



BOSTON REGION FREIGHT STUDY

A Report of the
Boston Region
Metropolitan
Planning Organization



Boston Region Freight Study

Project Manager

William A. Moore, P.E.

Project Principal

Karl Quackenbush

Authors

Anne McGahan

William A. Moore, P.E.

Contributing Staff

Thomas J. Humphrey

Bill Kuttner

Maureen Kelly

David Kruse

Efi Pagitsas

Geographic Information Systems

Kathy Jacob

Graphics

Kenneth A. Dumas

Maciej Citowicki

Kate Parker-O'Toole

Cover Design

Kate Parker-O'Toole

Photography

Kenneth A. Dumas

The preparation of this document was supported by Massachusetts Highway Department SPR contract #39687 and Massport Agreement #G-2924.

Central Transportation Planning Staff

Directed by the **Boston Region Metropolitan Planning Organization**. The MPO is composed of state and regional agencies and authorities, and local governments.

April 2007

Table of Contents

List of Figures and Tables	iii
Executive Summary	v
1 Introduction	1
2 Overview of the Region's Freight Movement and Key Facilities; Non-Mode-Specific Issues	3
3 Truck Freight	9
4 Maritime Freight	43
5 Rail Freight	59
6 Air Freight	77
7 Freight Planning by Other MPOs, Public-Private Partnerships, and the Private Sector	85
8 Issues Perceived by Stakeholders but Outside the MPO's Purview	91
Endnotes	99
Sources	101
Appendix 1: Stakeholder Interviewees List	105
Appendix 2: Posted Bridges in Massachusetts	107
Appendix 3: Bridges to be Rebuilt in the MPO Region, 2006–2010	123

List of Figures and Tables

Figures

1.	Massachusetts Intermodal Freight Facilities	7
2.	U.S. Domestic Freight-Truck Traffic	21
3.	FHWA Scheme F Vehicle Classification	23
4.	Boston Region MPO Area Municipalities and Regional Transportation Corridors	25
5.	Major Highways in Massachusetts	27
6.	Functional Classification of Major Roads in Massachusetts	29
7.	National Highway System Routes	31
8.	Roadways with Posted Bridges	33
9.	Population, VMT, & Roadway Mileage Growth, 1980–2000	15
10.	Volume-to-Capacity Ratios and Daily Traffic Volumes on Boston Area Expressways, 1970–2000	35
11.	2005 Estimated Volume-to-Capacity Ratios on Major Roads in Massachusetts	37
12.	Lane-Departure Crashes on Numbered Routes Summed by Half-Mile Sections, 1996–2001	39
13.	LDWS Warning Thresholds and Warning Threshold Placement Zones	41
14.	Massachusetts Seaports	55
15.	Harbor Reference Guide	57
16.	Rail Ownership on Active Lines	69
17.	Freight Operators on Active Rail Lines	71
18.	U.S. Domestic Rail Freight, Year 2000	73
19.	Rail Freight Operations with Vertical Clearances under Bridges	75
20.	Rail Intermodal Car Types	65
21.	Massachusetts Airports	81
22.	Air Cargo Flow Chart	83

Tables

1.	Massachusetts Freight Movement	4
2.	Massachusetts Intermodal Freight Facilities	5
3.	Public Roadway Ownership and Maintenance Responsibilities	11
4.	Highway Bridge Jurisdiction (2004)	13
5.	Highway Bridge Condition Ratings	14
6.	Top 60 Crash Locations on Arterial Roadways, 1997–1999	17
7.	Logan Airport Cargo Handled in 2004 (Tons)	77
8.	Massachusetts Commercial Service Airport Enplanements (2000)	78

Executive Summary

INTRODUCTION

The purpose of this study is to assemble a primer on freight in the MPO region. The main components of this primer are:

- An inventory of the freight transportation infrastructure and operations in the Boston Region Metropolitan Planning Organization area
- Descriptions of the existing and projected movements of freight in the area
- Lists of freight transportation issues perceived by stakeholders and possibly within the purview of the MPO

This executive summary, after giving some general background on the subject of freight transportation, highlights the study's inventories of infrastructure and operations and of perceived issues. An overview of movements of freight may be found in chapter 2.

BACKGROUND

The ability to efficiently move goods within the region requires suitable infrastructure, operations, and policies. Impediments to movement in any of those spheres can increase the cost of and timeframe for delivery of goods and thus impact the economy.

For the most part, the movement of freight is carried out by the private sector, using both public and private infrastructure. The two major determinants of how any given goods are shipped are transportation cost and travel time. Reliability of on-time arrival is also a factor.

