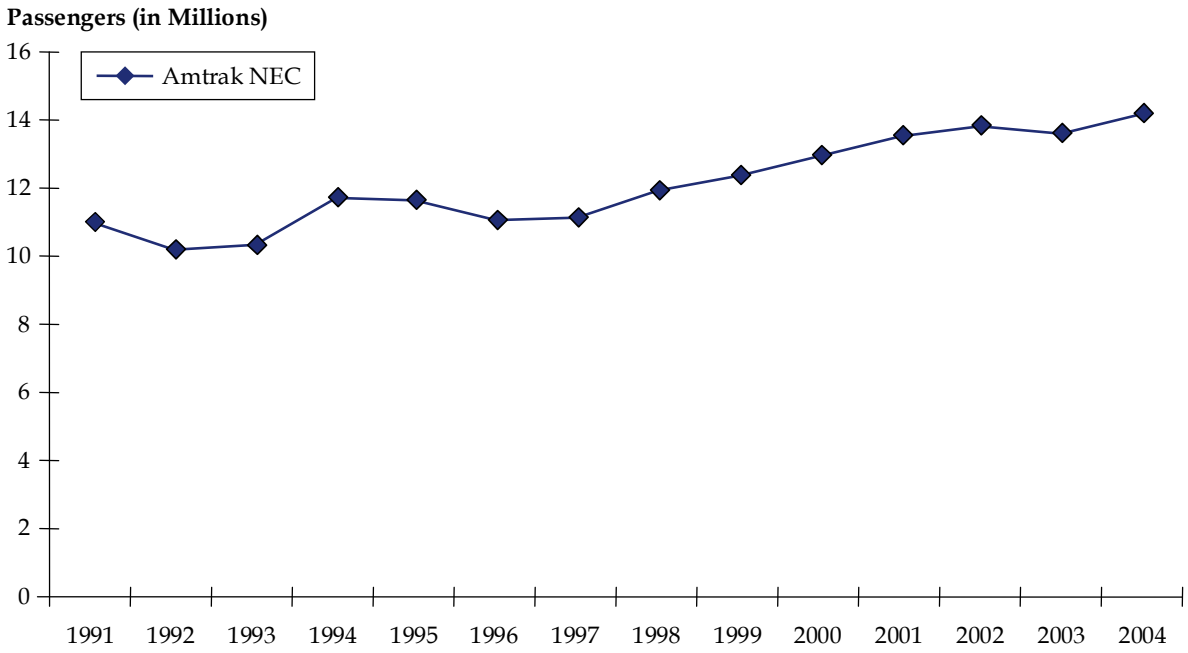
Figure 3.2 Commuter Rail Growth in the Northeast Region



Source: Individual Commuter Railroads.

Note: The MBTA Commuter Rail data point for 1985 is an estimate based on trends.

Figure 3.3 Passenger Volume on Amtrak's Northeast Corridor



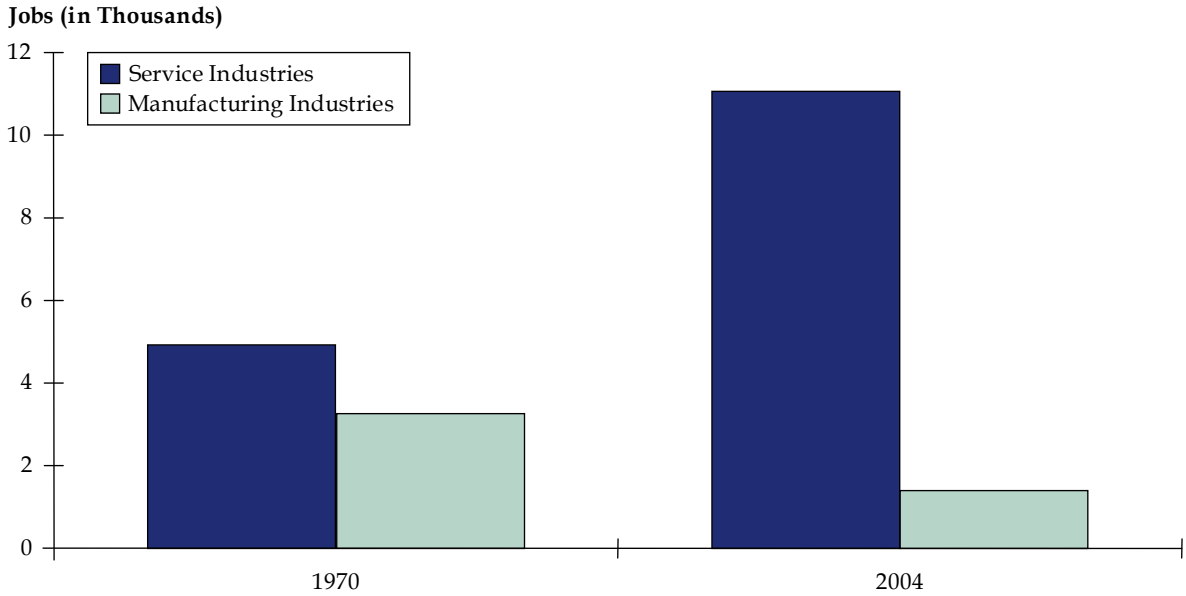
Source: Amtrak.

3.2 Trend Number Two – Evolving Markets and Logistics Patterns

Evolving Markets

The United States economy is continuing to evolve from its traditional manufacturing base to a service and information economy. In the past several decades, manufacturing employment dropped slightly, while employment in services doubled. Whereas the two sectors had similar employment levels in 1970, the service sector had roughly twice as many employees by 2004. This trend of a rapidly growing service sector combined with a declining manufacturing sector is mirrored in the Northeast region, as shown in Figure 3.4.

Figure 3.4 Total Jobs by Industry in the Northeast Region

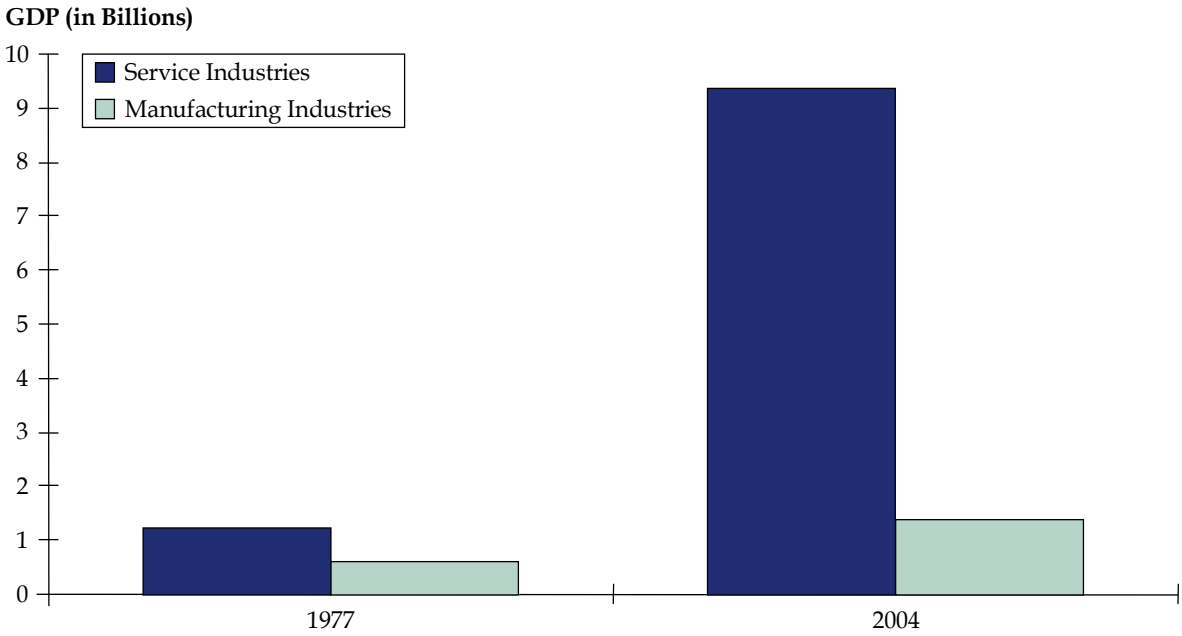


Source: Bureau of Labor Statistics.

The shift towards service industries impacts the composition of freight moved regionally as well as nationally and internationally, as service-related industries have different transportation needs than manufacturing industries. Shipments from service-related industries often consist of low-weight, high-value commodities that require a high degree of visibility and reliability. In fact, many businesses in these types of industries employ just-in-time logistics practices, which involve lower inventory levels, more flexible freight services, and time-definite delivery windows. These just-in-time logistics practices also depend on timely and accurate information to track market movements and fast and reliable transportation to meet customer demand. In many cases, this results in a greater reliance on truck and air shipments, which are highly flexible and responsive.

Although total employment in the manufacturing sector has declined over the last several decades, productivity increases have enabled the manufacturing industries that remain to produce more output with fewer employees (as shown in Figure 3.5), yielding continued growth in freight demand. Among the manufacturing firms in the Northeast region, inbound shipments are shifting from bulk raw materials, which can move cost-effectively via rail, to components shipped largely via intermodal containers, for which rail firms face stiff competition from trucks. Similarly, the final products of these manufacturers are increasingly lighter and higher-value manufacturing and high-tech goods, resulting in increased demand for truck and air transportation, particularly for small package movements.

Figure 3.5 GDP by Industry in the Northeast Region

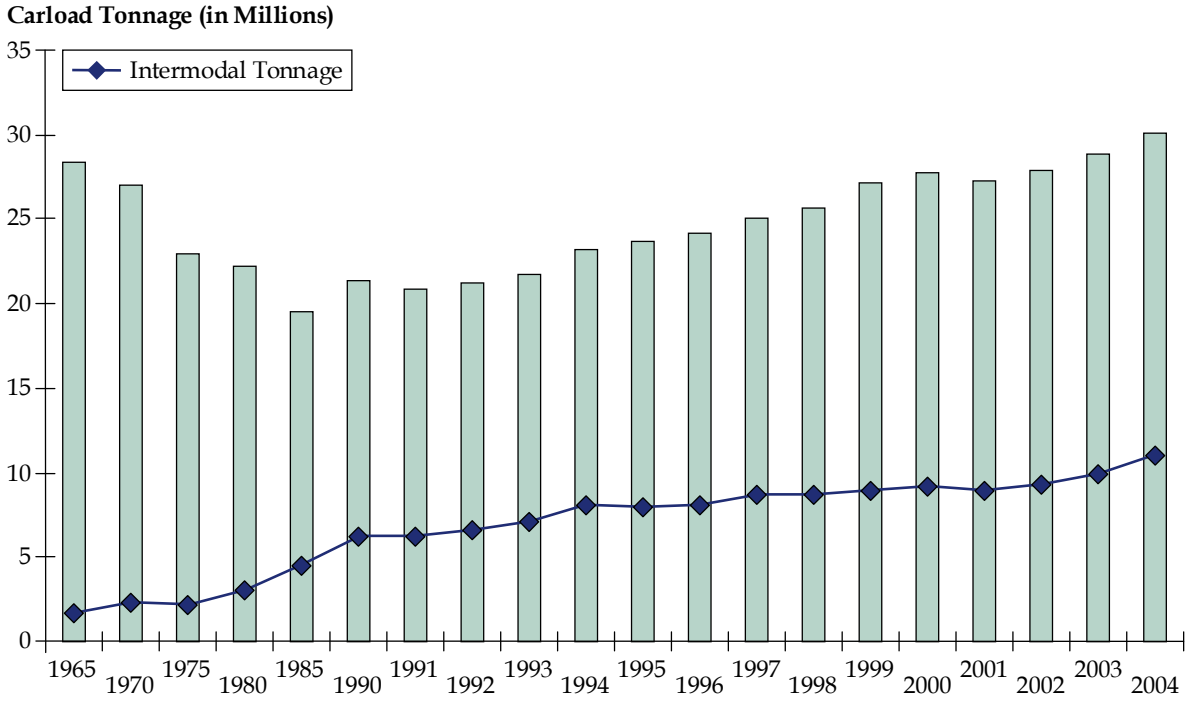


Source: Bureau of Labor Statistics.

The result of evolving market trends is a significant change in the traffic mix handled by the railroads in the Northeast and the rest of the United States. Both carload and unit train traffic continues to be an important contributor to the revenue of the Class I railroads. Carload traffic, in particular, continues to be the bread and butter of many of the region's regional and shortline railroads. Beginning in the early 1990s, however, the Class I's began to handle greater volumes of intermodal traffic. As shown in Figure 3.6, growth in intermodal traffic has greatly outpaced growth in carload traffic (560 percent to 6 percent growth since 1965, respectively) and currently is the primary revenue generator for the Class I railroads.[1]

[1] Total tonnage can be calculated by adding the figures associated with the bar and line charts represented in Figure 3.6.

Figure 3.6 Growth in Rail Carload and Intermodal Tonnage



Source: AAR.

Already their primary revenue generator as well as a rapidly growing market segment, intermodal service will continue to be a focal point for the larger railroads nationally and in the Northeast region. This trend can have significant impacts on the smaller rail operators, as well as some shippers and manufacturers in the Northeast. As discussed in Section 2.0, the Class I railroads are important partners for the region's shortline and regional railroads, as they allow the region's smaller shippers, manufacturers, and ports to access the national rail system. As the Class I's continue to focus on intermodal traffic, shippers and manufacturers that generate traditional carload traffic (e.g., bulk food products, lumber, coal, and scrap metal) may have difficulty accessing competitive rail rates and consistent service quality, as Class I railroads choose to allocate capacity to more profitable shipments. Without the ability of the railroads to provide cost-effective service, many bulk shipments would likely occur by truck.

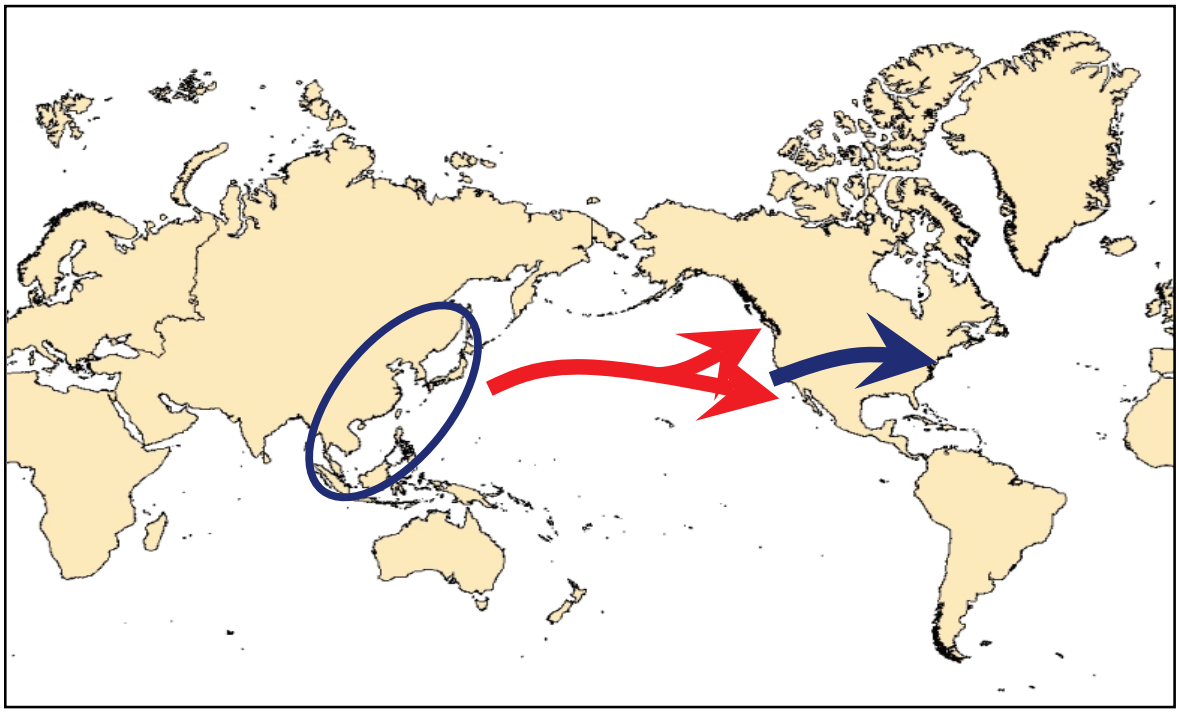
Evolving Logistics Patterns

Lower logistics and transportation costs have allowed shippers and manufacturers to outsource production, to reduce the cost of labor and components; implement just-in-time manufacturing and logistics processes, to reduce the cost of holding inventory; and support larger, more effective regional warehousing strategies, to reduce distribution costs. Shippers and manufacturers in the Northeast region are managing increasingly complex supply and distribution chains, which are dynamic in nature and can have significant impacts on regional, statewide, and local transportation systems. As discussed above, the

evolving nature of the region's economy, combined with changes in the composition of freight moved into, out of, through, and within the region, is causing changes in logistics patterns and strategies. In addition to the just-in-time logistics practices being employed by many of the region's shippers, the Northeast region also is being affected by the routes used by international containerships to connect Asian-based manufacturers and exporters with major consumer markets on the United States Gulf and East Coasts.

The Panama Canal, the Suez Canal, and the United States West-to-East rail intermodal system are the three most common routes used to connect Asian manufacturers with northeast U.S. markets. For many years, consumer markets on the East Coast were served most effectively by the rail intermodal system, which transported Asian imports arriving at West Coast ports to major East Coast markets. This distribution system, known as a rail landbridge, is shown in Figure 3.7. However, the combination of congestion at the Ports of Los Angeles and Long Beach (which handle approximately half of all United States imports), increasing costs and decreasing reliability on the rail intermodal system, and the proliferation of distribution and warehousing centers near ports along the Gulf and East coasts of the United States, have combined to make the Panama Canal and Suez Canal routes more attractive options to shippers serving these markets, particularly those shipping consumer goods in intermodal containers.

Figure 3.7 West to East Movement of International Freight via Rail Landbridge



The Panama Canal is a critical conduit for trade between Asia and the United States. Shipments moving through the Canal typically arrive at Gulf Coast or Southeastern ports and are distributed via rail or truck to major consumer markets. Driven by congestion at West Coast ports, the use of the Canal has increased sharply in recent years – total container shipments through the Canal between Asia and the United States have increased from 11 percent in 1999 to over 38 percent in 2004.[2] However, there are concerns about the ability of the Canal to absorb future growth in trade volumes, as it is physically constrained and many of the new containerships moving between Asia and the United States cannot fit in the Canal as it currently is configured. Recognizing these trends, the Panama Canal Authority is undertaking a $5.25 billion expansion project that will allow it to continue to serve the larger containerships transiting between Asia and the United States.

Of more immediate concern to the Northeast is the increasing use of the Suez Canal. As discussed above, the Panama Canal currently cannot handle many of the containerships serving the Asia-U.S. trade route. As a result, many international containerships are utilizing the Suez Canal and calling on ports in the eastern United States, including the Port of New York/New Jersey and the Port of Halifax, both of which have sufficient waterside infrastructure to handle these large ships. This trend, shown in Figure 3.8, has two implications for railroads in the Northeast region. First, it will bring to the forefront the importance of efficient connections between the region's deepwater seaports and the mainline rail network, as more and more Asian trade comes through the region's major ports and is shipped out via rail. Figure 3.9 shows the increase in Asian-related trade at two major northeast ports, New York/New Jersey and Boston, which significantly jumped between 2001 and 2004. Second, it will stress the importance of shipment reliability and visibility, encouraging East Coast freight railroads to maintain scheduled services between key markets and along key corridors and to enhance the capacity and efficiency of the intermodal terminal network. This will be a significant challenge in the Northeast region, as these movements will utilize the same infrastructure already shared by existing freight and passenger movements. Continued growth in Asian trade through the region's deepwater seaports will continue to strain this shared infrastructure.

[2] Panama Canal Authority, 2006.

