Central Massachusetts Metropolitan Planning Organization

REGIONAL TRANSPORTATION PLAN 2012

Multimodal - Intermodal

CMMPO

Prepared by the Staff of the Central Massachusetts Regional Planning Commission

CMRPC

Central Massachusetts
Metropolitan Planning Organization
Endorsement Sheet

2012 Regional Transportation Plan
&
Air Quality Conformity Determination

In accordance with 23 CFR Part 450 Section 322 (Metropolitan transportation planning process: Transportation Plan) of the February 14, 2007 Final Rules for Statewide and Metropolitan Planning, the Committee of Signatories representing the Central Massachusetts Metropolitan Planning Organization (CMMPO) hereby endorses the 2012 Regional Transportation Plan (RTP). The 2007 RTP has been endorsed at a meeting held by the CMMPO on August 24, 2011.

Also

In accordance with Section 176(c) (4) of the Clean Air Act as amended in 1990 [42 U.S.C. 7251 (a)], the CMMPO has completed its review and hereby certifies that implementation of the CMMPO 2012 Regional Transportation Plan satisfies the conformity criteria specified in both 40 CFR Parts 51 and 93 (August 15, 1997) and 310 CMR 60.03 (December 30, 1994); furthermore this RTP includes all regionally-significant transportation projects contained in the CMMPO Endorsed 2012-2015 Transportation Improvement Program (TIP). The projects in the TIP are of the same design and concept that were analyzed in the RTP. Both the CMMPO's 2012 RTP and the 2012-2015 TIP are consistent with the air quality goals of, and in conformity with, the Massachusetts State Implementation Plan.

Central Massachusetts Metropolitan Planning Organization Endorsement Sheet

CMMPO Committee of Signatories

X I concur
__ I do not concur
____________ Date 24 Aug 11
Jeffrey B. Mullan, Secretary of Transportation, MassDOT

✓ I concur
__ I do not concur
____________ Date 8-24-11
Francis DePaola, Acting Administrator, MassDOT - Highway

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Otto Lies, Chairperson, CMRPC

✓ I concur
__ I do not concur
Stephen O'Neil Date 8.24.11
Stephen O'Neil, Chairperson, WRTA

__ I concur
__ I do not concur
____________ Date________
Michael O'Brien, Worcester City Manager

✓ I concur
__ I do not concur
Edith M. Morgan Date 8-24-11
Edith Morgan, Representative, North Subregion

__ I concur
__ I do not concur
____________ Date________
Maurice DePalo, Representative, Northeast Subregion

__ I concur
__ I do not concur
____________ Date________
John Hebert, Representative, Southeast Subregion

✓ I concur
__ I do not concur
____________ Date 8-24-11
Dennis Lamarche, Representative, Southwest Subregion

✓ I concur
__ I do not concur
David Delanski Date 8/24/11
David Delanski, Representative, West Subregion

Central Massachusetts Metropolitan Planning Organization

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2. **Paul F. Maloney, P.E.,** FHWA
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1. **Marie Angelini,** P&W Railroad
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15. **Ann Sullivan,** MassDOT-H District 3
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Additional Photo Credits: Cover, bridge in Warren, Barbara L. Hale; Chapter III divider, P&W train, Nick Palazini;
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INTRODUCTION

I

I. INTRODUCTION

A. DOCUMENT OVERVIEW AND REQUIREMENTS

A.1 Regional Transportation Plan Overview

The 2012 Regional Transportation Plan (RTP) document addresses each of the major modes of transportation within the Central Massachusetts planning region (Figure I-1). It is considered both a *multimodal* and an *intermodal* document. The RTP provides an inventory of the major modes, identifies challenges & needs, and also provides a series of recommendations. Project-specific, major transportation improvements need to be reflected in the RTP in order to be eligible for federal-aid funding through the region's Transportation Improvement Program (TIP).

Throughout the development of the RTP, a strong effort is made to involve the general public, including those representing minority and low-income populations, state & local officials and various transportation providers. The development of the 2012 RTP document also included outreach to a number of the region's modal experts and stakeholders.

The FHWA and FTA have provided additional guidance in the new focus areas of Climate Change and Livability. Materials reflecting the themes and intent of these areas are included in the Environmental chapter, and as needed throughout. Statewide planning and policy initiatives are also included throughout and reflected as is pertinent in the themes and content of this document.

The major goal of this effort is the continued development of an integrated, intermodal transportation system that facilitates the efficient movement of people and goods throughout the region.