Each freight mode offers advantages and disadvantages in terms of cost, speed, and reliability. Air is the fastest and most reliable and is generally used for the lowest-weight, highest-value, and most time-sensitive cargo. Trucks can move freight quickly and reliably and can carry cargo ranging widely in weight and value. Rail intermodal can be competitive with trucks over the longer distances in terms of both time and money. Rail carload and water transportation are slower and generally used for the highest-weight, lowest-value, and least time-sensitive cargo.

Nationally, the average freight trip lengths by mode are:

Air: 1,070 miles	Water: 511 miles
Rail: 617 miles	Truck: 247 miles

MPO-AREA FREIGHT TRANSPORTATION INFRASTRUCTURE AND OPERATIONS

Freight customers in the MPO area are served by all four freight modes. Generally, goods are distributed in the MPO area over a multimodal network.

Truck

Of the freight transported in Massachusetts, trucks move 94%, and indeed most freight entering the MPO area arrives by truck. Most of this freight travels on the interstate highway system and other roadways directly to its final destination.

Much of the truck freight entering the MPO area comes from the Ports of New York and New Jersey. An alternate mode of freight delivery from the New York/New Jersey area is directly out of those ports by rail to Worcester and Beacon Park Yards in Allston, where it is transferred to truck and distributed in the MPO area.

In addition, a large amount of freight that is delivered to the MPO area enters the United States via the Ports of Los Angeles and Long Beach. After it is unloaded from container ships, it comes east by truck or rail.

Water

Waterborne freight is shipped directly into the Ports of Boston, Salem, and Gloucester, off-loaded, and delivered throughout the MPO region, mainly by truck. If its destination is outside the region, it may either be delivered via truck or be transferred to CSX rail at Beacon Park Yards in Allston or at Worcester. Maritime freight is also trucked to Ayer, Massachusetts, to be transferred for movement by rail on Pan Am. At the present time, there are no operating rail lines providing direct service to the Ports of Boston, Salem, or Gloucester. Rail connections are six miles away for Boston and one mile away for both Salem and Gloucester.

Rail

By rail, freight travels to the MPO area by either the CSX or Pan Am Railways (formerly Guilford Rail System) rail line and is then delivered to its final destination by truck. As mentioned, much freight from the Port of New York/New Jersey travels by rail to Worcester and Beacon Park Yards. In the MPO region, bridge heights prevent the movement of double-stack railcars. Some goods arriving at Logan International Airport and Hanscom Field in Bedford are transferred by truck to CSX or Pan Am Railways for delivery outside the region. Freight movement by rail in the region and linking to other regions is also provided by Bay Colony Railroad in southeastern Massachusetts and Fore River Transportation in Quincy on fixed or dedicated routes.

Air

Freight shipped into the MPO area by air arrives at either Logan International Airport or Hanscom Field in Bedford. It is then transferred to truck either to be shipped to its final destination or to be again transferred to the CSX or Pan Am rail line. Currently, there are no operating rail lines providing service directly to Logan or Hanscom.

ISSUES PERCEIVED BY STAKEHOLDERS AND POSSIBLY IN THE MPO'S PURVIEW¹

The following descriptions of issues perceived by stakeholders are based on interviews with individuals affiliated with owners and operators of freight transportation facilities and services and with users of freight transportation. The following are the views of the individuals interviewed.

Truck Freight

- **Roadway congestion:** Traffic congestion is a major concern; it increases shipping time and makes deliveries unpredictable, diminishing productivity and profitability.
- **Safety:** Arterial roadway, lane-departure, and rollover crashes are of concern. The trucking industry is promoting improvements to roadway design, safety improvements, and dedicated truck lanes.
- **Bridge weight capacity:** Closed and weight-restricted bridges sometimes require long detours, resulting in increased shipping costs and reduced efficiency.
- **Truck parking:** More off-road truck-parking facilities are needed that allow truckers to pull off the road to check their vehicles and/or sleep.
- **Tandem trailer storage:** There is only one location along the Massachusetts Turnpike (Interstate 90) where tandem trailers can be stored during the times they are not allowed to operate. It is located on the turnpike at Exit 6 near Springfield, Massachusetts. A similar location closer to the MPO region would be beneficial to truck freight operations.
- **Dedicated truck lanes on interstate highways:** The creation of these lanes would reduce auto/truck crashes, improve safety and travel time, and reduce congestion.
- **Improved access to intermodal and roll-on/roll-off shipping facilities:** Better roadway access to port and rail facilities would reduce both shipping time and costs.

¹ Issues perceived by stakeholders but outside the MPO's purview are presented in chapter 8.

Waterborne Freight

- “The last mile”: Massachusetts’s seaports, like most other older seaports, have difficulty moving freight between their facility and major highways. Interposed are districts of local or residential streets.
- Lack of rail service to most port facilities: Freight trains are not currently directly accessing the Port of Boston at Conley Terminal, Moran Terminal, or Charlestown. Direct service to the ports should be provided.
- Overweight-truck routes: There is a need for more overweight-truck routes in the Port of Boston area.
- Dredging: The channel into the Port of Boston is currently dredged to a depth of 40 feet but needs to be at least 45 feet deep in order to accommodate ships of deeper draft, such as those currently servicing the Ports of New York and New Jersey. Massport is pursuing a permit for this dredging.