Figure 3.8 Emerging Trend
East to West Movement of International Freight through Suez Canal

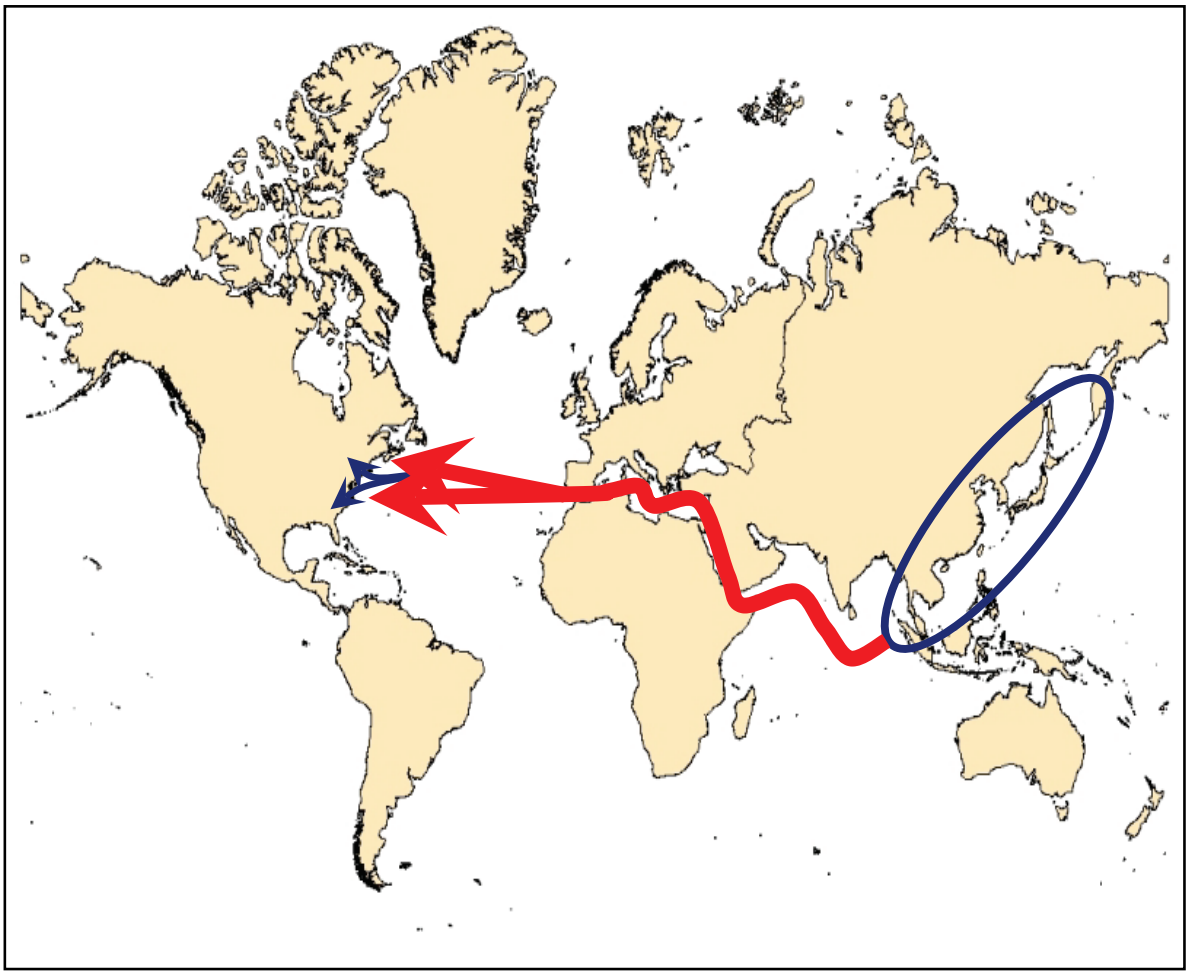
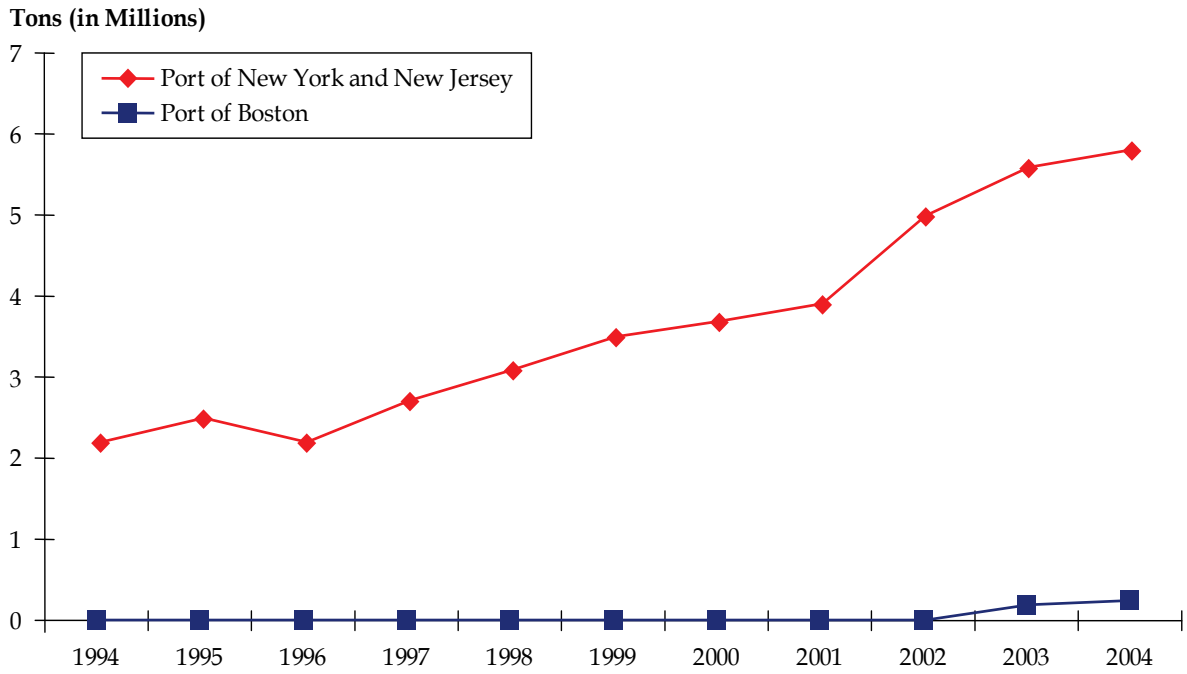


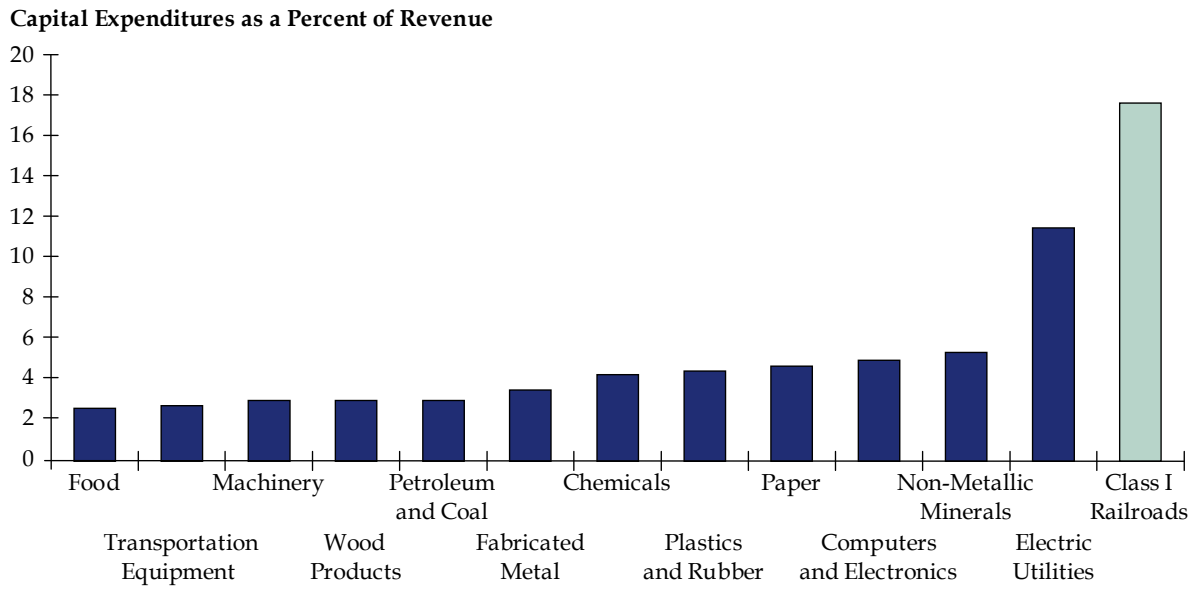
Figure 3.9 Asian Trade at Northeast Ports



3.3 Trend Number Three – Continued Financial Challenges of the Railroad Industry

The rail industry nationally and in the Northeast region is stable, productive, and competitive, with sufficient business and profit to operate effectively. However, the industry's financial condition does not allow it to quickly improve its infrastructure or to greatly enhance its market share. As shown in Figure 3.10, railroads are a highly capital-intensive industry, requiring significant spending for infrastructure, such as track and signal systems; rolling stock, such as locomotives, freight cars, and other equipment; and communications and information technology. Although this graphic shows the capital expenditures for the larger railroads, the same trend holds true for the region's shortline and regional carriers, as well.

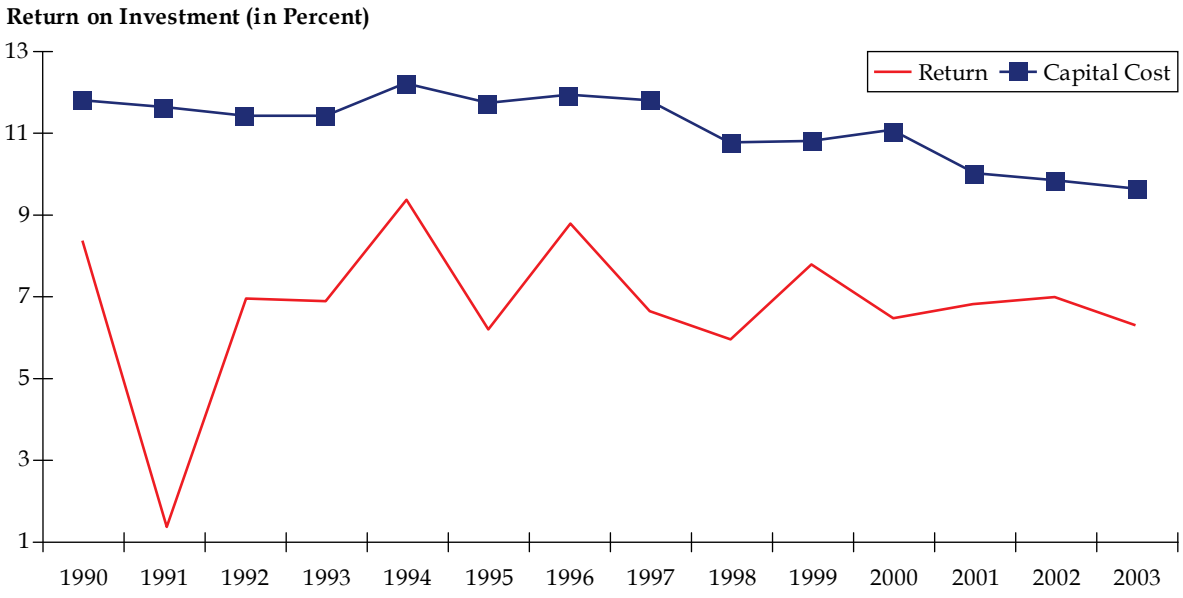
Figure 3.10 Capital Expenditures as a Percent of Revenue for Various U.S. Industries



Source: AAR.

A fundamental problem for the rail industry – both nationally and in the Northeast region – has been that, despite improvements in performance, financial returns have not been adequate to fully justify capital replacement. Railroads have not been earning their cost of capital, which is derived from the costs of debt and equity of the railroads. Figure 3.11 illustrates this point.

Figure 3.11 Railroad Cost of Capital



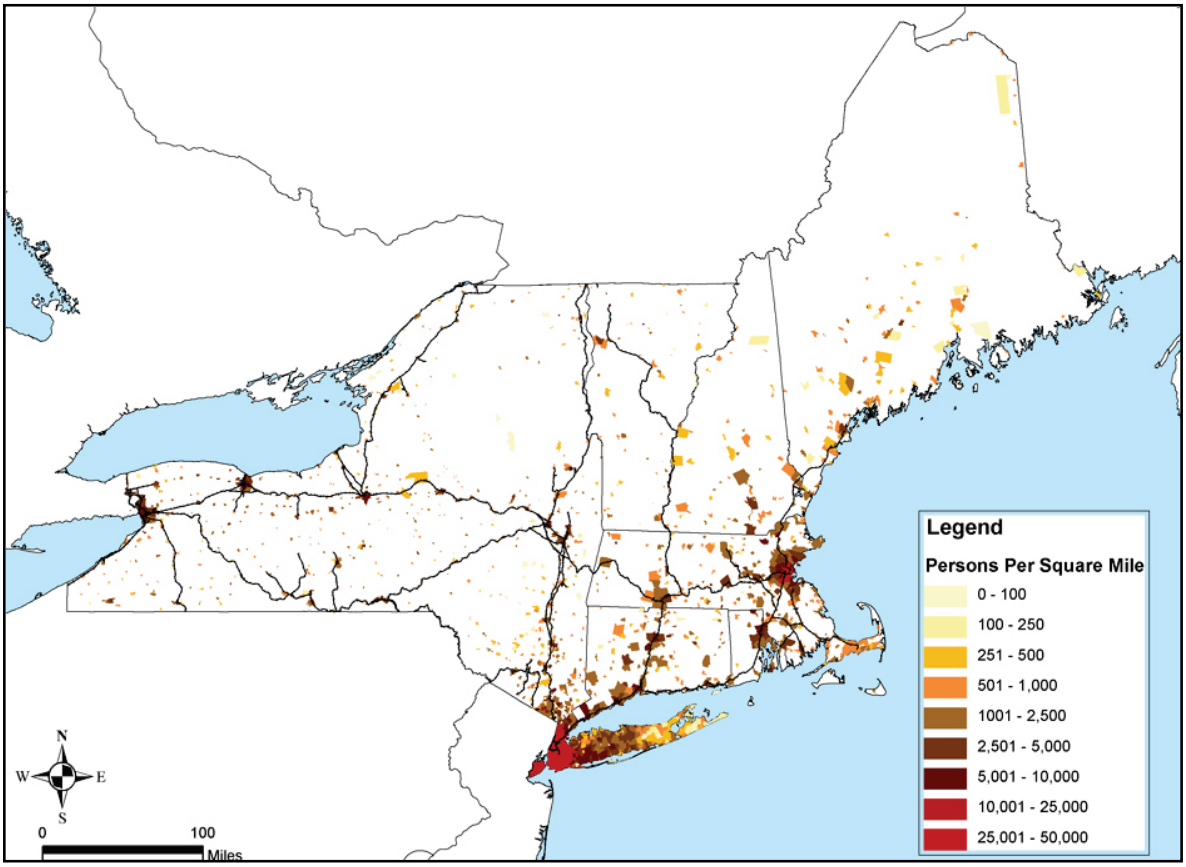
Source: AAR.

This issue is particularly true for shortline and regional railroads, many of which operate on low-density lines formerly owned by Class I's that may have been adequately maintained, but were not likely to have been improved or enhanced. The marginal profitability of many shortline and regional railroads, combined with their limited access to capital markets, makes it even more difficult for many of them to improve their infrastructure and attract additional traffic. As a result, these (and other) railroads concentrate their scarce capital on investments that have the highest short-term payback, in terms of increased volume and revenue, sometimes at the expense of longer-term needs.

3.4 Trend Number Four – Regional Population and Employment Growth

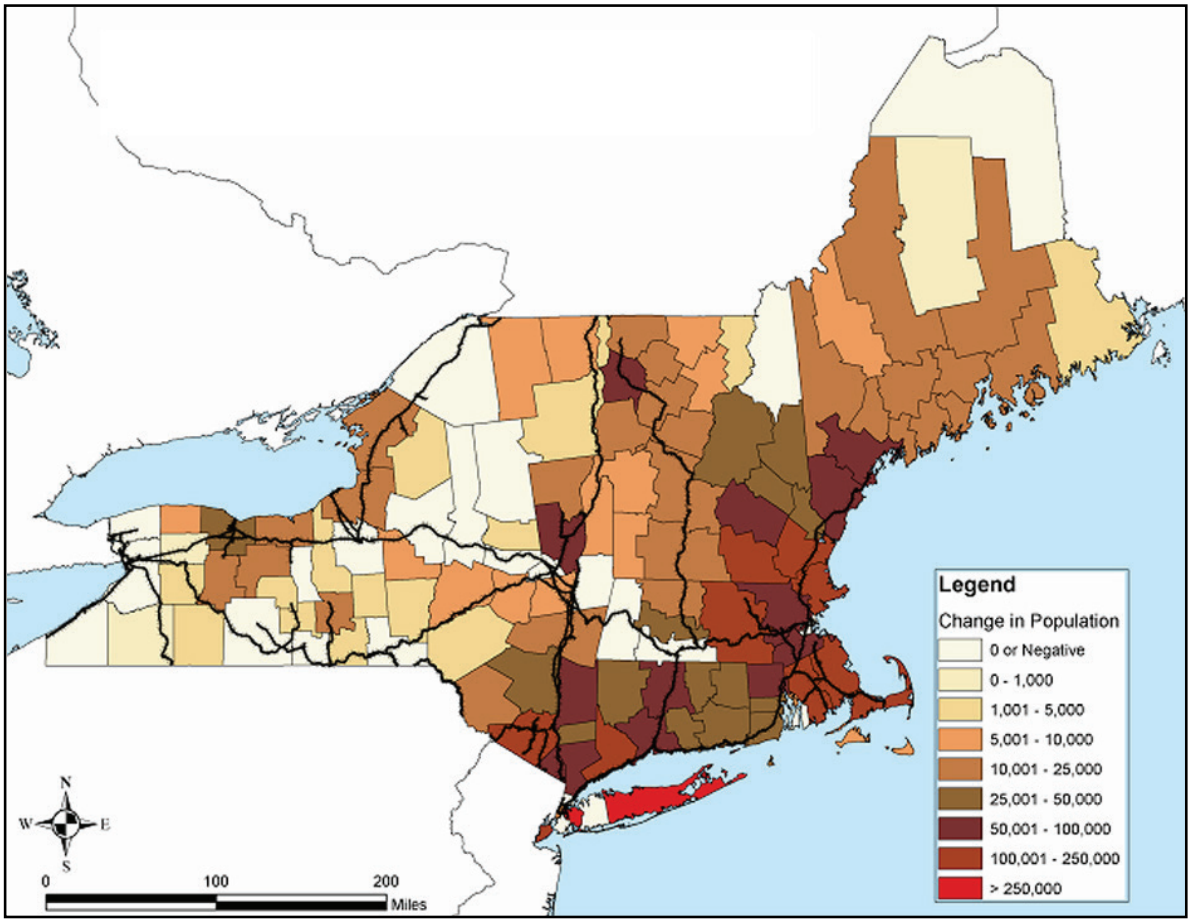
With a population of just over 33 million people, the Northeast region is home to 12 percent of the nation's total population although it accounts for just three percent of total land area. As a result, the Northeast – more so than most other regions of the country – is densely populated. Figure 3.12 shows population by county in the region for 2000. Many of the most densely populated areas are concentrated around important traffic lanes and freight rail facilities.

Figure 3.12 Population Density by County
2000



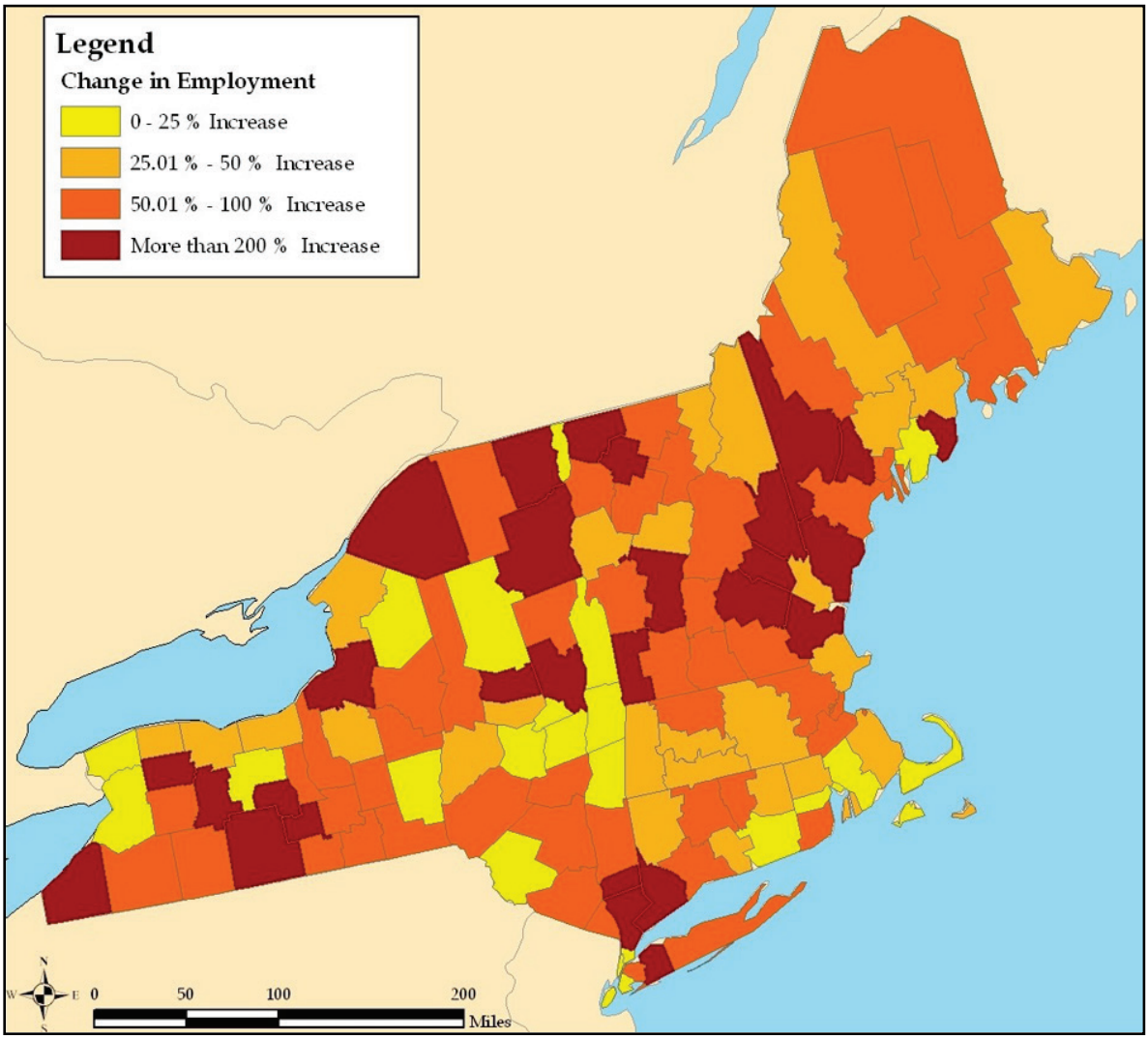
While the Northeast region's population is not growing as quickly as other parts of the country, it has grown significantly over the last several decades. As shown in Figure 3.13, much of this growth is occurring away from many of the region's traditional urban cores.