A.2 SAFETEA-LU Requirement for a Regional Transportation Plan

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) is the national transportation legislation that authorized the Federal surface transportation funding programs for highways, highway safety, and transit for the 5-year period 2005-2009. It has since been extended several times while new authorizing legislation waits for proper consideration. SAFETEA-LU reiterated the long-standing requirement for the preparation of a Regional Transportation Plan (RTP) document every four years within regions defined as Transportation Management Areas (TMAs).

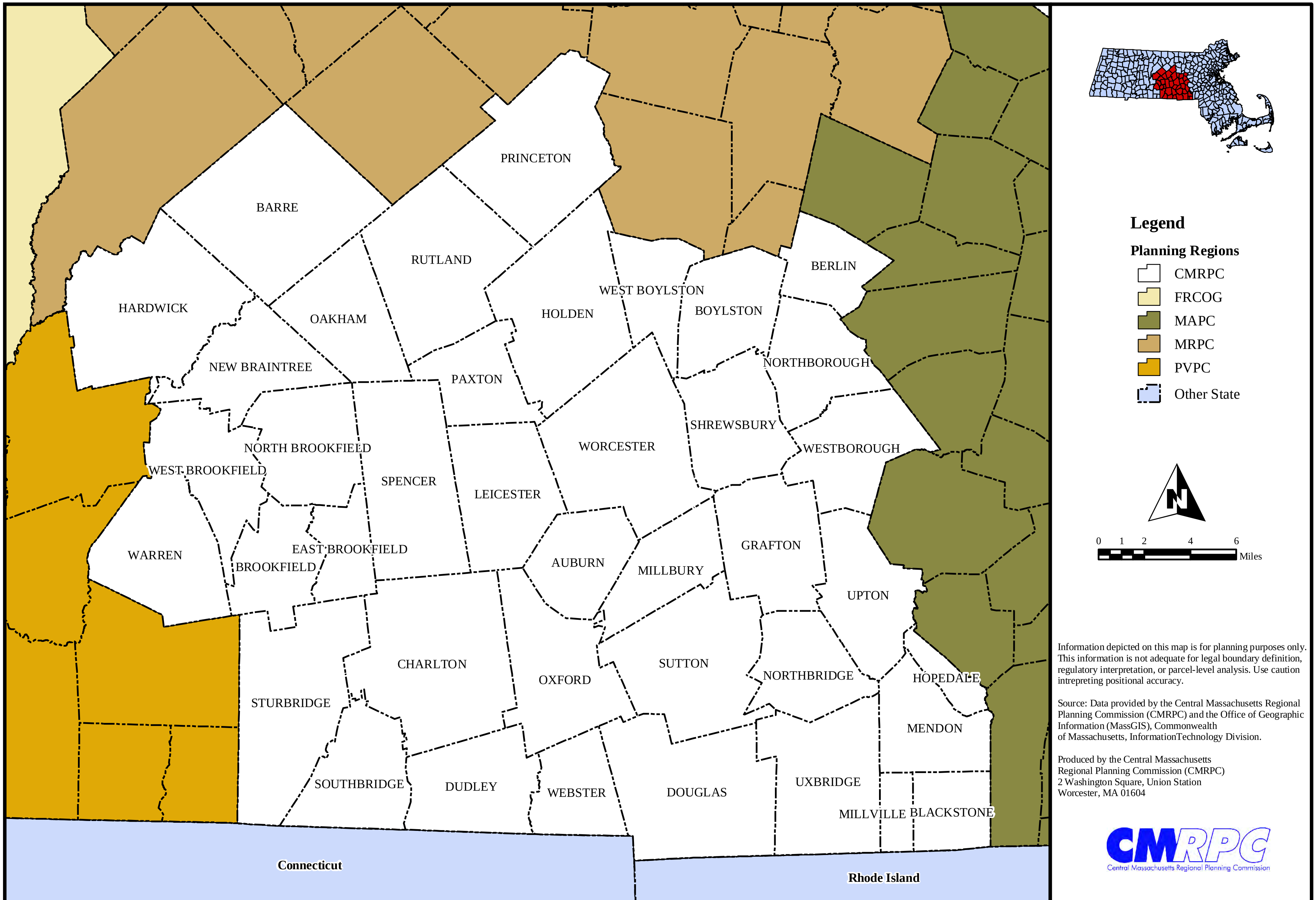


Figure I-1 The Central Massachusetts Regional Planning Commission Municipalities

B. SCOPE OF THE PLANNING PROCESS

B.1 SAFETEA-LU Requirements

The implementing regulations for the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) state that the planning process it authorizes and requires shall be continuous, cooperative and comprehensive. Transportation planning in the region is conducted in this manner. It addresses required planning factors described below in its consideration and implementation of projects, strategies and transportation services. This plan considers these factors in its formulation of goals and objectives.