Rail Freight

- Double-stack: Expanded double-stack capability should be pursued; it is necessary in order for the Port of Boston to be competitive in the future with the “super ports.”
- Weight-restricted bridges: A number of rail bridges in the region cannot carry the full 286,000 pounds per train carload. This should be remedied. Also, on a segment of rail line between the Grand Junction and Allston, the ties need upgrading.
- Improving grade crossing safety: Though grade crossing collisions have declined, they are still a concern.

Air Freight

Of the issues related to the air freight industry raised by the stakeholders interviewed, none are believed to be within the MPO’s purview.

Non-Mode-Specific

- Four-mode freight centers: The region should have more intermodal freight centers that are accessible to all modes of freight.
- Broader-scoped freight planning: Joint freight planning among contiguous MPOs is desirable.

1 Introduction

The purpose of this study is to assemble a primer on freight in the MPO region. The main components of this primer are:

- An inventory of the freight transportation infrastructure and operations in the Boston Region Metropolitan Planning Organization area
- Descriptions of the existing and projected movements of freight in the area
- Lists of freight transportation issues perceived by stakeholders and possibly within the purview of the MPO

The descriptions of issues perceived by stakeholders are based on interviews with individuals affiliated with owners and operators of freight transportation facilities and services and with users of freight transportation. The individuals who were interviewed and their affiliations are listed in Appendix 1.

This report's organization of the material bulleted above and of additional material is outlined later in this introduction.

BACKGROUND

A key component of a vibrant economy for the Boston Region Metropolitan Planning Organization (MPO) area is the ability to efficiently move goods within the region. That ability requires suitable infrastructure, operations, and policies. Impediments to movement in any of those spheres can increase the cost of delivery of goods and impact the economy.

For the most part, the movement of freight is carried out by the private sector, using both public and private infrastructure. The two major determinants of how any given goods are shipped are transportation cost and travel time. Private freight customers make the choice of which mode—truck, rail, water, or air—is best able to deliver their cargo within their required timeframe for a reasonable price. Reliability of on-time arrival is also a factor.

Each freight mode offers advantages and disadvantages in terms of cost, speed, and reliability. Air is the fastest and most reliable and is generally used for the lowest-weight, highest-value, and most time-sensitive cargo; much cargo that is time-sensitive is so because it is perishable. Trucks can move freight quickly and reliably and can carry cargo ranging widely in weight and value. Rail intermodal can be competitive with trucks over the longer distances in terms of both time and money. Rail carload and water transportation are slower and generally used for the highest-weight, lowest-value, and least time-sensitive cargo.

Nationally, the average freight trip lengths by mode are:

Air: 1,070 miles	Water: 511 miles
Rail: 617 miles	Truck: 247 miles

ORGANIZATION OF THIS REPORT

Chapter 2 gives an overview of primary paths of freight movement to and within the MPO region, of key freight infrastructure, and of current and projected quantities of freight transported. It also lists non-mode-specific issues perceived by stakeholders and possibly within the purview of the MPO.

Chapters 3 through 6 address truck, waterborne, rail, and air freight transportation, respectively. They inventory the infrastructure and operations and list issues perceived by stakeholders and potentially within the purview of the MPO. Information on current and anticipated freight movements and types of freight moved is generally presented in the context of the information on infrastructure and operations. However, in the rail chapter it is also summarized in a brief overview section. Other material provided in chapters 3 through 6 is historical background and information on logistics.

Chapter 7 discusses what other MPOs around the country are doing in freight transportation planning. It also describes federal regulations and programs pertinent to such planning.

Chapter 8 presents issues perceived by stakeholders but lying outside the purview of the MPO.

STUDY METHODS

The primary methods used in this study were stakeholder interviews, document searches, Internet research, and literature reviews. The report itself is a summary of information gathered via these interviews and reviews, supplemented with pertinent data derived from the document searches.