Figure 3.13 Absolute Change in Population by County
1970 to 2005



Employment growth has followed a similar pattern. The Northeast region has added over 1.5 million jobs over the last 10 years, many of which are being created not in the urban cores, but in suburban and exurban areas. As shown in Figure 3.14, the fastest-growing counties within the Northeast region (as measured by employment growth) are nearly all located away from the region's major metropolitan areas.

Figure 3.14 Change in Employment by County
1970 to 2005



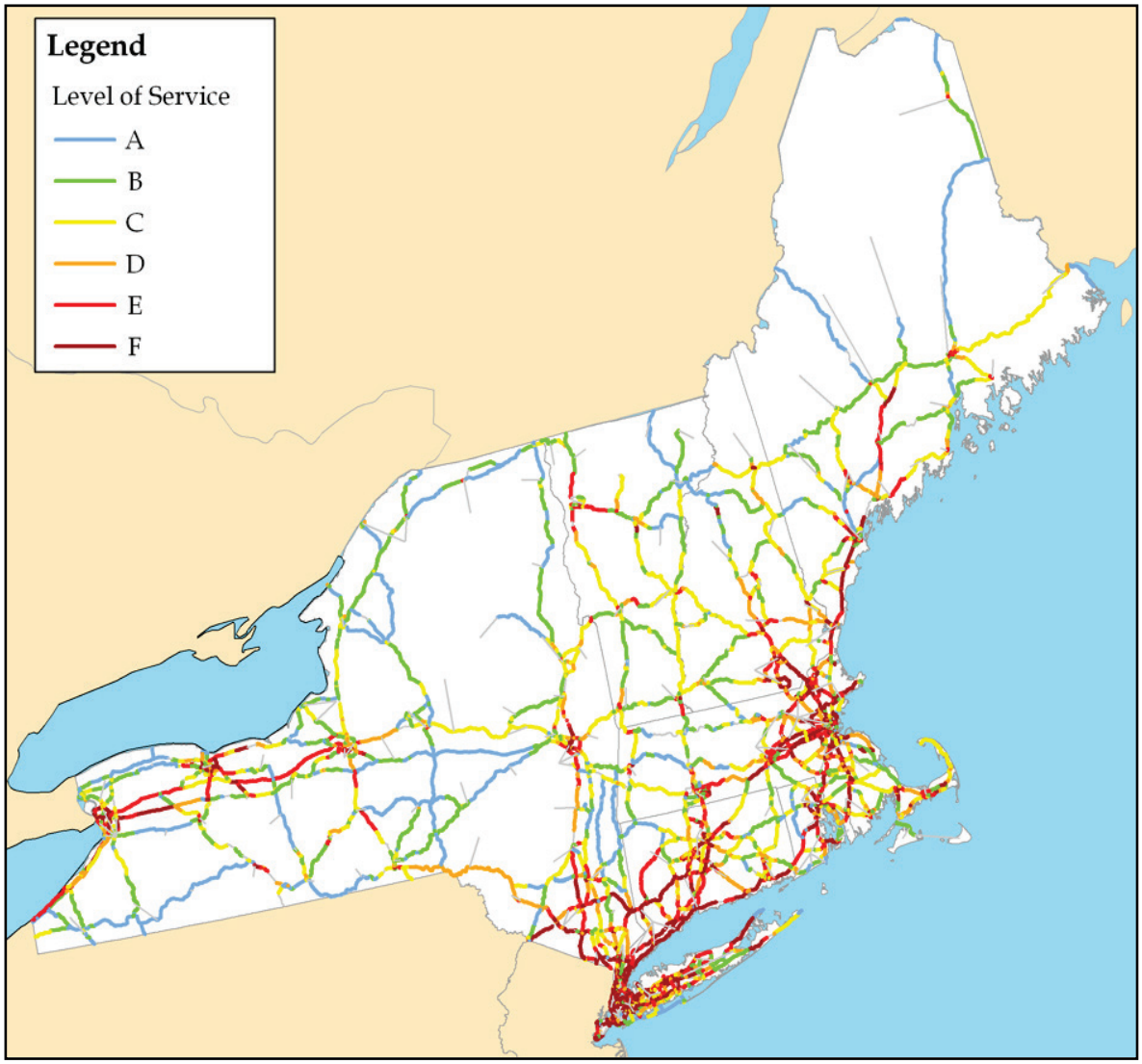
While the use of transit and commuter rail in the Northeast region is higher than the national average – particularly in the urban areas – these population and employment growth and distribution patterns have further contributed to automobile and truck movements in the region. Commuter rail systems work best as a "hub and spoke" system, where trips from many population centers can be provided to a single employment center. The region's existing commuter rail systems operate on this philosophy, providing service to major employment centers (e.g., Boston, New York) from suburban areas that radiate away from the employment center. However, employment in the Northeast region has become less centralized and employment centers have become more dispersed, which has changed the way workers in the region commute. For example, as employment centers move into suburban and exurban areas, there is a corresponding increase in suburb-to-suburb work trips.

Additionally, there are more workers commuting from their urban residences to their suburban and exurban employment centers. Upon analyzing its 2005 ridership, New York's Metro-North Railroad, which serves the Lower Hudson Valley of New York as well as Southwestern Connecticut, announced that for the first time, less than 50 percent of its ridership was of the traditional suburb to center city commute. Metro-North found that reverse commuting (New York City to suburbs) and suburb-to-suburb ridership has increased tremendously since their last analysis, while general off-peak and weekend ridership also has increased. These kinds of "decentralized" transportation patterns are difficult for commuter rail systems to serve, given their fixed networks.

Similarly, while rail accounts for approximately 10 percent (by weight) and 7 percent (by value) of overall freight shipments in the region, truck accounts for 85 percent and 92 percent (by weight and value, respectively), as trucks are often better able to serve dispersed markets.

The continued growth and distribution of population and employment in the region will result in worsening congestion on the region's highway systems, as shown in Figure 3.15.

Figure 3.15 Level of Service on Northeast Region Highway System
2020



Note: This congestion will not be limited to metropolitan areas; key intercity links and travel lanes also are expected to experience serious congestion.

3.5 Effects on the Northeast Region

The trends discussed in this section are changing the way that railroads operate in the region, changing the types of services they offer, and placing additional pressure on them to provide consistent, reliable service. The specific implications of these trends are described below.

Increasing Capacity Constraints

The combination of a rail system that has lost more than 50 percent of its physical capacity with rising demand for both passenger and freight movements over the last decade has led to tight capacity along several key corridors in the region and at some rail yards and facilities. These capacity constraints affect both small and large railroads, albeit in different ways. Capacity on the Class I rail system is becoming increasingly tight, given overall growth in demand coupled with the costs of owning and maintaining large national networks. The effects of these capacity constraints are exacerbated by the nature of the traffic being handled by the Class I's, which is increasingly intermodal in nature. Intermodal traffic demands reliability and is much more sensitive to shipment delays, but as overall system capacity becomes more constrained, it becomes harder for the larger railroads to adhere to schedules and meet the delivery windows that are so important to efficient intermodal movements.

Although regional and shortline railroads generally have fewer capacity concerns along their own networks, they are impacted by the capacity constraints on the Class I system, as they must often use portions of that system to access more distant markets. As Class I's increasingly focus on intermodal traffic, traditional carload shipments are being left to the region's shortline and regional carriers. In some areas, this has allowed these smaller railroads to capture additional market share. However, many shortline and regional railroads are dependent on interline agreements with Class I railroads to expand their overall service area and are affected by Class I capacity issues that "trickle down" to their own networks. In addition, many of these smaller railroads suffer from significant clearance and track structure issues. As will be discussed in more detail later in this report, much of the region's track is incapable of handling 286,000-pound railcars, which are quickly becoming the new national standard for railcars. Complicating matters is the fact that several areas of the region do not have sufficient clearance to serve double-stack containers, further limiting available rail capacity.

As a result, it is becoming difficult for the region's smaller railroads to access capacity on the Class I system, limiting the markets and customers they can serve as well as the reliability of their existing shipments. Exacerbating this issue is the fact that Class I's typically target large blocks of traffic in order to take advantage of economies of scale. In many areas of the Northeast region, these large blocks of rail traffic are difficult for shippers to generate. In addition, some shippers in the region feel that rail is not a viable or cost-competitive option for some markets, as access to the national rail system from some states is becoming more expensive, is requiring more circuitous routing, and is less reliable than other modes. This is particularly true for the states in the region that do not have direct access to Class I services or have fewer Class I carrier options than they did in the past. As a result, these shippers may not utilize rail transportation as frequently as they might like.

While the railroads have utilized technological and operational strategies to maximize the use of their existing capacity and have made (and continue to make) targeted capacity improvements to major corridors and facilities, existing capacity constraints can make it difficult for rail to capture additional market share in the region. In addition, the age of the region's transportation infrastructure, coupled with the density of its population,

limits the options for improving or expanding the rail system, further preventing rail from attracting new business. In many cases, increasingly tight capacity in the Northeast region, coupled with rising passenger and freight demand, have contributed to some of the physical and operational constraints that will be described in the next section.

Commingling of Freight and Passenger Operations

Freight and passenger railroads share infrastructure in many parts of the United States. This is particularly true in the Northeast region, which is home to many major urban areas, commuter rail systems, and intercity passenger movements. The downsizing of the rail system, along with the way that the railroads evolved in the region, has concentrated both passenger and freight operations on several main corridors in many areas, as can be seen in Figures 3.16 and 3.17.

Figure 3.16 Annual Rail Freight Shipments

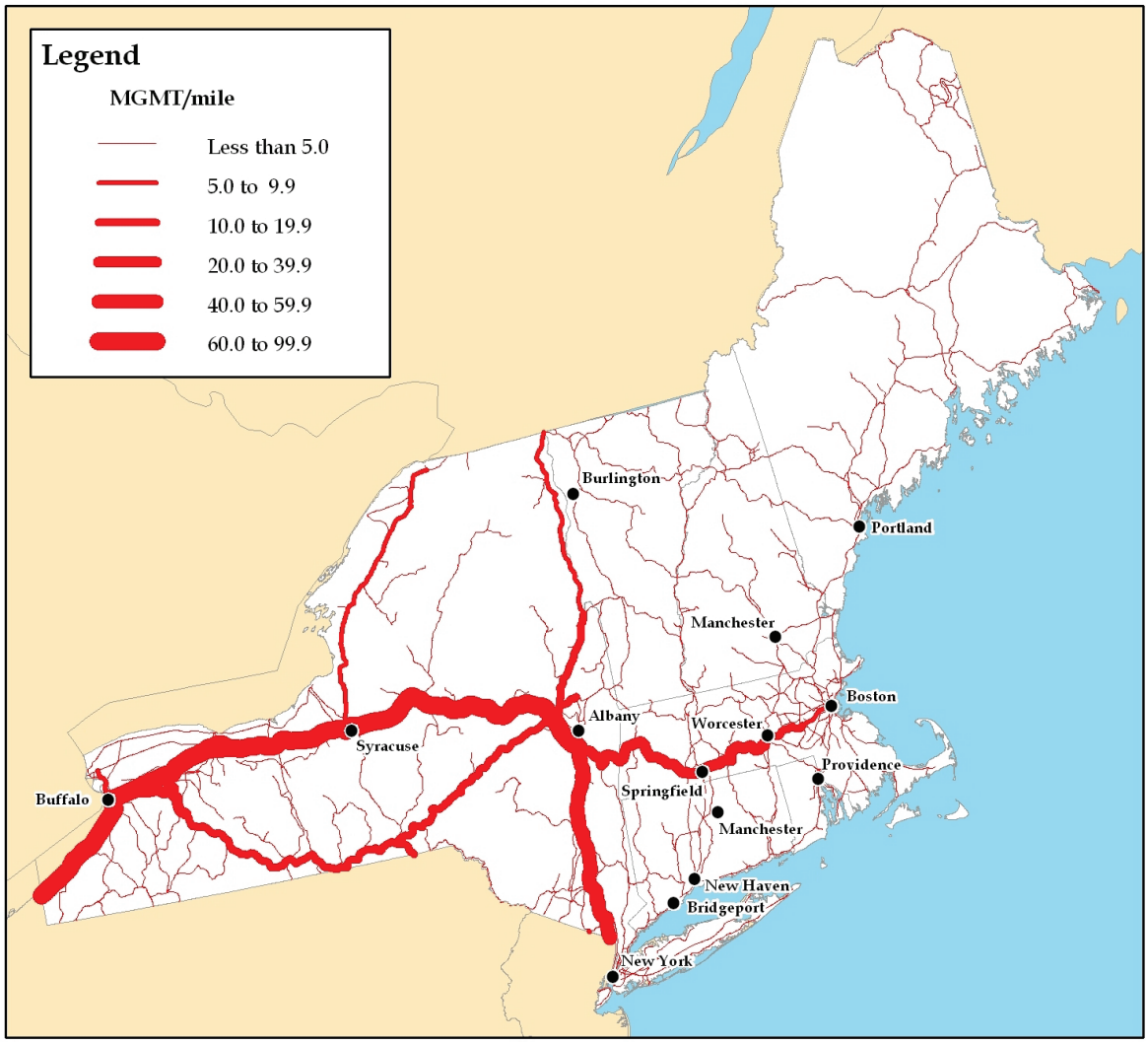
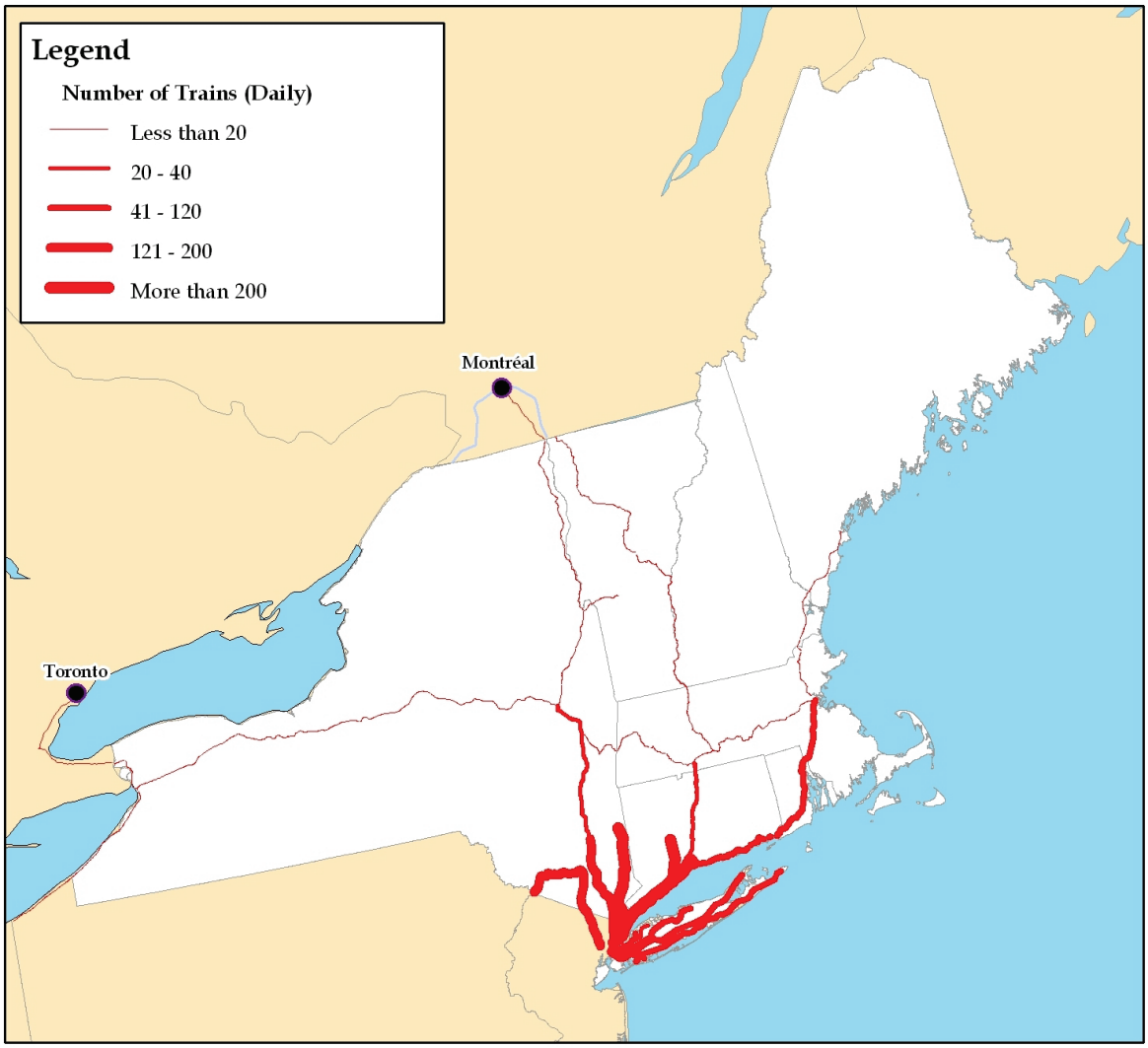


Figure 3.17 Intercity and Commuter Rail Volume



As described in Section 2.0, the freight and passenger rail systems and operations in the region are closely entwined and tightly managed. The creation of Amtrak in 1971, while relieving the freight railroads from the burden of providing passenger service, also ensured that the Northeast Corridor, a strategic rail lane in the region, would primarily serve passenger traffic moving between the region's major metropolitan regions. Additionally, agreements developed as part of the creation of Amtrak and the split of the Conrail system between CSX and NS in 1998 have contributed to some of the institutional issues among railroads (both small and large), states, shippers, and the Federal government. The commingling of both freight and passenger operations throughout the region, coupled with the complicated and overlapping arrangements and agreements made among various rail stakeholders, have contributed to many of the operational and institutional constraints that will be described in the next section.

Increased Importance of Port-Rail Connections

Capacity and congestion issues at some load-center ports on the west coast are causing some large shippers to change their logistics patterns to make better use of east coast ports, particularly the Port of New York/New Jersey and Halifax. Many ports in the Northeast region have seen increases in the amount of Asian trade, particularly since 2002, and are expanding infrastructure and updating container facilities in order to efficiently handle the anticipated increase in containerized freight moving into these facilities. The Port of New York and New Jersey, for instance, is entering the final design and construction phase for ExpressRail Port Newark, which will be capable of handling approximately 250,000 containers annually; and a Corbin Street rail support facility, which will provide capacity to stage and unload two-mile long trains and integrate traffic from the three existing on-dock ExpressRail facilities. The Port Authority also has re-instituted rail service to Howland Hook Marine Terminal, a growing container facility located in the northwest corner of Staten Island. In 2001, the Port Authority purchased a 124-acre tract at Howland Hook known as Port Ivory and currently is in the process of constructing a 39-acre intermodal rail terminal there. In addition, the Port of Halifax has recently increased its existing container storage capacity, and has begun to lengthen and deepen the vessel berths to more efficiently serve larger containerships. These trends are placing additional pressure on the rail connections and service to these port facilities, many of which are located in dense urban areas that have significant passenger rail movements as well. These trends also are contributing toward the increasingly intermodal focus of the Class I railroads (described earlier) as much of the international traffic imported into the region consists of low-weight/high-value consumer goods that often are handled by the railroads as intermodal shipments.

Limited Funding for Capital Investments

Many of the region's rail carriers are making or plan to make targeted infrastructure improvements, but those investments are not keeping pace with the rising demand for both passenger and freight service in the region and there is limited funding for the types of large-scale capital investments and capacity improvements that would most improve the efficiency and reliability of the system. This is an issue that affects all railroads, though shortline and regional railroads are at a particular disadvantage. First, in most cases these smaller railroads have even less access to capital markets than their Class I counterparts, making it difficult to attract outside investment for capital improvements. Second, they often operate on track that has not yet been upgraded to handle 286,000-pound railcars (the current industry standard), preventing them from taking advantage of economies of scale often available to larger railroads (an issue that will be described in more detail in Section 4.0). The lack of funding makes it difficult for railroads to make improvements that would alleviate the physical and operational issues that will be identified in the next section.

Compounding this issue is the fact that there is little tolerance for enhanced rail operations or rail capacity improvements, particularly in track-side communities. While the era of building major new transportation system facilities in the Northeast is largely behind us, there are opportunities to make targeted capacity improvements along key rail corridors and facilities in the region. However, both passenger and freight rail in the region travel

through densely populated areas and balancing rail capacity improvements with community and neighborhood concerns often presents challenges. This issue is exacerbated by the fact that the potential economic vitality, congestion, and environmental benefits of rail movements are not always well understood by transportation decision-makers (particularly at the local level) and the general public. Further complicating matters is the fact that in much of region, individual cities and towns hold sway over local land use decisions, making it challenging for railroads to plan, coordinate, and implement improvements on some corridors. This institutional issue may prevent both passenger and freight railroads from effectively growing their market share.

Growth and Distribution Patterns Straining Performance of All Modes

Growth and distribution patterns are straining the performance of all modes. As discussed above, population and employment growth and distribution patterns in the region are resulting in worsening congestion on the region's highway network, and both passenger and freight rail are having a hard time providing service to evolving population and industry centers. When coupled with the rising demand for both passenger and freight service (described earlier), this can result in significant performance degradation across all modes and may make it challenging for the region to sustain continued economic vitality. The fact that both freight and passenger railroads attempt to serve more dispersed markets can sometimes lead to the operational constraints that will be described in the next section.

4.0 Key Issues, Chokepoints, and Constraints Affecting the New England Freight and Passenger Rail Systems

Despite the importance of freight and passenger rail to the transportation and economic health of the Northeast, significant capacity, operating, and institutional issues and constraints are impacting the ability of the system to effectively serve current and future freight and passenger needs. A series of in-person interviews with regional rail stakeholders, including the railroads, state DOT and MPO personnel, advocacy and industry groups, and others, painted a picture of a system that is being affected individually or collectively by these issues and constraints.

This section provides an overview of issues and constraints that currently are affecting or will affect freight and passenger rail service in the Northeast. This section also describes how those issues and constraints may affect investment and operational decisions of railroads operating in the region, location and expansion decisions of the region's shippers and manufacturers, and public policy decisions of the region's transportation and economic development agencies. Two types of issues are described:

- **Infrastructure or operational issues,** which affect the performance and efficiency of the region's rail system; and
- **Institutional challenges,** which affect the ability of states, MPOs, railroads, and other stakeholders to improve the performance of the system.

Following are these high-level discussions.

4.1 Infrastructure and Operational Issues

As described in Section 3.0, a significant portion of the existing freight and passenger rail infrastructure was designed and built in the late 19th and early 20th centuries. In many areas, including the Northeast region, the combination of age and higher maintenance and investment costs is beginning to affect specific areas, facilities, or corridors to the degree that the physical condition or coverage of the rail system in the Northeast is preventing it from adequately serving freight or passenger movements. In some cases, the infrastructure is simply not capable of handling modern rail equipment or volumes. In other cases, infrastructure issues are contributing to inefficiencies at key facilities and along some corridors, causing railroads operating in the region to develop and implement specific strategies, techniques, or practices that are required to maintain reliable passenger and freight service.

Individually or collectively, these infrastructure and operational issues can impede high volumes of rail freight and/or passenger traffic into, out of, through, and within the region; restrict service to important facilities, markets, and metropolitan areas; and contribute to operational constraints by forcing significant degrees of circuitry in routing. There are five major types of infrastructure and operational issues in the region, including:

1. System capacity issues;
2. Track clearance, structure, and alignment issues;
3. Yard-related issues;
4. Bridge, tunnel, and viaduct issues; and
5. Railcar availability.

The following sections describe how and why these types of infrastructure and operational issues developed in the Northeast and through the use of case study examples, how they are affecting the operational efficiency of railroads and the entire transportation system operating in the region. At the end of this section are three sets of maps and accompanying descriptions that summarize important physical and operational issues in the Downstate New York/East of Hudson region, the New Haven area, and Southern New England.

System Capacity Issues

In many cases, the capacity of the rail system in the Northeast region is not sufficient to efficiently handle modern-day freight and passenger traffic. Rail capacity is not only a function of the number of tracks in a region, but also the number of sidings, the location and performance of signal and information systems, and the location and operations of yards and terminals. It also is a function of the region's traffic mix, as different types of traffic (i.e., intermodal, carload, or passenger) have different schedule, delivery, and capacity needs.

Overall rail capacity in the Northeast is tight, particularly on the Class I system, for several reasons. First is the growth in both freight and passenger traffic on the system, described in Section 3.0. While this overall growth has impacted system capacity, as more volume is being pushed onto the system, the growth in intermodal traffic has had particular capacity impacts. As discussed earlier, intermodal traffic depends on timely and reliable service, and tightly managed transfers. As a result, freight railroads in the Northeast are dedicating large chunks of capacity to intermodal traffic along some corridors, further limiting the space available to serve traditional carload traffic. The limited windows for freight movements along corridors also serving commuter and intercity passenger traffic (see Section 2.0) also restricts available capacity in the Northeast.

Second, the region's yards and terminals are not fully capable of handling increasing volumes of freight traffic. The specific infrastructure and operational issues affecting yards and terminals in the Northeast is described later in this section.

Third, the region's railroads often use outmoded and inadequate information and control systems. Each of the railroads in the region has sophisticated dispatch and control systems, but information often moves among the railroads by telephone and fax, hindering efficiency and emergency response. Implementation of Positive Train Control (PTC) systems, which involve technology applications to prevent train collisions, over speed derailments, and casualties or injuries to roadway workers, has been slow to develop. Although Amtrak has implemented a PTC system (Advanced Civil Speed Enforcement

System – ACSES) on the Northeast Corridor (NEC) between Boston and New Haven, not all of the freight or commuter railroads in the region have followed suit.

Finally, the rail system in the Northeast region suffers from a general lack of sidings, particularly passing sidings that allow trains in opposing directions to pass and also allow faster trains to pass slower ones. In addition to improving efficiency, the importance of sidings from a security standpoint has been enhanced over the last five years as well, as customs, security, and law enforcement agencies often utilize sidings near border crossing locations to verify the security of cargoes, vehicles, and operators as well as to conduct secondary inspections.

The limited capacity of the Northeast rail system can be traced, in part, to how the rail system evolved in the region. As discussed earlier, overall system mileage in the region has declined by over 50 percent since the mid-20th century and many corridors that had been double- or triple-tracked at one time were reduced to a single-track operation in order to reduce maintenance costs and real estate tax burdens. The capacity of many of the region's mainline corridors were reduced in this way, including the CSX River Line, which runs from New Jersey to Selkirk along the West side of the Hudson River and is a critical corridor for freight moving intermodal traffic from the Port of New York and New Jersey.

Until recent years, this single-track capacity was typically sufficient to meet the needs of the region's freight and passenger traffic volumes. However, the combination of increasing volumes of freight and passenger traffic, changing traffic mix, and evolving logistics patterns (all described in Section 3.0), is contributing to the region's capacity concerns. In many locations, development of sidings may offer a less expensive alternative to regaining some of this lost capacity, but installing or enhancing sidings in the Northeast is often challenging, given the land use, population density, and environmental characteristics of the region.

In any case, these system capacity issues can have several notable effects on rail operations in the region, including:

- **Decreased Level-of-Service and Reliability –** Limited capacity and the lack of sidings can result in decreased level-of-service and reliability for both passenger and freight rail traffic across the entire network, as trains do not have the ability to pass effectively. In addition, the larger railroads are dedicating large portions of their available capacity to serve intermodal traffic, decreasing capacity available to and the reliability of traditional carload traffic (which is often the bread and butter of the region's shortline railroads). Additionally, the impacts of incidents or accidents along mainline rail corridors are magnified in these areas, as there are few alternate routes. Decreased level-of-service and reliability makes rail a less attractive mode for many shippers and manufacturers and can increase costs for both shippers and consumers.

- **"Rolling" Delays and Other Operational Constraints –** The lack of capacity in the region can often cause delays at key yards and facilities, which roll or cascade throughout the rail network in the Northeast and in adjacent regions. These rolling delays can affect reliability and efficiency in the Northeast and elsewhere.

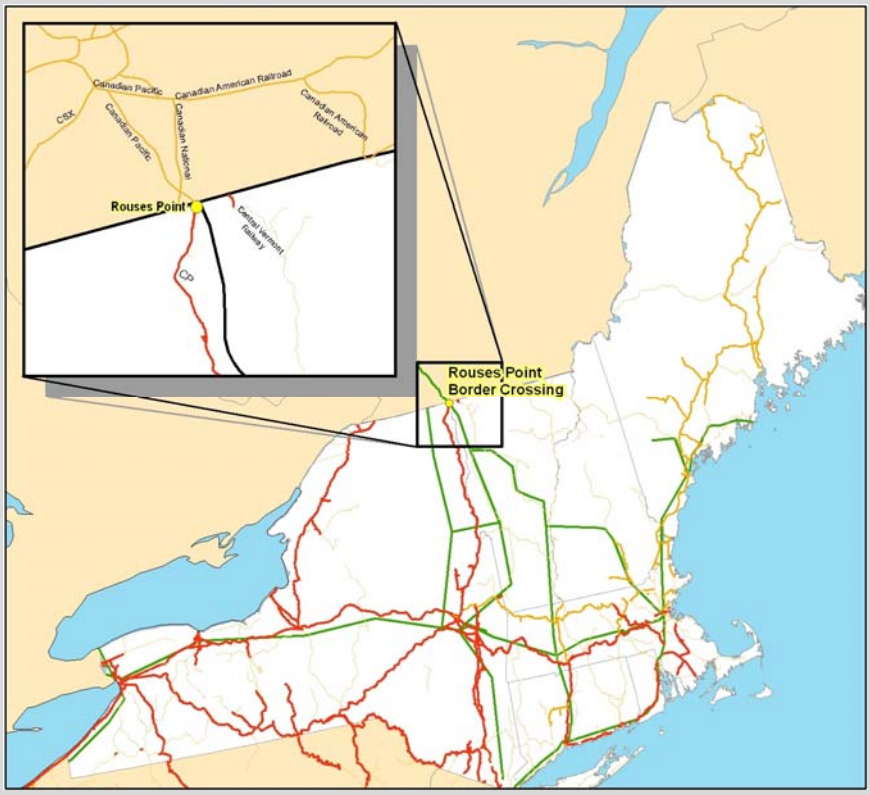
- **Passenger and Freight Commingling –** Finally, diminished capacity along certain corridors, particularly those that went from double- or triple-track to single-track operations, has hindered the ability of passenger and freight trains to share infrastructure effectively. Efficient management of shared lines requires a delicate balance of effective communications and dispatching, adherence to curfews and delivery windows, and tight coordination among both passenger and freight railroads. When operational constraints or other issues disrupt this balance, the performance of all system users is affected.

While capacity improvements could be made to many of the region's rail corridors, financial, social, and environmental factors make it difficult to implement these improvements in the Northeast. The region's population density, for instance, makes it challenging to coordinate improvements or enhancements to existing corridors or to develop new corridors, as many of these corridors traverse heavily populated areas. Environmental considerations also provide a challenge, as many of the rail corridors serving the Northeast region closely follow water routes. Improvements to these corridors often come with considerable environmental impacts. Finally, the financial challenges of the railroads operating in the region, many of whom maintain expansive regional or national networks, make it difficult to plan and implement large-scale improvements. Property taxes levied on private rail firms by states and municipalities serve as financial disincentives to make investments that would affect assessed values of property and improvements. These financial issues are exacerbated in the Northeast, which has witnessed slower growth in freight rail traffic compared to other regions. Some of the impacts of limited rail system capacity – along with some of the difficulties associated with adding additional siding capacity – are described in the following case study.

Case Study – Rouses Point Border Crossing

The Rouses Point Border Crossing, shown below, is located along the Canadian Pacific (CP) mainline. In 2004, more than 1,350 trains entered the United States from this crossing, carrying over 30,000 passengers, over 57,000 loaded containers, and nearly 20,000 empty containers.

Inbound freight trains crossing at this and other border crossings are screened by U.S. Customs and Border Protection (CBP) staff using a Vehicle and Cargo Inspection System (VACIS).



The use of the VACIS at this border crossing, while critical to ensuring the safety and security of inbound rail shipments, significantly impacts rail movements into the Northeast region because of the lack of sidings in the area. The CP is a single-track mainline, and the closest available siding is several miles downstream of the Rouses Point Border Crossing. As a result, when secondary inspection of an individual rail car or group of rail cars is required, the train must transit to that siding in order for CBP staff to conduct the inspection. Installation of sidings in this area is complicated by the fact that there are several at-grade crossings and there are few, if any, appropriate locations for rail sidings in the area. These physical limitations make it challenging to locate and develop appropriate sidings.

The lack of sidings in the Rouses Point area has several effects on rail movements in the Northeast region. Although only southbound freight trains are subject to inspection, the lack of sidings may cause delays to passenger and freight movements in both directions. These delays also can impact traffic flows outside the Northeast region, as trains across the CP network – particularly those originating in Montreal or points west – must be held until the line is clear. This can result in cascading delays throughout the system, increasing costs for shippers and consumers in the Northeast region and beyond.

Track Clearance, Structure, and Alignment

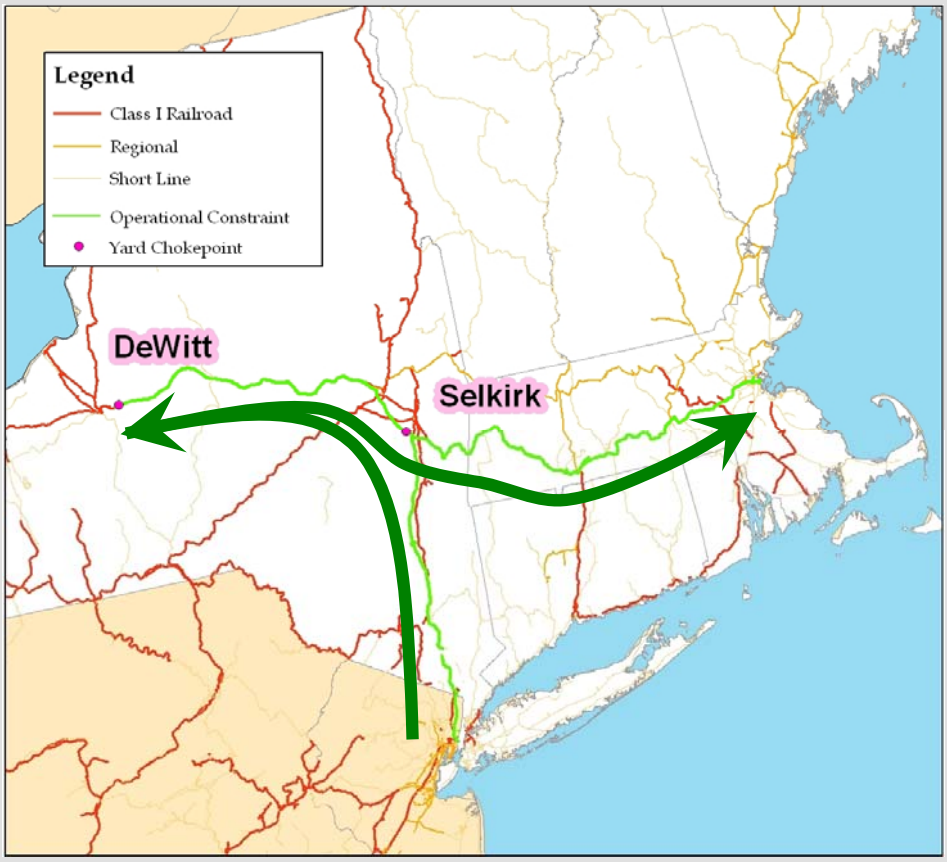
In addition to general capacity concerns, the age of the rail system in the Northeast region, coupled with the social, financial, and environmental constraints to making large-scale improvements, contributes to specific physical chokepoints and issues of several types, including track clearance, structure, and alignment.

Clearance Issues

A major issue facing railroads in the Northeast region is the fact that the entire region is not cleared for double-stack operations. Double-stacking, simply hauling containers stacked one on top of the other, can result in substantial reductions in the cost of shipping containers, compared to the cost of conventional piggyback operations. Much of the containerized traffic moving into and out of deepwater seaports, including the Port of New York and New Jersey, travels on double-stack trains to reach inland markets. Cost reductions of double-stack can range from 20 to 40 percent, depending on the length of haul and quantity of goods shipped. Double-stack trains typically require clearances of at least 20-feet, 8-inches, while autoracks, specialized rail cars used to ship automobiles, require at least 20-feet, 2-inches. Although both double-stack trains and autoracks do operate within the Northeast, they typically involve "short" double-stack (i.e., 8.5-foot container on top of a 9.5-foot container), not "full" double-stack, which requires higher clearance levels. Because the entire region is not cleared for double-stack operations – and some corridors, including some areas of New York City are not even cleared for autoracks or "single-stack" intermodal trains – the extent of these services are limited in the Northeast, resulting in lower efficiency for the railroads operating in the region and higher transportation costs for shippers and consumers. Hot spots for double-stack clearance in the region include Amtrak's Northeast Corridor, whose electric catenary lines prevent full double-stack clearance, the CSX mainline east of Framingham (Massachusetts), and elements of Metro-North's New Haven Line. The freight rail system in the Lower Hudson Valley (south of Tarrytown), in New York City, and on Long Island are also affected by low bridge clearances. The implications of these clearance issues on freight rail operations in the region are described in the case study below.

Case Study – DeWitt Yard

CSX's DeWitt Yard, shown below, is located near Syracuse, New York, handles over 50,000 annual container lifts, and is the only intermodal terminal on the CSX system between New York City and Buffalo. It also is the site where Boston-bound intermodal traffic arriving through the Port of New York and New Jersey is "filleted" from double-stack units to single-stack units due to clearance issues along CSX's mainline in Massachusetts.



Because the CSX mainline east of Framingham, Massachusetts is not cleared for double-stack operations, Boston-bound intermodal traffic arriving at the Port of New York and New Jersey is combined with westbound intermodal traffic on a double-stack train. Upon arrival at DeWitt, the Boston-bound containers are separated from the double-stack and combined with eastbound traffic on a single-stack train. While this strategy is being managed efficiently by the railroad, it can result in increased costs for shippers serving the Boston market by rail and may result in decreased reliability along that corridor. It also further reduces the available capacity for other traffic, as this movement absorbs capacity in two directions – New York to DeWitt, then DeWitt to Boston.

This is an example of physical issue that results in significant operational inefficiencies for the railroads, the costs of which are often borne by shippers and consumers. This case study also demonstrates how tightly interconnected the transportation system is within the Northeast region and shows how a physical issue in one state can have ramifications for rail operations in another.

Track Structure Issues

Another major issue facing shortline and regional railroads in the Northeast is the ability of the region's existing track to handle 286,000-pound railcars, which is quickly becoming the new national standard for railcars. Motivated by lowering costs and maximizing efficiency, the Class I railroads in North America, including the four that operate within the Northeast region, have been replacing 263,000-pound railcars, which are capable of handling 100 tons, with 286,000-pound cars that can handle 111 tons. While the Class I rail network is generally able to accommodate these heavier cars, much of the shortline and regional rail system in the Northeast region is not. These networks often suffer from thin ballast sections, limited tie maintenance, and old bridges. Upgrading tracks to handle 286,000 pound cars can be challenging, given that smaller railroads often do not have access to sufficient capital to make large-scale track improvements. This is a particular concern in the Northeast, as approximately 61 percent of the total track miles are on this shortline or regional system.

The inability of most of the Northeast freight rail network to handle 286,000-pound cars can have significant implications on transportation and economic competitiveness in the region. First, shortline and regional railroads that cannot handle 286,000-pound cars will find it increasingly difficult to interline with the Class I rail system, limiting access to that system by shippers and manufacturers in the region, particularly those that are located in Maine, New Hampshire, Vermont, and rural areas of New York. Some shippers may be forced to use trucks to access markets, exacerbating existing highway congestion, and contributing to environmental impacts and increased pavement wear. Finally, some shortlines may not be able to remain viable without a 286,000-pound upgrade, reducing transportation options in the region and hindering its ability to attract or retain businesses and jobs. While some segments of the Northeast rail system have been upgraded or will soon be upgraded to 286,000-pound capacity,[1] many will not. The result may be a fragmented Northeast rail system, which may not be capable of providing efficient, high-capacity rail access to shippers regionwide.