2 Overview of the Region's Freight Movement and Key Facilities; Non-Mode-Specific Issues

The MPO area freight story can be summarized by saying that most goods manufactured outside of the MPO region and delivered to the region come by one of the following methods:

- By truck directly from almost anywhere on the continent to their final destination in the MPO region (or elsewhere in Massachusetts)
- From the Port of New York/New Jersey:
 - By truck to their final destination in the MPO region (or elsewhere in Massachusetts) or
 - By single-stack rail to the Port of Worcester or to Beacon Park Yards in Allston; then transferred to truck for transport directly to their final destination in the MPO region (or elsewhere in Massachusetts)
- By ship to the Port of Boston
 - Delivered by truck to their final destination in the MPO region or elsewhere in Massachusetts (the port has relatively easy access to Interstates 90 and 93 via the South Boston Haul Road) or
 - Delivered by truck to Beacon Park Yards in Allston or to the intermodal facility in Ayer, for intermodal, rail, or truck delivery to their final Massachusetts destination
- From the Port of Los Angeles/Long Beach
 - By double-stack rail to Syracuse, New York, for destacking into single-stack rail cars for delivery to the Port of Worcester or to Beacon Park Yards in Allston; then loaded onto trucks for delivery to their final destination
 - By truck for the entire trip from the Port of Los Angeles/Long Beach
- By air to Logan International Airport, delivered by truck to their final destination in the MPO region (or elsewhere in Massachusetts)

Table 1 shows the amount of freight delivered by highway, water, rail, and air to Massachusetts in 1998 and projected to be delivered in 2010 and 2020. Highway, or truck, is by far the dominant mode. Its current share (arrived at by interpolating between the 1998 and 2010 figures) is approximately 94%.

Figure 1 shows the routes and locations of the major highways and rail lines that connect the intermodal rail and water freight facilities and airports serving the Boston Region

**TABLE 1
Massachusetts Freight Movement**

Mode	Tons (millions)			Value in Dollars (billions)		
	1998	2010	2020	1998	2010	2020
Air	<1	<1	1	28	66	114
Highway	162	222	268	122	222	355
Rail	14	20	25	8	12	19
Water	14	21	24	2	4	7
Other	8	11	14	1	3	5
State Total	199	274	332	161	307	499
By Destination Market						
Domestic	179	245	293	138	255	403
International	20	30	39	23	53	96

Source: Federal Highway Administration

MPO area. Table 2 lists the commonwealth's busiest intermodal freight facilities and indicates the modes accommodated by them.

NON-MODE-SPECIFIC ISSUES PERCEIVED BY STAKEHOLDERS AND POTENTIALLY IN THE MPO'S PURVIEW

Descriptions of issues perceived by stakeholders were compiled based on interviews with individuals affiliated with owners and operators of freight transportation facilities and services and with users of freight transportation. Perceived issues that are related to truck, water, rail, and air freight transportation and may be of interest to the MPO are presented in the following four chapters, respectively, which address those modes. The non-mode-specific issues perceived by stakeholders and possibly of interest to the MPO are presented below. The following are descriptions of the views of the individuals interviewed (all interviewees for this study are listed in Appendix 1).

Four-Mode Freight Centers

The region should have more intermodal freight centers that are accessible to all four modes of freight. An example of this would be created by providing rail access to the Port of Boston: doing this would make the new intermodal freight centers being constructed in the South Boston Marine Industrial Park practically accessible by water, rail, and truck, with air being connected by a short ride through the Ted Williams Tunnel.

Broader-Scoped Freight Planning

Joint freight planning among contiguous MPOs is desirable.

TABLE 2
Massachusetts Intermodal Freight Facilities

Facility	Modes Accommodated
Massport Conley Terminal	Water / Truck
Boston Autoport	Water / Rail / Truck
New Bedford / Fairhaven Harbor	Water / Truck
Fall River Harbor	Water / Rail / Truck
Salem Harbor	Water / Rail / Truck
Route 1A / Chelsea Creek Petroleum Terminals	Water / Truck
Weymouth Fore River	Water / Truck
Woods Hole MV&N Steamship Terminal	Water / Truck
Hyannis MV&N Steamship Terminal	Water / Truck
Vineyard Haven MV&N Steamship Terminal	Water / Truck
Nantucket MV&N Steamship Terminal	Water / Truck
Worcester Municipal Airport	Air / Truck
New Bedford Municipal Airport	Air / Truck
Barnstable Municipal Airport	Air / Truck
Nantucket Memorial Airport	Air / Truck
Logan International Airport	Air / Truck
Westover Metropolitan Airport	Air / Truck
Barnes Municipal Airport	Air / Truck
Hanscom Field	Air / Truck
Martha's Vineyard Airport	Air / Truck
Worcester P&W Railroad Wiser Avenue Yard	Rail / Truck
Ayer B&M Railroad Auto Yard	Rail / Truck
West Springfield CSX Yard	Rail / Truck
Devens Intermodal Rail Terminal	Rail / Truck
Beacon Park CSX Railroad Yard	Rail / Truck
Worcester P&W Railroad Southbridge Street Yard	Rail / Truck
Worcester TVT CSX Yard	Rail / Truck
Westborough CSX Auto Yard	Rail / Truck
Palmer Intermodal Terminal	Rail / Truck

Source: Massachusetts Office of Transportation Planning

FIGURE 1
Massachusetts Intermodal Freight Facilities