Track Alignment Issues

Railroads operate most efficiently on straight, level track, and must carefully (and slowly) navigate curves, particularly those with curvature sharper than eight degrees. Railroads utilizing networks with higher degrees of curvature must operate at slower speeds and must often run shorter trains, hindering their efficiency and often their overall reliability. The geography of the Northeast region (where population centers and rail customers are located near seaports or along major waterways), combined with the way the system evolved (serving markets and metropolitan areas most often located in or around coastal areas), has resulted in a rail system that is highly serpentine in some areas. These alignments make it difficult for rail operators to maintain speed between some key markets, affecting overall transit times and reliability. Hot spots for track alignment in the region

[1] Including the State of Vermont, which has received substantial amounts of Federal funds through earmarks in SAFETEA-LU to begin to address the issue.

include Metro-North's New Haven Line, whose alignment follows the coastline and prevents higher-speed service on some corridors.

Yard-Related Issues

Rail yards are locations for storing, sorting, or loading and unloading railroad cars. There are several types of rail yards in the Northeast region, listed below, each of which serves different needs:

- **Classification Yards –** These yards, sometimes referred to as marshalling yards or hump yards, are regional gathering points where freight cars are classified (sorted among trains) and forwarded to their final destination. Major classification yards in the region are located in Binghamton (New York), Selkirk (New York), and Buffalo (New York).
- **Intermodal Yards –** These yards are facilities used to load and unload intermodal containers and/or trailers between flat cars and trucks. Major intermodal yards in the region are located in Buffalo (New York), Syracuse (New York), Worcester, Boston, West Springfield (Massachusetts), and Auburn (Maine).
- **Automobile Yards –** These yards are facilities used to load and unload new automobiles. Major automobile yards in the region are located in East Brookfield (Massachusetts), Framingham (Massachusetts), and Selkirk (New York).
- **Layover Yards –** These passenger train yards serve two purposes. First, they allow for recovery time (usually at the end of the day) to ensure on-time departure for the first trip in the morning; and in some cases, they allow for operator rest or break time between trips. Major layover yards in the region are located in Readville, South Boston, and Somerville (Massachusetts) and Sunnyside (New York).

Like many components of rail infrastructure in the Northeast, many of the yards in the Northeast were designed and built earlier in the 20th century and are beginning to face significant capacity issues, which have been exacerbated due to the general growth in freight and passenger movements described in Section 3.0. Many major rail yards were developed in close proximity to (or in some cases, in the middle of) city and town centers. Examples include Rutland (Vermont) and West Springfield (Massachusetts), both of which have major freight rail yards within central business or residential districts. The growth in freight traffic has enhanced the pace of operations at these facilities, a trend that is not always consistent with surrounding land uses and can significantly impact community livability and accessibility. Many state DOTs and MPOs are struggling with how to improve or relocate these facilities but, like sidings, making improvements to rail yards can be challenging in the region, given the land use, population density, and environmental characteristics of the area.[2]

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[2] There are some efforts to address these challenges, most notably the Merrick/Memorial Neighborhood Redevelopment Plan in West Springfield, a cooperative effort of CSX and the Pioneer Valley Planning Commission to address freight and community issues affecting the neighborhood.

In other areas, however, yards are underutilized, despite the growth in freight traffic. Yards in these areas are often the target of redevelopment efforts, particularly for higher-revenue generating projects such as condominiums or retail development. While this kind of development can increase the tax-base (and revenue) for municipalities, it may also prevent rail from gaining market share and could result in urban areas in the region being totally dependent on trucks in the future.

Commingling of passenger and freight operations poses another challenge to freight and passenger yards in the region. While this commingling occurs in many different parts of the country, it is particularly common in the Northeast, given the way that the rail system and population growth and commuting patterns have evolved.

There are several yard capacity hot spots of concern in the Northeast region, including:

- **Mohawk Yard –** A CP facility in Schenectady, New York. This facility dedicates a significant percentage of its capacity to passenger trains running between Schenectady, Whitehall, and Rouses Point. In addition, the facility is bounded by the Mohawk River on its southern edge, further contributing to capacity concerns.

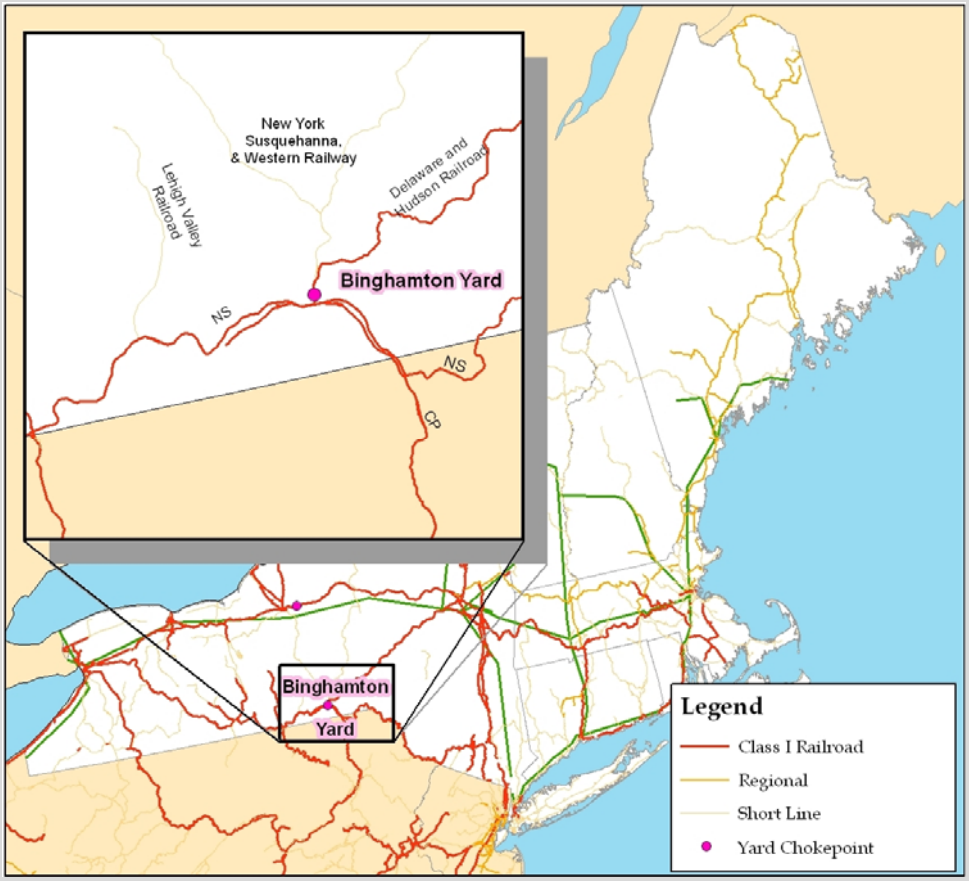
- **Selkirk Yard –** A major CSX yard and automobile distribution facility. It is CSX's largest yard in the Northeast and connects to the Castleton Bridge, the southernmost Hudson River freight rail crossing in the region. A significant percentage of rail freight to and from New England traverses this facility, and, as this traffic increases, capacity at this facility is becoming scarcer.

- **Readville and Southampton Yards –** Two major layover yards on the MBTA system, which are both nearing capacity. In some cases, trains scheduled to layover at these yards cannot, and are forced to rest at Boston's South Station or other locations, which can cause operational issues throughout the system. To address this concern, the MBTA and the Rhode Island DOT (RIDOT) have agreed to fund a new layover yard in Pawtucket, Rhode Island. This facility would consist of a six-track yard for overnight layover/storage of commuter rail equipment on both the existing Providence-Boston service and Rhode Island's future South County commuter rail service.

Like other infrastructure issues, these yard capacity constraints often manifest themselves in the form of operational limitations. Rail operations in the region are both highly coordinated and tightly wound. Any ripple, whether caused by an infrastructure issue, a security or safety incident, a change in commodity flow patterns or rail operating strategies, can have cascading effects throughout the Northeast and other regions, affecting the efficient flow of people and goods regionwide. An example of a complex operational strategy stemming from a yard capacity issue is provided below.

Case Study – Binghamton Yard

CP's Binghamton Yard, shown below, is a 17-track yard through which three freight railroads operate. In addition to CP, the New York, Susquehanna, & Western (NYS&W) and NS also run into and through the facility. Even though it was originally designed as a holding facility, CP currently uses Binghamton as a sorting and interchange yard and runs through six trains per day. In addition, four NS trains per day pass through the facility and the NYS&W runs two trains per day. Physical expansion of the existing yard is difficult, as it is situated on the north side of the Susquehanna River.



Maintaining efficient operations at Binghamton requires a high degree of coordination among the three affected railroads and that personnel work closely to manage movements, minimize delays, and maximize throughput. However, the delicate balance of operations at Binghamton can be severely affected by delays elsewhere in the system. For instance, congestion in Albany can sometimes cause the westbound CP train to have a delayed arrival into Binghamton. Because the CP train must clear Binghamton before the eastbound NS train is released, its departure may be delayed, causing further ripples downstream on the NS system. When the delicate operational balance at Binghamton is disrupted, the result is delays that ripple through the rail system in the Northeast and other parts of the country. This is another example of how delays and inefficiencies in one part of the region affecting movements in other parts, as delays at Binghamton Yard can significantly impact New England-bound trains.

Bridges, Tunnels, and Viaducts

Bridges, tunnels, and viaducts can represent critical chokepoints in the Northeast rail system in two ways. First, because so many of these structures were designed and built in the early to mid-20th century, they may not be sufficient to handle modern-day rail equipment, volumes, and weight. Second, many bridges in the region are located along working waterfronts or active rivers or channels. Consequently, these bridges must sometimes be opened and closed to accommodate maritime traffic. Outdated bridges, tunnels, and viaducts present a challenge to both railroads and their customers, as there is little redundancy within the rail system. Weight capacity constraints or failures of these structures can cause significant circuitry in routing, which can cause the entire rail system to perform inefficiently, further hindering rail's ability to attract additional market share for freight or passenger movements. There are many examples of critical bridge, tunnel, and viaduct chokepoints in the Northeast region, including:

- **Portage Bridge –** A 154-year-old bridge that crosses over Letchworth State Park along the NS Southern Tier mainline in Livingston County, New York. The New York State DOT recently awarded $3.5 million to NS as part of its Rail Freight and Passenger Rail Assistance to fund preliminary engineering on a replacement for this bridge.

- **Saga, Walk, and Cob Bridges –** Along Metro-North's New Haven line. These old, movable bridges frequently are opened and closed during the summer months to allow boat traffic to pass underneath. These bridges normally are closed and open to allow marine traffic to pass. Due to their age, the operation of these bridges can cause significant delays during the opening and closing process. Rehabilitation of both the Saga and Walk Bridges are being undertaken by the Connecticut DOT.

- **Thames, Niantic, and Connecticut River Bridges –** Along Amtrak's Northeast Corridor. Similarly, the operation of these bridges can cause significant delays as they are opened and closed frequently during the summer months for boat traffic. Unlike Metro-North bridges, these Amtrak bridges are normally open, closing to allow trains to pass. A replacement for the 87-year-old Thames River Bridge, to include erection of two lift towers and a lift span, relocation of the bridge tender's control house, installation of new machinery, electrical systems, and underwater communications and signal cable, started in 2006 and is expected to last until 2008.

- **Hartford Viaduct –** Whose clearance requires Amtrak trains to slow when approaching Union Station.

As mentioned in Section 1.0, much of the Northeast already was developed when the railroads were building infrastructure in the late 19th and early 20th centuries. Consequently, there are some cases where there is a lack of rail infrastructure which, in and of itself, can have significant implications for passenger and freight movements in the region.

One example is the limited freight rail access into New York City and other East-of-Hudson counties and cities, particularly across the New York Harbor, as described in the following case study.

Case Study – East-of-Hudson Rail Access

As discussed earlier, CSX's Selkirk Yard is served by the Castleton Bridge, south of Selkirk and the southernmost Hudson River freight rail crossing in the Northeast region. Mid-Atlantic-based rail freight destined to East-of-Hudson markets must first travel to Selkirk (approximately 140 miles north of the New York/New Jersey port area) and then an equal distance south on the east side of the Hudson River. In addition, the Hudson Line below Poughkeepsie is subject to an overnight freight window due to heavy commuter rail operations. Access to New York City also is limited due to clearances and a general lack of rail freight facilities. These and many other physical and operational issues in the Downstate New York and East-of-Hudson area are summarized in Section 4.2. As a result of these issues, there are limited transportation options for shippers located in or serving the New York City/Long Island region – currently, less than 2 percent of all freight enters this region by rail and the majority of freight movements (approximately 78 percent) cross into New York City and other markets east of the Hudson by truck.

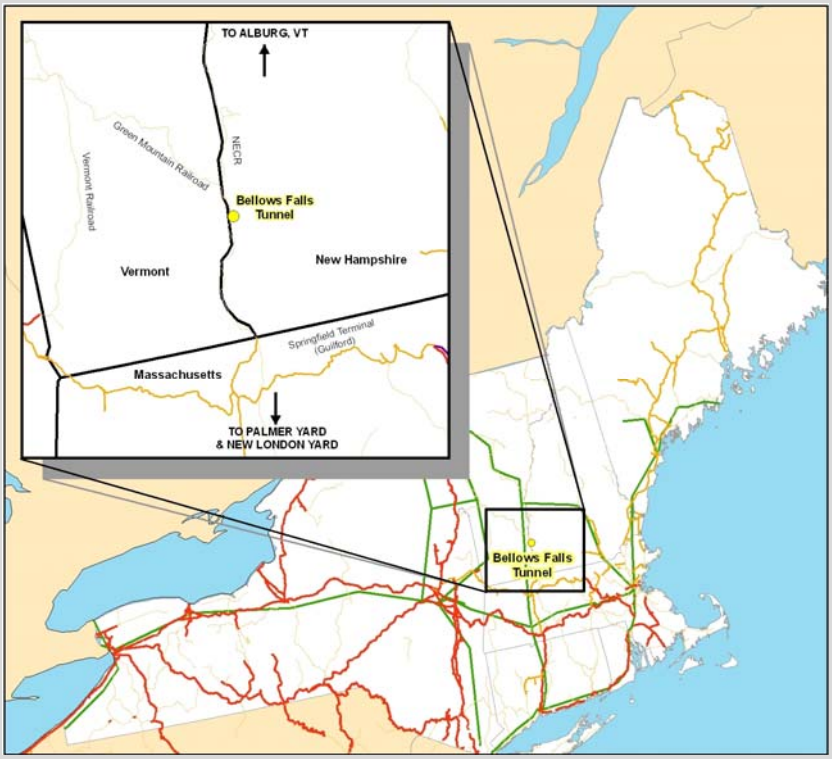
Several previous studies and efforts have addressed this issue and while potential solutions have been offered, implementation is fiscally, physically, operationally, and politically challenging. The New York City Economic Development Corporation's *Cross-Harbor Freight Movement Project Environmental Impact Statement* (EIS) identified a rail tunnel between Greenville Yard, Jersey City, New Jersey and the Bay Ridge Branch, Brooklyn, New York, as the Preferred Alternative for a crossing of New York Harbor. Two studies by New York State Department of Transportation, the *Pilgrim Intermodal Center EIS*, which investigated the potential for an intermodal rail yard on the site of the former Pilgrim State Hospital, and the *Hudson Line Rail Transportation Plan*, also identified freight rail improvements that would benefit East-of-Hudson markets by making freight rail more viable and attractive to shippers.

Several stakeholders in the region, including railroads, NJDOT and NYSDOT, the New York Metropolitan Transportation Council and North Jersey Transportation Planning Authority, the Port Authority of New York and New Jersey (PANYNJ), legislators, and others are continuing to investigate ways to broaden the transportation options available to shippers in the East-of-Hudson region. Examples include new or enhanced infrastructure and services, such as the construction of a new physical crossing or expanding the capacity of existing crossings; enhanced use of alternative modes, such as barges, car floats, and ferries; new operational strategies that would allow trains to move faster and more frequently; and new institutional arrangements that allow for more shared use of track by passenger and freight services. The improvements necessary to make freight rail in East-of-Hudson markets more attractive will require substantial investments shared among the many partners in the public and private sectors that are responsible for the region's rail system.

Like all transportation infrastructure improvements or operational strategies, alternative approaches have unique public policy, business practice, and environmental impacts that affect different stakeholders in different ways. Developing consensus among these stakeholders on how to most appropriately expand the transportation options available to shippers in the region can be challenging. In addition to the land use, population density, and environmental constraints that often accompany rail infrastructure improvements, there can be considerable financial and institutional challenges, as rail improvement projects are typically expensive and involve many stakeholders from both the public and private sectors. However, there are many examples in the Northeast of rail improvement projects that have been planned, developed, and implemented, including the Bellows Falls Tunnel described below.

Case Study – Bellows Falls Tunnel

The Bellows Falls Tunnel is a 400-foot, 155-year old structure located along the New England Central Railroad (NECR), as shown below. The tunnel's current clearance does not permit double-stack operations nor can it handle trilevel auto carriers.



This causes a significant physical chokepoint for traffic moving north-south in the region, as double-stack and autorack traffic is routed around the tunnel. In fact, the tunnel's low clearance often discourages the railroads from accepting this kind of traffic at all and is a particular concern for the Providence and Worcester Railroad (P&W), which is interested in increasing its volume of northbound automobiles from the Port of Davisville (Rhode Island) via the NECR and eventually to the CP in Whitehall, New York; and in increasing its volumes of automobiles southbound from Canada to New England for retrofitting.

Recognizing that improving this chokepoint could have significant public and private benefits, in the form of increased mobility for people and goods as well as improved economic competitiveness, the Vermont Agency of Transportation worked closely with the State legislature and its Congressional delegation to develop funding strategies to address it. Improvements to the tunnel's clearance are slated to begin in mid-2006, using a $2 million earmark from the Safe, Accountable, Flexible, Efficient Transportation Equity Act: a Legacy for Users (SAFETEA-LU), the most recent surface transportation authorization legislation, and state transportation funds. An additional $2.5 million will be provided to upgrade the capacity of the Green Mountain Railroad line between Bellows Falls and Rutland, Vermont, allowing this line to handle heavier, faster trains.

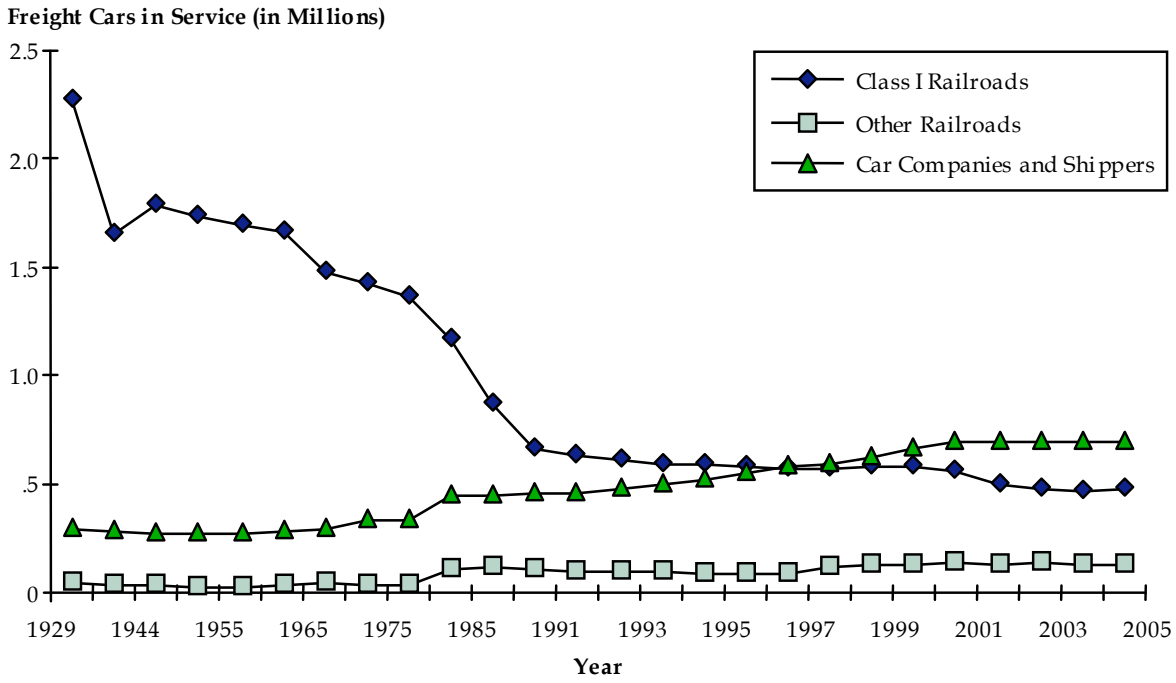
This case study provides a good example of how states, railroads, and other stakeholders can work together to identify and understand the public and private benefits of rail investment and develop a strategy to alleviate it. Another example is the Rhode Island Freight Rail Improvement Project (FRIP), a series of track and overhead bridge construction and rehabilitation improvements along the NEC right-of-way in Rhode Island. These improvements, which were funded using a number of state and Federal transportation sources and are nearly complete, will improve freight service to the Quonset/Davisville Port and Commerce Park by providing an alternate access route for freight trains accessing the port. Completion of this project will have significant impacts on passenger service in the region as well, improving the ability of Amtrak to maintain schedules along that vital corridor.

Railcar Availability

A fifth issue that affects the efficiency and reliability of the region's rail system is the availability of railcars to serve the region's shippers and manufacturers. This is both an infrastructure and operational issue and an institutional issue. Railcars, particularly specialized cars necessary for carload shipments, are typically provided by one of three entities: railroads, primarily Class I's, but also regionals and shortlines; car companies, which purchase and lease specialized cars; and individual shippers. As shown in Figure 4.1, the Class I railroads have significantly decreased their investment in railcars, particularly in the last 20 years. As a result, the burden of providing railcars has shifted to regional and shortline railroads, car companies, and individual shippers.

This issue is being driven by several trends. The first is tight system capacity, which is forcing railroads, particularly the larger railroads, to target large blocks of traffic (typically 100 cars or more) to take advantage of economies of scale and maximize the use of their increasingly limited capacity. In addition, as travel times on the network increase, it is more challenging to manage and redeploy assets, creating a significant shortage for most types of railcars. The second is the continuing intermodal focus of the larger railroads, described earlier. Intermodal equipment differs significantly from the equipment needed for carload shipments, and larger railroads are more likely to invest in equipment that is the primary driver of their revenue (i.e., intermodal). Third, regional and shortline railroads often do not have the capital required to invest heavily in railcars and shippers are often hesitant to invest in rolling stock as well. In many cases, the railroads wait to invest in railcars until they are convinced that increases in demand in freight for specific car types are strong and lasting. Until they are convinced, availability of railcars nationally and in the region will remain tight. This is a particular concern in the Northeast, which is home to many regional and shortline railroads and industries that have a hard time generating the volumes of freight that may be attractive to the Class I railroads. The lack of railcars in the region makes rail transportation a less viable option than other more flexible modes.

Figure 4.1 Car Supply
1929 to 2004



Source: AAR.

4.2 Institutional Challenges

In addition to the infrastructure and operational issues described above, there are a number of institutional challenges, i.e., key policy, legal, and environmental matters, that affect passenger and freight rail service in the Northeast. These institutional challenges, which affect both the railroads operating in the region as well as the region's transportation planning agencies, can have significant impacts on freight and passenger rail service in the region and hinder the ability of regional rail stakeholders to address or mitigate the infrastructure and operational issues described above.

There are several specific and unique characteristics of the region that play a considerable role in how some of these institutional challenges developed. First, the Northeast region consists of seven contiguous states whose transportation systems are highly interconnected. Although their transportation systems are intertwined, these states consist of a mosaic of counties, cities, towns, and villages which have a wide array of government, oversight and administrative functions. This structure can make it challenging to coordinate infrastructure improvements, operational strategies, and transportation and economic development policies across jurisdictional boundaries.

Second, there is a need to balance security and efficiency in the operations of the region's rail system. For example, there are a significant number of border crossings in the Northeast region. These crossings, in Maine, Vermont, and New York, handled over 20 percent of rail freight traffic across the entire United States-Canada border and a significant volume of cross-border passenger traffic as well. Consequently, rail movements into, out of, and through the region can be affected by the policies, procedures, and practices of other agencies such as customs and law enforcement, on both sides of the border.

Finally, the Northeast region is more reliant on regional and shortline railroads than other parts of the country. Balancing the unique infrastructure and operational constraints of these railroads with the needs and issues of larger railroads can pose significant policy challenges to state DOTs and MPOs in the region. This final issue already has been discussed in this report and will not be repeated here.

In the next several sections, existing institutional issues will be discussed, followed by emerging issues that may soon affect freight and passenger rail movements in the Northeast.

Existing Issues

Multijurisdictional Programming and Implementation of Rail Projects

Four major institutional issues affect the ability of DOTs and MPOs to effectively plan, program, and implement rail improvement projects:

- **Difficulty incorporating freight and freight rail into the traditional transportation planning and programming process.** In recent years, many states and MPOs in the region have begun to more actively incorporate freight and freight rail issues into traditional transportation planning programs and processes, particularly long-range plans. Several states and MPOs in the region have begun to build statewide or regional pictures of freight movement and link freight policy and transportation investments more closely to economic development goals. But while the inclusion of freight in long-range planning activities has helped raise the profile of freight and emphasize the importance of incorporating freight into statewide and metropolitan transportation planning programs, many state DOTs and MPOs in the region still find it difficult to program, develop, and implement projects, including rail improvements, that benefit freight movements. In some areas, there is some institutional resistance to using public transportation funds to make investments that are perceived to benefit the private sector, which can prevent freight and freight rail projects from being considered during discussions regarding the setting of regional transportation and investment priorities. However, even in states and MPOs where freight and freight rail issues are addressed within long-range planning documents, these issues are not often translated into actual improvement projects that appear in Transportation Improvement Programs (TIP) and Statewide Transportation Improvement Programs (STIP), making it difficult for freight and freight rail issues to receive equal consideration in the establishment of priorities and the programming of funds. As a result, freight and freight rail improvements often do not appear in TIPs and STIPs, or are ranked very low with little hope for implementation.

- **Difficulty coordinating improvements across jurisdictional boundaries, once these improvements have been identified, planned, and programmed.** As discussed earlier, the Northeast region consists of seven states whose transportation systems are highly interconnected. Rail movements within the region often involve more than one railroad (e.g., shortline and regional or regional and Class I) and travel through several jurisdictions. There are many instances where infrastructure improvements could alleviate bottlenecks and improve the efficiency of rail movements regionwide. However, individual states and railroads often cannot afford larger improvements to the rail system, especially since the costs and benefits of these improvements are unevenly distributed. For example, a capacity expansion at Binghamton Yard would benefit CP and NS, as well as rail shippers and consumers in New York and New England. Similarly, clearing the CSX line east of Framingham (Massachusetts) to allow double-stack operations would benefit not only Massachusetts-based rail shippers and consumers, but also CSX and the Port of New York and New Jersey. When investments in one state or metropolitan area result in benefits to several other states or regions, it is often difficult to determine how costs, risks, and benefits should be shared. Compounding the problem is the fact that the existing state-specific and Federal financing tools do not yet make this kind of cost-sharing attractive.

- **Difficulty quantifying public benefits of rail improvements.** State DOT and MPO staff are an important resource in identifying rail-related needs and deficiencies, proposing potential improvement projects, and moving those projects through the transportation planning and programming process. But while most state DOT and MPO transportation planners hold advanced degrees in transportation or planning, few have formal training in freight planning and even fewer have experience in addressing freight and passenger rail-related issues. Compounding the issue is the fact that freight-specific data and analytical tools are limited in their availability and their effectiveness in describing costs and benefits of freight rail improvements. As a result, many state DOTs and MPOs find it difficult to adequately describe the costs and benefits of rail improvement projects and how they accrue to different stakeholders (i.e., public and private). Although public investment in the rail system might have the joint benefit of improving mobility for freight and passenger movements while simultaneously reducing the need for additional highway capacity expansions, most DOT and MPO staff lack the analytical tools to adequately make that argument. As a result, freight and passenger rail needs, issues, and potential solutions are often not fully mainstreamed within the transportation planning and programming process, making them unlikely to be included in the setting of statewide or regional priorities or in the allocation of funds.

- **Limited funding resources.** All states and MPOs in the region commit a large portion of their budgets to the maintenance and preservation of their current highway systems, leaving limited resources for rail improvement and other nonhighway projects. Highway-related freight improvement projects are usually eligible for funding under Federal and state highway programs, but rail improvement projects must often be shoehorned into air quality mitigation (e.g., CMAQ), safety programs (e.g., highway-rail grade-crossing separation programs), or loan or credit enhancement programs (e.g., Rail Rehabilitation and Improvement Financing, RRIF). Although

existing funding strategies can be useful for making small, localized improvements to the rail system, addressing issues such as grade crossings, rural branch lines, and commuter rail services, they are not well suited for funding improvements to the regional infrastructure issues facing the rail system within the Northeast. Financing rail capacity improvements may require a regional approach and investments must be made at the network level, i.e., those major elements at the top of the system: capacity chokepoints along regionally significant corridors; at intermodal terminals; and at urban rail interchanges and connectors. Improvements to these elements of the system will be necessary in order to retain and grow freight-rail and intercity passenger-rail traffic in the region.

Balancing Security and Efficiency

A third institutional issue is the challenges posed by balancing freight and passenger rail efficiency with new security requirements instituted in the wake of 9/11. This issue affects both railroads and transportation planning agencies at the state and metropolitan levels.

Freight and passenger railroads nationally and in the Northeast region have not been exempt from the increased pressure to deal with security exerted by the government and the public in the aftermath of the attacks of 9/11. Hazardous materials, a key commodity for the freight railroads, have been singled out for increased attention, and there is increasing pressure on the freight railroads and others to take steps to reduce the threat of hazardous materials shipped by rail and improve emergency response and incident management techniques. Cross-border passenger movements also have been affected. Cross-border passenger trains are required to submit passenger manifests to customs officials in advance of crossing the United States-Canada border. At the border, cross-border trains and passengers, including their checked and carry-on baggage, are subject to inspection by customs officers. In an effort to reduce delays at border crossings, some of these inspections are now being conducted at nonborder locations, including Syracuse and Rochester. However, delays encountered at these locations can cause even more serious delays to freight movements, as they are located along heavily used freight mainlines. Customs-related delays of passenger trains at these and other locations can require the rescheduling of some freight trains, disrupting the delicate operational balance that exists in the region.

The increased focus on security also is having several other impacts on rail operations in the Northeast and nationally. First, there is an enhanced focus on improving the physical security of rail facilities, which can place additional financial strains on the region's railroads. This is true of both passenger and freight railroads, many of which have improved the security of their facilities and processes, but have often done so at the expense of making other infrastructure or operational investments. In addition, both rail cargo and rail passengers are being scrutinized more closely. This is true particularly of hazardous materials, as described above, as well as cargo and passengers arriving through the United States-Canada rail crossings. This can slow operations and can result in delays, given the lack of sidings at many of the region's border crossings. Finally, some railroads are seeing increases in insurance rates. While this has not posed a problem to the major carriers, a number of the region's shortline and regional freight railroads have indicated that the increased costs have contributed to making freight rail a less viable option to shippers in some areas.

States and MPOs in the region also are struggling with how to effectively balance security and efficiency and, in many cases, are still determining their specific roles and responsibilities as it relates to security issues. Even prior to the events of 9/11, the movement of freight through international freight gateways in the region, including marine ports and terminals and international border crossings, was not operating at peak efficiency, due in part to limited capacity at some gateways and on the rail corridors and highways that serve them. In the aftermath of 9/11, Federal, state, and local governments, along with other stakeholders, have taken steps to tighten freight and passenger transportation security. Currently, more than 40 individual security-related programs, strategies, and initiatives may impact rail movements into and out of the region.

In addition, several different Federal agencies and administrations, in the Department of Homeland Security and elsewhere in the Federal government, are involved in rail security to some degree or another. Many states and MPOs nationally and in the Northeast are interested in better defining their roles and responsibilities in improving freight security and understanding how their activities fit within the various Federal agencies and initiatives that arose in response to 9/11. Defining roles and responsibilities is complex because many local, state, and Federal agencies have significant missions in ensuring the safety and security of the region's freight and passenger movements and complicating matters, rail shipments often travel through multiple jurisdictions, particularly in the Northeast region. The new and evolving security requirements of the region's passenger and freight railroads instituted since 9/11, coupled with the challenges faced by states and MPOs in determining their role in addressing freight and passenger security, makes it even more challenging to effectively address the infrastructure and operational issues affecting the region's rail system.

Emerging Issues

The Future of Amtrak and the Northeast Corridor (NEC)

In recent years, both the existing Federal administration and the Congress have developed a number of Amtrak reform proposals and legislation. The key elements of these proposals are described in Table 4.1.

As shown in Figure 4.2, the Northeast Corridor through the Northeast region is owned by a combination of Connecticut DOT (CDOT), Amtrak, Metropolitan Transportation Authority (MTA), and MBTA. Different segments are operated by Metro-North, Amtrak, MBTA, and the Long Island Railroad, the largest commuter railroad in the United States.

Table 4.1 Key Aspects of Recent Amtrak Reform Proposals

Key Aspects of Amtrak Reform Proposals	Description of Proposed Change
Zero or Limited Funding	• No or insufficient Federal operating or capital funds for Amtrak • STB to fund directed commuter and freight service
Infrastructure Separation	• Separate Amtrak infrastructure and operating responsibilities to different companies
NEC Commuter Rail Fee	• New fee for maintenance and operating costs, in addition to existing operating contracts, assessed on commuter railroads that use NEC
Multistate NEC Compact	• Passenger rail operations on NEC transferred to a multistate compact of Northeastern states
Private Ownership of NEC	• Ownership of NEC transferred to another entity, which would contract for maintenance and operations
Cost-Reduction Proposals	• Require Amtrak to reduce losses on sleeper car and food/ beverage services
Accounting Reforms	• Require Amtrak to assign revenue and expenses by line and between maintenance and operations

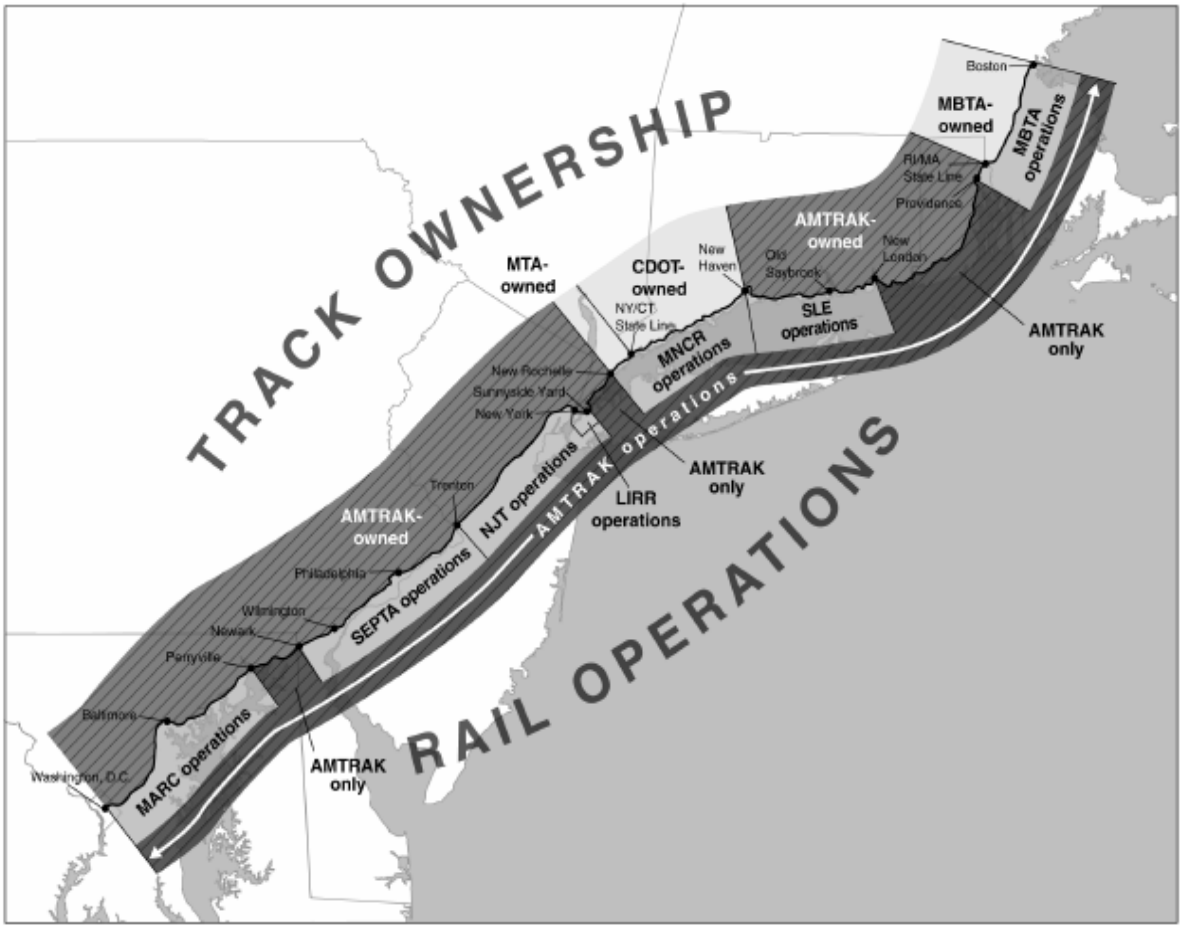
Source: GAO Report 06-470, April 2006.

As shown in Figure 4.2, the Northeast Corridor through the Northeast region is owned by a combination of Connecticut DOT (CDOT), Amtrak, Metropolitan Transportation Authority (MTA), and MBTA. Different segments are operated by Metro-North, Amtrak, MBTA, and the Long Island Railroad, the largest commuter railroad in the United States.

Amtrak is a critical partner for the commuter railroads in the region, as these railroads not only utilize Amtrak infrastructure, but rely on Amtrak to provide track maintenance and dispatching for all trains along much of its right-of-way. For example, from its centralized dispatching center in Boston, Amtrak dispatches all MBTA trains on the NEC between Boston and Providence as well as its own intercity trains. Amtrak also distributes power to commuter rail agencies that use electrically powered trains along the NEC. These trains, which may be hauled by locomotives or made up of self-propelled, multiple-unit cars, require electric power delivered directly from overhead catenary lines.[3]

[3] GAO Report 06-470, June 2006.

Figure 4.2 NEC Ownership and Operations



Source: GAO Report 06-470, April 2006.

Some of the reform proposals described in Table 4.1 could have significant, immediate impacts on Amtrak's operations and overall viability. Any temporary suspension or complete termination of Amtrak services could cause several critical operational issues for commuter rail agencies and the freight railroads in the region that operate along the NEC. First, commuter rail agencies that operate along the NEC, such as the MBTA, Connecticut's Shore Line East, LIRR, NJ Transit, SEPTA, and MARC, may not be able to continue to provide full service if their ability to access Amtrak-owned tracks and other facilities is denied or reduced. Second, commuter agencies would lose access to Amtrak dispatching services. Many commuter railroads in the region simply do not have ample capabilities or expertise to take over dispatching within a short time period. Third, it could result in an increase in NEC access fees paid by the states and the commuter railroads, increasing the burden to these states and agencies in providing passenger services along the NEC; in fact, some proposals would transfer all responsibility for providing intercity passenger services to states. Fourth, states would bear the equipment depreciation and interest costs for their state-supported intercity services, such as the

Ethan Allen Express and the Adirondack service. Finally, without Amtrak, travel to northern New England would be restricted to automobiles and (limited) airline service.

In addition to these reform proposals, Amtrak has recently proposed that states be required to cover all operating deficits on corridor operations outside of the NEC and on all long-distance services. As described in Section 2.0, several states in the Northeast provide funding to Amtrak to subsidize intercity passenger service. If adopted, this new proposal would have a significant impact on intercity passenger service in the region by increasing the costs of existing state-supported services and introducing new costs to states that currently do not provide state subsidies. For example, the State of Vermont has estimated that its annual costs to retain Vermonter and Ethan Allen Express services would more than double, from $2.65 million (in FY 2006) to $5.8 million (in FY 2007).[4] With state transportation budgets already stretched thin, these increases could result in the reduction or even elimination of these services in the region, further limiting the transportation options in many areas.

High-Speed Rail in the Region

A final institutional issue relates to the potential for development and implementation of high-speed rail service within the Northeast region. High-speed rail is generally defined as "self-guided intercity passenger ground transportation by steel-wheel railroad or magnetic levitation (maglev) that is time-competitive with air and/or auto for travel markets in the approximate range of 100 to 500 miles."[5]

The Federal Rail Administration (FRA) designated high-speed rail corridors within the Intermodal Surface Transportation Efficiency Act (ISTEA, 1991) and the Transportation Equity Act for the 21st Century (TEA-21, 1998). This designation allows states through which these corridors pass to receive earmarked funding for the study, design, and construction of high-speed rail facilities as well as specially targeted funding for highway-rail grade-separation projects. As can be seen in Figure 4.3, there are several designated high-speed rail corridors in the region, including the existing Northeast Corridor between Washington and Boston; the Northern New England Corridor, which would provide service between Boston and Montreal (via Concord, New Hampshire and Montpelier, Vermont) as well as to Portland/Auburn, Maine; and the Empire Corridor, which would link New York City and Buffalo via Albany, New York. A final corridor would link Boston, Springfield (Massachusetts), and New Haven.

There have been a number of high-speed rail feasibility studies in recent years, including the Boston-Montreal High-Speed Rail Planning and Feasibility Study (released 2003) and the New York Senate High-Speed Rail Task Force Feasibility Study (released 2006). The Boston-Montreal study concluded that potential ridership warranted further study of the operational, engineering, and cost/revenue factors of the proposed service and the New

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[4] Vermont Joint Fiscal Office, October 2006.

[5] *High-Speed Ground Transportation for America*, FHWA, 1997.

York study developed an action plan that would implement high-speed rail service along the Empire Corridor over the course of 20 years.

Implementation of high-speed rail service in the Northeast region, along either the Northern New England or Empire Corridors, will require resolution of several institutional and policy issues among the affected states and railroads.

Figure 4.3 High-Speed Rail Corridor Designations

Major issues include:

- **Traffic Rights Agreements –** Individual freight railroads own and maintain significant portions of the proposed high-speed rail corridors. Agreements that allow state access to this infrastructure must be negotiated in a way that allows for efficient freight and passenger service along key parts of those corridors. In addition, the Association of American Railroads (AAR) recommends that these agreements should include compensation agreements and limitations on liability.[6]

[6] AAR Position Paper, *Passenger Service on Tracks Owned by Freight Railroads*, August 2006.

- **Infrastructure Improvements –** Implementation of high-speed passenger service in the region will likely require significant track, signal, station, and other infrastructure improvements along strategic portions of the proposed routes. In fact, the AAR recommends that high-speed passenger operate on dedicated tracks and along "sealed" corridors with no at-grade crossings.[7] The affected states and railroads must develop cost-sharing agreements that allow all parties to share equitably in the costs and benefits of these and other improvements.

- **Potential Impacts to Existing Freight Service and Flow Patterns –** A final issue that should be investigated is the potential impact that implementation of high-speed rail service in the region may have on existing rail freight flow patterns. As described earlier, rail operations in the region are both highly coordinated and tightly wound. Any disruption, including those caused by changes in commodity flow patterns or rail operating strategies, can have cascading effects throughout the Northeast and other regions, affecting the efficient flow of people and goods regionwide. The potential impact of high-speed rail service on freight rail operations and flow patterns should be investigated, as these changes could have potential impacts on other states in the Northeast region and beyond. Again, AAR encourages the freight railroads to work with high-speed rail authorities and other stakeholders to ensure that adequate infrastructure capacity exists to accommodate existing and future volumes of freight and high-speed passenger traffic.[8]

4.3 Specific Examples of Issues in the Northeast Rail System

This section contains maps and detailed descriptions of issues specific to three subregions of the Northeast rail network that, along with the case studies in this section, present a representative, but by no means all-inclusive, list of physical and operational issues in the Northeast:

- The Downstate New York/East-of-Hudson River Rail Network, which includes the lower Hudson Valley and Long Island;

- The New Haven Line between New York and New Haven; and

- The Southern New England region, which includes rail lines in Massachusetts, Connecticut, and Rhode Island that serve those states and connect to Northern New England and Canada.

Several references to height clearances and weight restrictions will appear throughout this section. Vertical clearance is a major issue affecting the efficiency of freight movement in the Northeast region. By carrying two containers stacked one on top of the other on a

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[7] Ibid.

[8] Ibid.

single rail car, called "double-stacking," rail companies can make more efficient use of the space occupied by the railcar. There are several methods of carrying double-stack shipments, including the following:

- "Short" double-stack shipments (i.e., 8'-6" container on top of a 9'-6" container, also referred to as "first-generation" double-stack or "autorack" height in this document), which require 19 feet of clearance, including a 1-foot safety margin; and

- "Full" double-stack (two 9'-6" containers), which is the current international standard for modern double-stack container movement, utilizing two full-size shipping containers.

In addition to double-stacking, railroads sometimes carry truck trailers directly on a flat railcar, eliminating the need to transfer goods from a truck into a rail boxcar and then back again at the destination. This method of shipment is referred to as "trailer on flatcar," abbreviated "TOFC." TOFC railcars require 17'-3" of vertical clearance. Several other vertical clearance types will be mentioned infrequently in the following sections.

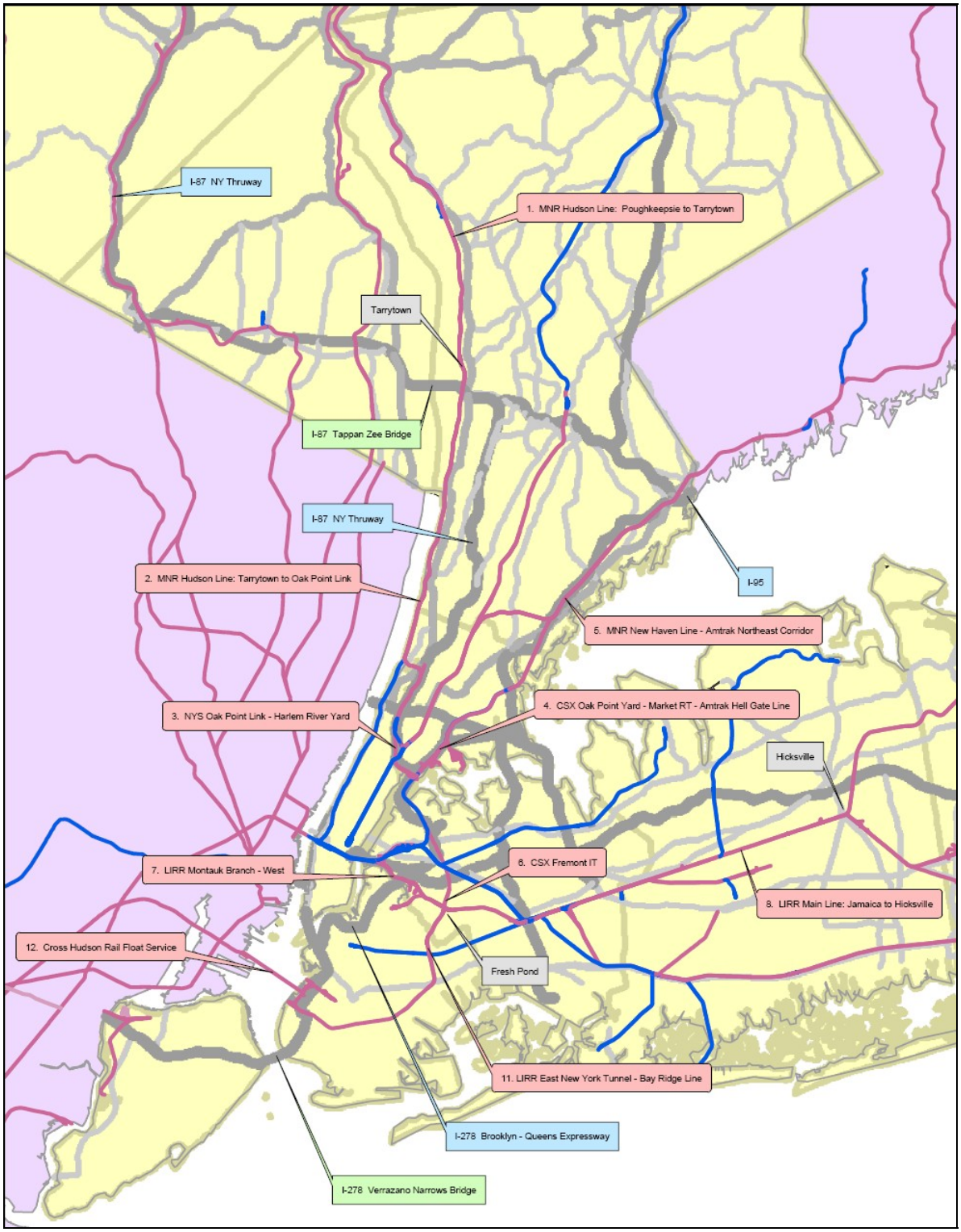
Rail cars weighing 286,000 pounds are the current industry standard, but many rail lines in the Northeast are not able to accommodate these cars. (Newer rail cars weighing 310,000 pounds already are in use and are evolving into the next generation industry standard.) Therefore, rail lines designed to meet the current 286,000-pound standard are commonly referred to as "286,000-pound" capable lines. Throughout this section, references will be made to tracks that do or do not meet "286,000-pound" standards.

Downstate New York/East-of-Hudson River Rail Network

The Downstate New York/East-of-Hudson River rail network includes the freight, commuter, and intercity rail networks that serve the nation's largest metropolitan area, in and around New York City. Perhaps the most significant issue in this subregion is the absence of a direct freight rail link across the Hudson River in the New York Metro area, as discussed in the case study above.

Other issues of regional significance include vertical clearance; shared use of rail tracks by Metro-North Railroad (MNR) commuter services, Amtrak intercity passenger rail, and various freight rail services; and weight restrictions. The following summaries of the physical characteristics of the main rail lines in the region correspond to the numbered labels on the map in Figure 4.4.

Figure 4.4 Downstate New York and East-of-Hudson Subregion



1. **MNR Hudson Line –** Poughkeepsie to Tarrytown (Milepost 75 to Milepost 26)
   - **Railroad Clearances –** Autorack (19'-0") load heights or less.
   - **Shared-Use Trackage –** High frequency of commuter trains limits operating windows of intercity passenger trains, while restricting long-haul freight trains to night time service only.
   - Two-track railroad from Poughkeepsie (Milepost 75) to Peekskill (Milepost 41), three tracks from Peekskill to Croton-Harmon (Milepost 33), and four tracks from Croton-Harmon to Spuyten Duyvil (see next segment below).
   - Third track from north of Cold Spring (Milepost 53) to Beacon (Milepost 59), in conjunction with existing siding from Milepost 59 to Milepost 61, is in conceptual planning stages.
   - Signal system north of Croton-Harmon (Milepost 33) is designed for freight rail service (e.g., the length of signal blocks was designed to accommodate longer freight trains rather than shorter and more frequent passenger trains), thus reducing effective available capacity of commuter rail operations.

2. **MNR Hudson Line –** Tarrytown to Oak Point Link (Milepost 26 to Milepost 8)
   - **Railroad Clearances –** TOFC (17'-3") load heights or less.
   - **Shared-Use Trackage –** High frequency of commuter trains limits operating windows of intercity passenger trains, while restricting long-haul freight trains to night time service only.
   - **Three- and Four-Track Corridor –** Two-track bottleneck between Milepost 12 and Milepost 10 (the "Rock Cut") severely restricts freight train movements to/from Oak Point Link and limits commuter train movements. Four tracks north of Milepost 12 from Spuyten Duyvil to Croton-Harmon. Three tracks south of Milepost 10 from Spuyten Duyvil to Mott Haven Junction for access to Grand Central Terminal.

3. **New York State Oak Point Link –** Harlem River Yard
   - **Railroad Clearances –** Autorack (19'-0") load heights or less. Plate H clearances (20'-2" load height) not achievable due to four regionally significant overhead highway structures.
   - Single freight-only rail line approximately two miles in length.
   - Harlem River Yard unfinished freight intermodal (TOFC) track and ramps.

4. **CSX Oak Point Yard –** CSX Market Terminal – Amtrak Hell Gate Line
   - **Railroad Clearances –** TOFC (17'-3") load heights or less.
   - **286,000-Pound High Axle Loads –** Not allowed north (east) of Oak Point Yard.

- **Shared-Use Trackage –** Northern most 4.5 miles shared trackage along Amtrak's Hell Gate Line (Northeast Corridor).
- Oak Point Yard rail access and interchange improvements are required.

5. **MNR New Haven Line – Amtrak Northeast Corridor**
   - See discussion in next section.

6. **CSX Fremont IT –** Amtrak Hell Gate Bridge
   - **Railroad Clearances –** Plate F (17'-0") rail load heights or less. 2007 track work will enable TOFC (17'-3") East-of-Hudson rail load service between Queens, Albany, and the national freight rail network.
   - East-of-Hudson service available to/from Queens to Albany and the national freight rail network.
   - Dark Signal Territory (7.5 miles) from Oak Point Yard to Fresh Pond Yard (Queens).
   - Single track line along the northern portion (3.8 miles) of line over Amtrak's Hell Gate Bridge and viaducts.

7. **LIRR Montauk Branch –** West
   - **Railroad Clearances –** Plate C (15'-0") rail load heights or less from Fresh Pond Yard west to Long Island City.
   - **286,000-Pound High Axle Loads –** Not allowed.
   - **Fresh Pond Yard Access to Montauk Branch –** West limited to one crossover severely restricting yard movements and freight train scheduling.

8. **LIRR Main Line –** Jamaica to Hicksville
   - **Railroad Clearances –** TOFC (17'-3") load heights or less between Fresh Pond Yard, Jamaica, and Hicksville.
   - **286,000-Pound High Axle Loads –** Not allowed.
   - **Shared-Use Trackage –** High frequency commuter train service with very limited daytime operating windows for local freight service. No long-haul freight operations.
   - Main line reduced to only two tracks east of Bellerose, severely limiting daytime commuter and freight rail service. Third track proposed between Milepost 14 and Milepost 25.

9. **LIRR Main Line –** East (off map to east)
   - **Railroad Clearances –** TOFC (17'-3") load heights or less east of Hicksville to freight terminus in Southold.
   - **286,000-Pound High Axle Loads –** Not allowed.

- **Shared-Use Trackage –** High frequency commuter train service with limited daytime operating windows for local freight service. No long-haul freight operations.
- Reduces to single track at Milepost 31 and continues 63 miles to end of line.

10. **LIRR Montauk Branch –** East (off map to east)
    - **Railroad Clearances –** TOFC (17'-3") load heights or less east of Hicksville.
    - **286,000-Pound High Axle Loads –** Not allowed.
    - **Shared-Use Trackage –** High frequency commuter train service with very limited daytime operating windows for local freight service. No long-haul freight operations.
    - Reduces to single track at Milepost 50 and continues 65 miles to end of line.

11. **LIRR East New York Tunnel –** Bay Ridge Line
    - **Railroad Clearances –** Plate F (17'-0") rail load heights or less. Primary overhead obstruction is 0.6 mile East New York Tunnel.
    - **286,000-Pound High Axle Loads –** Not allowed.
    - Single track line with no modern signal equipment ("dark signal territory") between Fresh Pond Yard and 65th Street Yard in south Brooklyn (12 miles).

12. **Cross Harbor Rail Float Service –** Greenville, New Jersey – 50th Street Brooklyn, New York)
    - **Railroad Clearances –** Plate H (20'-2") rail load heights.
    - Brooklyn rail connection to 65th Street Yard and Bay Ridge Line has "street running" along First Avenue, where trains operate in the middle of a city street.

New Haven Line

The New Haven line runs through communities along the Long Island Sound in New York and Connecticut, including the most heavily developed and populated areas of Connecticut. It is the main line for commuter service for the communities between New Haven and New York City (Grand Central Terminal). Most of the line has four tracks, although there are three tracks from the Waterbury Branch cutoff in Milford to New Haven. The tracks are made of continuously welded rail, and the track is electrified via overhead catenary wires.

The New Haven Line is maintained at Federal railroad Administration (FRA) Class 4 track standards. Freight service on the New Haven line is limited to Plate E (15'-9") rail load heights or less. The height restrictions are due to overhead electric catenary wires and support structures, numerous bridges, and other structures. The corridor cannot accommodate 286,000-pound high axle loads.

The New Haven Rail Line provides continuous connection at the State line in Greenwich with rail service in New York. In Connecticut, it also connects with the New Canaan

Branch Line in Stamford, the Danbury Line in Norwalk, the Waterbury Line in Milford, and the Springfield Line and Shore Line East in New Haven. The Connecticut portion of the line is owned by Connecticut Department of Transportation.

Through freight service along the line is provided by CSX and Providence and Worcester Railroad (P&W), and local freight service is provided by CSX. Intercity passenger service is provided by Amtrak, while commuter service is operated by Metro North Commuter Railroad in both Connecticut and New York. The high frequency of commuter trains limits the operating windows of intercity passenger trains, while restricting long-haul freight trains to night time service only. At the moment, no statistical analysis has been done of the impact that adding freight capacity to the corridor or increasing freight frequencies would have, but it is a topic that is being considered for the second phase of this study.

Given the heavily populated areas served by this corridor, the demand for both freight and passenger movement by rail has been growing steadily, thus creating scheduling conflicts during most of the day. Furthermore, as mentioned in Section 3.0 of this report passenger travel demand along this line has shifted from New York-oriented commuter flows to a mix of central city and suburb-suburb commutes. Weekday off-peak and weekend travel on Metro-North and Amtrak services also has steadily increased.

Southern New England Region

Rail lines in Southern New England, including Connecticut, Rhode Island, and Massachusetts, plus the lines heading north into Vermont, New Hampshire, and Maine, are significantly impacted by vertical clearance restrictions. Low overpasses, tunnels, electrical catenary wires and their supports, and other structures prevent railroads from providing full double-stacking capabilities, impeding their operational efficiency compared to rail service outside the Northeast U.S.

As shown in Figure 4.5, Massachusetts is served by two main line connections to the national rail network. The northern tier of the State is served by Pan Am Railway (Guilford), while the central tier is served CSXT. In Connecticut, the New Haven Line runs from New York to New Haven, and the Short Line East continues along the coast to Rhode Island. Several north-south rail lines highlighted on the map connect cities along the Connecticut coastline to the main east-west freight lines in Massachusetts.

Both the Pan Am Railway (Guilford) and the CSX lines in Massachusetts are capable of handling “short” double-stack shipments (i.e., 8.5-foot container on top of a 9.5-foot container, also referred to as “first” generation double-stack or “autorack” height) and not “full” double-stack (two 9’-6” containers), which requires higher clearance levels. In the case of Pan Am the clearances allow for travel as far east as Ayer (Devens). CSX currently has short double-stack clearance as far east as Framingham.

Massachusetts and Connecticut also are served by a consortium of regional and short line railroads that have combined to provide a third alternative clearance route through New York, Vermont, and Massachusetts. The Green Mountain Gateway is a collaborative effort

of the Vermont Railway and Providence & Worcester Railroad. This route provides first generation double-stack clearance to the Worcester intermodal terminals.

During the 1990s the Commonwealth and railroads collaborated to establish a framework for joint funding to improve vertical clearances further to the east. It was believed that direct double-stack service to and from the Port of Boston would provide economic benefits to the State and region. Due to the complexity of railroad market forces, and the competitiveness of that market, the so called Massachusetts Double-Stack Initiative was not implemented.

Both main line railroads, as well as the Green Mountain Gateway consortium, initiated their own efforts to improve clearances to and from the region. However, all clearances into New England are still first generation. As noted in the Case Study of DeWitt Yard, this situation increases costs of moving goods via container, and reduces the inherent benefits of double-stack rail service. Full double-stack clearance into Massachusetts would have benefits for the entire region, would enhance capacity of the overall system, and would benefit shippers and consumers throughout New England.

North-south lines in the State of Connecticut are significantly impacted by their lack of double-stacking capabilities. In addition to the lines included in the Green Mountain Gateway collaboration, the rail line between Danbury and Pittsfield, portions of which are owned by either Housatonic Railroad or Connecticut Department of Transportation, and Amtrak's Springfield, Massachusetts to New Haven, Connecticut line are limited by low-clearance bridges.

A brief summary of vertical clearance issues on key rail lines in Southern New England is presented in the remainder of this section. Numbers preceding each line correspond to the numbers on the map in Figure 4.5.

1. Pan Am Railway, Vermont State Line to Ayer, Massachusetts

- **Railroad Clearances –** Autorack (19'-0") load heights or less due to multiple low-clearance overpasses and Hoosac Tunnel.
- Constrained by multiple bridges and tunnels, and in particular the Hoosac Tunnel.

The Pan Am (northern tier route) main line is constrained from full double-stack service by a significant number of roadway bridges passing over the railroad, as well as by the railroad's own Hoosac Tunnel (shown in Figure 4.5 in the northwest corner of Massachusetts). Full double-stack service east of Ayer has not been examined in any detail since the 1990s initiative – but is likely subject to the same market constraints as are cited above in the CSX discussion.

2. CSX Mainline, New York State to Worcester

- **Railroad Clearances –** Autorack (19'-0") load heights or less due to 37 low-clearance bridges between New York State Line and Greater Worcester area.
- Long stretches of single track.

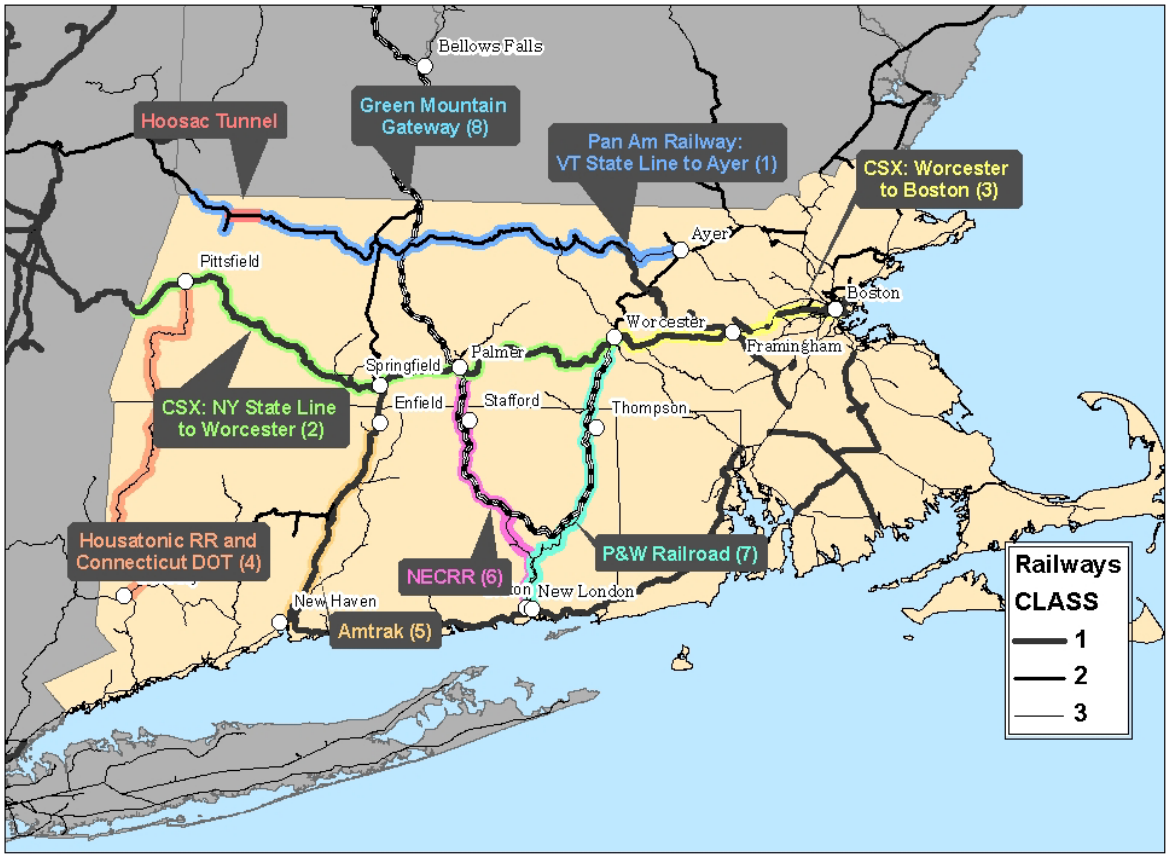
The CSX main line (Boston main line between Albany and Boston) is constrained by approximately thirty seven bridges over the railroad between the New York State line and the greater Worcester region. Previous analyses of the route easterly into Boston have suggested that the costs to benefit of accommodating full double-stack clearances would be overwhelming, given all of the obstructions along the route. This route also is constrained by long stretches of single track operation that often result in east-bound trains having to wait for west-bound trains, thus contributing to a cascading impact on yard and main line operations further east.

3. CSX, Worcester to Port of Boston

- **Railroad Clearances –** No double-stack service due to multiple bridges lower than 19'-0."
- Freight and passenger shared use.

East of Worcester the capacity of the CSX main line is further constrained by joint use of the route for passenger and freight operations and multiple low bridges that prohibit even first-generation double-stack cars. Massachusetts Bay Commuter Rail Corporation operates commuter rail service under contract to the Massachusetts Bay Transportation Authority, and Amtrak operates intercity passenger rail services over the tracks from Boston's South Station to points west.

Figure 4.5 Rail Issues and Bottlenecks in Southern New England



4. **Housatonic Railroad and Connecticut DOT, Pittsfield, Massachusetts to Danbury, Connecticut**

   – **Railroad Clearances –** Autorack (19'-0") load heights or less due to 16 bridges lower than 22'-6."

Housatonic Railroad owns the southern portion of this line from Danbury to New Milford in Connecticut (13.2 miles), while Connecticut Department of Transportation (DOT) owns the portion from New Milford to the Massachusetts state line (36.4 miles). The Housatonic Railroad Company is a short line that operates in the western part of Connecticut and in Massachusetts and New York along the Berkshire Line (49.6 miles, highlighted on the map in Figure 4.5) and the Derby Branch (33.6 miles, not shown). The Housatonic Railroad interchanges with CSX in Pittsfield, Massachusetts. The two lines combined carry approximately 5,000 railcars per year of lumber, food, chemicals, pulp and paper, and waste.

5. Amtrak, Springfield, Massachusetts to New Haven, Connecticut

- **Railroad Clearances –** Autorack (19'-0") load heights or less due to 44 bridges lower than 22'-6." Improving the line to permit double-stack container cars is cost-prohibitive.

Double-stacking issues are not a major concern for the Amtrak passenger trains that run along this route, but freight carriers such as CSX often operate on these lines and are limited by height restrictions.

6. New England Central Railroad, Palmer, Massachusetts to New London, Connecticut

- **Railroad Clearances –** Autorack (19'-0") load heights or less due to 14 bridges lower than 22'-6" between New London and Stafford.

This line was previously owned by the Central Vermont Railway but is now owned by the New England Central Railroad (NECR), a subsidiary of RailAmerica, Inc. The NECR operates service over their own line between New London and Stafford (59 miles) and on to East Alberg, Vermont, where they connect with the Canadian National Railroad. The Green Mountain Gateway service operates over a portion of this line, as shown in Figure 4.5. The NECR also interchanges with CSX at Palmer, Massachusetts, where they operate an intermodal facility, and they interchange with the P&W Railroad in New London.

7. Providence and Worcester Railroad, Worcester, Massachusetts to Groton, Connecticut

- **Railroad Clearances –** Autorack (19'-0") load heights or less due to 17 bridges lower than 22'-6."

This line is owned by the Providence and Worcester Railroad (P&W). Service operates over the line to a chemical and bulk plastic transfer facility in Plainfield. A P&W maintenance facility, where repairs are performed on the railroad's maintenance of way equipment, also is located along the line.

8. Green Mountain Gateway

The Green Mountain Gateway is a collaborative effort of the Vermont Railway and Providence & Worcester Railroad. This route provides first generation autorack double-stack clearance through New York, Vermont, Massachusetts, and Connecticut to the Worcester intermodal terminals. The Green Mountain Gateway is capable of handing, and provides the region with an alternative intermodal service route, connecting to CP routes into and through Canada. Full double-stack service is not anticipated on this route.

5.0 Conclusions and Recommendations

This section presents the conclusions of the study, which were developed from the analysis of freight and passenger rail trends in the region, and from the identification and description of key chokepoints, constraints, and issues in the Northeast. This section also recommends next steps that the Northeastern states should take in order to more fully understand and address the chokepoints, constraints, and issues identified in the region.

The I-95 Corridor Coalition has approved funding for Phase II of the NEROps study. The conclusions and recommendations in this Phase I report are meant to provide a foundation and a process to allow the Northeast states to begin addressing specific systemwide issues and chokepoints that cross jurisdictional, interest, and financial boundaries during Phase II.

5.1 Conclusions

The passenger and freight rail systems in the northeast are generally stable and productive and are an important part of the transportation mix in the region.

Both the passenger and freight railroads are an important element of the overall transportation picture in the Northeast. Gains in efficiency and productivity have allowed the region's freight railroads to become increasingly competitive and, while rail accounts for less than 10 percent of the overall market share in the region, it is critical to the transportation and distribution of several major commodities, including transportation equipment, paper and wood products, chemicals, food products, and consumer goods.

Passenger rail is an important component of the region's transportation mix, as well. The Northeast region includes several urbanized areas and the region as a whole has a higher percentage of commuter rail and transit users than any other region in the country.

Physical, operational, and institutional issues in the region will not allow the rail system to absorb further freight and passenger growth.

The freight and passenger railroads in the Northeast region are effectively managing their existing capacity. However, there are several physical, operational, and institutional issues that, individually or collectively, hinder the ability of the railroads from effectively serving growing freight and passenger demand. While operational and institutional strategies are being used effectively to mitigate the impacts of these physical chokepoints, this will become more difficult as freight and passenger demand continues to increase and as shippers and passengers continue to demand high-speed, high-quality, and highly reliable service.

Growth in both freight and passenger demand, coupled with the fact that the environmental, social, and financial costs of adding capacity to the region's highway system continues to rise, presents an opportunity for rail in the Northeast region, but require these

physical, operational, and institutional issues to be appropriately addressed. Not doing so will make it impossible for the railroads to absorb this growth without significant social, economic, and environmental costs.

Regional and shortline railroads are a critical element of the intermodal freight transportation and distribution in the region, but their continued viability is vulnerable in some cases. The decline of regional and shortline railroads would have significant impacts on the region's transportation system and economic competitiveness.

Regional and shortline railroads are a vital component of the Northeast region's transportation system, serving locally generated traffic, providing access for the larger national or regional rail system shippers and manufacturers, and serving the region's smaller seaports. However, the continued viability of these railroads is uncertain, as they struggle to address physical, operational, and institutional issues.

The challenges described in this report may make it difficult for some shortline and regional railroads to continue to thrive in the region. A decline in the extent or level-of-service offered by these railroads would lead to increased costs for consumers and increased traffic on the region's highway system, eroding the overall mobility of people and goods throughout the region. It also would affect the ability of economic development agencies to attract or retain businesses, as access to efficient reliable, intermodal transportation services has become an important factor for businesses to consider when making location and expansion decisions.

Freight rail issues are often overlooked in the traditional statewide and metropolitan transportation planning and programming process.

Although many states and MPOs in the region have begun to more actively incorporate freight and freight rail issues into traditional transportation planning programs and processes, many state DOTs and MPOs in the Northeast region still find it difficult to program, develop, and implement projects, including rail improvements, that benefit freight movements. Freight and freight rail issues are often included in statewide or metropolitan planning documents, but these issues are not often translated into actual improvement projects, making it difficult for freight and freight rail issues to receive equal consideration in the establishment of priorities and the programming of funds. Challenges associated with identifying appropriate funding and financing mechanisms and coordinating improvements across jurisdictional boundaries also make it difficult for states and MPOs to plan, program, and implement freight rail improvement projects, hindering their ability to address mobility needs comprehensively.

5.2 Recommendations

Addressing the ability of the Northeast rail system to adequately serve future passenger and freight mobility needs in the region will require a concerted, cooperative effort led by the seven Northeastern states and involving the region's freight and passenger railroads, the Federal government, the I-95 Corridor Coalition, and other regional rail stakeholders. This Phase I report provides a foundation that will allow the Northeast states to start

addressing specific systemwide issues and chokepoints that cross jurisdictional, interest, and financial boundaries during Phase II of the NEROps study. The following recommendations describe actions that the seven Northeastern states should take to build on this foundation and provide a framework for Phase II and future phases of the NEROps study. These recommendations also outline areas where the I-95 Corridor Coalition should provide support.

Educate legislators and other transportation decision-makers on the importance of rail to the region.

Both the passenger and freight railroads are an important element of the overall transportation picture in the Northeast. However, few transportation decision-makers in the region have a solid understanding of how rail fits within the intermodal transportation system in the region and even fewer have a grasp of the issues facing the region's rail system and the challenges faced by the railroads, state and metropolitan transportation planning agencies, and other stakeholders in addressing them.

It is critical to help regional decision-makers, including DOT/MPO management, industry and business leaders, local citizens, and statewide or local elected officials understand the importance of rail to the region as well as the challenges associated with improving the system's ability to absorb future growth. This educational effort can help groom high-level advocates within state DOTs, MPOs, and state legislatures for rail planning activities. These advocates, in turn, can help ensure that freight and rail issues are appropriately reflected in transportation planning and policy guidance and also can help provide or allocate staff and funding resources to accomplish planning, programming, and project development activities.

The Northeastern states should work closely with the I-95 Corridor Coalition and other groups as appropriate to educate regional transportation decision-makers on the importance of rail transportation and investment in the region. Targeted distribution of this report and executive summary is an excellent starting point.

Actively participate in regional and national rail planning and policy efforts.

A number of national groups are undertaking policy studies and other activities designed to highlight major rail-related issues, identify strategies, recommendations, and processes to facilitate rail planning and investment, and develop high-level advocates for addressing rail needs as part of a comprehensive statewide or metropolitan transportation planning and improvement program. Of particular note is the American Association of State Highway and Transportation Officials (AASHTO), whose Freight Rail Bottom Line Report identified concerns about the capacity of the national freight-rail system to keep pace with the expected growth of the economy and found that relatively small public investments in the nation's freight railroads can be leveraged into relatively large public benefits for the nation's highway infrastructure, highway users, and freight shippers.

Representatives from the Northeast states should actively participate in these and other efforts, as their participation can help ensure that specific regional issues are brought to the table and addressed. More importantly, participation will help the Northeastern states

more effectively shape the national policy debate regarding the degree to which public sector transportation planning agencies should be involved in planning and funding rail improvements. Finally, participation in these groups will help the Northeastern states more effectively coordinate rail investments that may have regional impacts.

Simultaneously, the Northeastern states should work with their state legislatures, Congressional delegations, the Coalition of Northeast Governors, the New England Governors and Eastern Canada Premiers, AASHTO, and other groups to develop strategies to enhance the flexibility of both state Federal transportation improvement funds to facilitate rail planning and investment.

Better integrate freight and freight rail issues throughout the transportation planning and programming process.

One key to an ongoing, successful, and comprehensive transportation improvement program is to fully integrate rail issues within an existing statewide or metropolitan transportation planning and programming process. Although most states address freight rail issues within long-range plans and many actively invest in freight-rail projects, few have done so within the traditional transportation planning and programming process. Instead, rail planning efforts often are undertaken in parallel with the existing transportation planning process or on an ad hoc basis. That is, the identification, prioritization, development, and implementation of rail improvement projects in many areas is separate from the process used to plan, develop, and implement more "traditional" highway, pedestrian, and bicycle projects.

As a result, rail often is not viewed as a normal component of a state or MPO transportation planning program, making it more difficult for potential improvement projects to be included in discussions of statewide or regional transportation priorities or to compete for funds and planning resources. The limited integration of rail issues into this process, combined with the limited flexibility in how state and Federal transportation funds can be used, results in unbalanced investment in the transportation system. In fact, in 1998, state and Federal expenditures on highways were 33 times greater than their expenditures on passenger rail and freight rail: the public sector invested $108 billion in highways, $11 billion in transit, $9 billion in airways and airport, but just $3 billion in the nation's rail system, which was split between passenger and freight rail.[1]

Better understanding and quantifying the potential public benefits of passenger and freight rail investments may allow public sector transportation agencies to target their investments more effectively across the entire transportation system. In addition, it may allow these agencies to allocate transportation resources in proportion with overall system needs and potential benefits.

The Northeastern states should ensure that rail issues are more effectively mainstreamed within their existing transportation planning and programming processes. There are

[1] AASHTO, *Freight Rail Bottom Line Report*, 2003.

many specific strategies that can be employed by the states to guide this integration, including designating a rail point-of-contact (if one already does not exist); and actively engaging the region's railroads in the planning and programming process; or developing private sector "advisory committees" to identify rail needs and discuss potential solutions. Through identification and sharing of best practices, sponsorship of rail planning forums or peer exchanges, or other strategies, the I-95 Coalition should assist the Northeastern states in more effectively mainstreaming rail issues within existing planning and programming processes. In addition, the Coalition should consider investing in detailed commodity flow data and regional economic impact tools and models that can be used by the Coalition and its member agencies to more effectively quantify and articulate the public benefits of rail investments.

Work cooperatively as a region to more specifically identify and address key rail chokepoints.

This Phase I report has identified and described the infrastructure and operational chokepoints and issues that can impede high volumes of rail freight and/or passenger traffic into, out of, through, and within the region; restrict service to major facilities, markets, and metropolitan areas; and generally prevent the rail system from adequately serving growing and evolving passenger and freight mobility needs. Phase II of the NEROps study will provide a more detailed understanding of the location, type, severity, and impacts of these chokepoints and issues is required before specific actions can be undertaken to alleviate them. The environmental impact statement (EIS) prepared for the proposed Cross-Harbor Tunnel in New York provides an example of an approach to assess freight demand that could be replicated for the next phase of the NEROps study.[2]

During Phase II, the Northeastern states, working with the railroads, the I-95 Corridor Coalition, and other regional stakeholders, should build upon the work completed in this study by better quantifying how the physical, operational, and institutional issues and constraints described in this report affect regional rail operations and the mobility of both passengers and goods. This would be accomplished by conducting a detailed commodity flow and passenger analysis so as to better identify strategic traffic lanes within the Northeast region and the flow of both people and goods along those lanes. This analysis should highlight how the chokepoints, hot spots, constraints, and issues identified within this report impact the movement of people and goods and the potential for additional or different types of traffic along these lanes.

Each physical and operational chokepoint/issue should be assessed based on its relative impact on the physical track where it is located, on the traffic lane in which it is situated, and on its impact on the regional rail network as a whole. In particular, Phase II of the NEROps study should investigate the potential for increased shared use of rail infrastructure by passengers and freight to maximize the efficiency of the system for passengers and freight.

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[2] Cross Harbor Freight Movement Project EIS, available at www.crossharborstudy.com.

The states, again working with the railroads and the I-95 Corridor Coalition, should then work toward developing a consensus-based list of potential regional rail improvements. This list should be prioritized and transformed into a comprehensive regional rail improvement program. This would entail several specific steps, including:

- **Developing a better understanding of existing and planned rail improvements.** Several states and railroads have recently implemented improvements to their lines or have committed to plans that incorporate railroad upgrades. Examples include CSX, which is making improvements to its River Line in New York; Amtrak, which is replacing strategic bridges in Connecticut; Rhode Island, whose Freight Rail Improvement Project is now complete; and others. These projects should be placed into a regional context so as to allow for a more comprehensive understanding of the impact that these projects will have on critical travel lanes. In so doing, it will be possible to determine if these upgrades will have an effect on an entire corridor or simply on a surrounding area.

- **Identifying gaps where further investment would improve regional operations.** The detailed commodity flow and passenger analysis should be compared and contrasted to the existing and planned rail improvements in the region. This would facilitate the development of a gap analysis in order to identify key points on the railroad network or critical travel lanes where improvements would be most beneficial to regional rail operations. This gap analysis would serve as a basis for the development of any regionwide plans designed to address the improvement of regionwide rail operations.

- **Listing and prioritizing regional rail improvements and evaluating estimated costs and potential benefits of the program.** The gap analysis should be utilized as a base map with which to approach regional stakeholders in order to develop a consensus-based list of potential regional rail improvements. The list of improvements should be ranked and prioritized, creating a comprehensive regional rail improvement program. The ranking and prioritization should again incorporate stakeholder input so as to produce a program that addresses the needs and desires of as many railroad users as possible.

- **Identifying potential institutional mechanisms that could be used to finance and implement a regional rail improvement program.** During Phase II of the NEROps study, the I-95 Corridor Coalition should build on ongoing efforts to identify potential multistate financing mechanisms for projects with multistate benefits. The NEROps Phase II report should include a matrix or toolbox of potential mechanisms that could be used by states with differing regulatory and institutional frameworks.

Develop and apply methods to better quantify public benefits of rail investments.

One of the significant challenges faced by states in the Northeast region and nationally is how to best quantify the public benefits of rail investments. The inability to quantify and articulate the public benefits of rail investments, particularly freight rail investments, makes it difficult to justify allocating scarce transportation resources to rail improvements. However, the AASHTO Freight Rail Bottom Line Report and other efforts have shown that public investment in the rail system can result in significant public benefits, in the

form of decreased congestion on the highway system, improved reliability for passengers and shippers, and improved air and water quality. The I-95 Corridor Coalition has worked to develop and refine methods to quantify the public benefits of rail investments.

As described above, the Coalition should consider investing in detailed commodity flow data and regional economic impact tools and models that can be used to quantify the public benefits of rail investments. The Northeastern states should work closely with the Coalition to utilize these tools and models, as well as existing methods, to quantify and articulate public benefits. This would have two important benefits. First, it would allow the Northeastern states to better assess tradeoffs of different transportation investments, allowing them to better target scarce transportation resources to projects that best fit their mobility needs. Secondly, it would enhance the ability of these states in developing high-level advocates for conducting rail planning activities and investing in the regional rail system.

Actively participate in developing and refining approaches to address amtrak issues in the region.

As discussed earlier, both the existing Federal administration and the Congress have developed a number of Amtrak reform proposals and legislation in recent years. These proposed changes, which could alter Amtrak funding levels, oversight, and operations, would inordinately impact the transportation landscape in the Northeast region, as Amtrak is a crucial partner for the commuter rail agencies operating in Southern New England and New York and Amtrak services represent one of few modal options for travelers accessing upstate New York and Northern New England. Of particular concern in the Northeast region is the Amtrak proposal that would require states to cover all operating deficits on corridor operations outside of the NEC and on all long-distance services. This proposal, if adopted, could result in the reduction or even elimination of passenger rail services in some parts of the region, further limiting the modal options in many areas.

In addition, there have been a number of policy discussions related to the future ownership and operation of the Northeast Corridor. Proposals, which range from temporary suspension or termination of Amtrak services along the NEC to increases in NEC access fees, would have significant, immediate impacts on freight and passenger rail service in the Northeast. The Northeastern states have a clear stake in the future of Amtrak and should work closely with each other and their congressional delegations to actively participate in Amtrak policy discussions.