B.2 Factors That Are Addressed in Planning Activities

(1) Support the *economic vitality* of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency;

(2) Increase the *safety* of the transportation system for motorized and non-motorized users;

(3) Increase the *security* of the transportation system for motorized and non- motorized users;

(4) Increase the accessibility and mobility of people and freight;

(5) Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns;

(6) Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;

(7) Promote efficient system management and operation; and

(8) Emphasize the preservation of the existing transportation system.

Listed below are some examples of how the document addresses these factors and uses their principles and intent in its themes, demonstrations and discussions.

- The RTP's regional thrust – dealing effectively with a central city surrounded by many smaller towns – enhances regional economic vitality by giving proper importance to the key central region's concerns while keeping the needs and strengths of the ring towns and outer suburbs in view and in perspective. Each of the identified Major Infrastructure projects within financial constraint was carefully chosen due in large part to its significance to economic vitality, as evidenced by their location along the region's primary economic corridor. (1)

- System safety and security are enhanced by the continuing inclusion of separate chapter work (Chapters V and VI). Additionally, railroad grade crossing lists, mapping of key area crash locations, and similar inventories lend the ability to focus efforts on the proper locations. Past safety and security analyses and the identification of needs are included. (2,3)

- Freight mobility and productivity are enhanced by the RTP's ongoing freight planning detail (Chapter III-D). This information is used as a resource by many in the region in order to realize the big picture as well as for various carrier and transload location details. Regional freight rail gatherings also keep stakeholders regionally informed and provide them opportunities for growth and coordination. (4)

- The Plan promotes energy conservation and quality of life issues via its new standalone Environmental chapter (Chapter IV), which addresses global warming and climate change as well as livability topics. Additionally, comprehensive bike and trail materials (Chapter III-E) assist those interested in maintaining health and quality of life via outdoor travel activities. (5)

- The comprehensive public transit materials in the RTP (Chapter II-B) keep attention and focus on modal travel that is available to all people, and show how the region is working towards improved connectivity between all modes. Public outreach activities (reviewed in this Chapter) keep connectivity and intermodality in the forefront of MPO attention and concern. (6)

- Congestion Management Process studies described in the RTP promote efficient system management by locating and verifying inefficient/congested locations. The growing part that Intelligent Transportation Systems plays will also serve as a guide as we plan into the future. (7)

- The RTP emphasizes preservation by reviewing, evaluating and setting resource employment priorities, allocating the largest share of resources to pavement and other preservation activities (Chapter IX). Further refinement of pavement analysis techniques will continue into the future in order to optimize the preservation strategy. (8)

C. STATE EMPHASIS & PRIORITIES

C.1 State Policies and Initiatives Considered for Inclusion

In 2008, MassDOT launched the *youMove Massachusetts* planning and public outreach initiative, which engaged the public to develop a high-level statewide vision for transportation. Based on input received at public workshops across the Commonwealth and through an interactive website, ten core themes were developed for future planning, design, and operation of the transportation system. These ten themes are listed below along with additional descriptive text.

1) Improve Transportation System Reliability – *Consumers want a more reliable transportation system where delays are minimized and travel times are consistent.*
2) Focus More Attention on Maintaining Our Transportation System – *The Commonwealth's transportation assets need to be managed to extend their useful life and thereby maximize the benefits of past investments.*

3) Design Transportation Systems Better – *Transportation facilities and operations should be better informed by real-world conditions faced by system users.*
4) Encourage Shared Use of Infrastructure – *With so many different users competing for space, we must find better ways to share our roadways through engineering, education, and enforcement.*
5) Increase Capacity by Expanding Existing Facilities and Services – *Expansion of transportation capacity, both through the more efficient management of existing corridors and through new capital investments, is necessary to meet future transportation needs.*
6) Create a More User-Friendly Transportation System – *Consumers want a more user-friendly transportation system, where information is easier to access, and the travel experience is more comfortable and welcoming.*
7) Broaden the Transportation System to Serve More People – *The transportation network and transportation services should be broadened to serve more and different users in more locations.*
8) Provide Adequate Funding and Collect Revenue Equitably – *In an era when our transportation funding falls far below our needs, it is imperative that both new funds and new efficiencies be identified, and that the burdens placed on systems users is fair and appropriate.*
9) Minimize Environmental Impacts – *Make our transportation system environmentally sustainable.*
10) Improve Access to Our Transportation System – *People need more and better access to our transportation system.*

MassDOT's *youMove Massachusetts* themes were used as the basis for formulating public outreach plans, formats and suggestions. Public input was generated and evaluated in setting thematic goals and strategies for the Plan.

Additionally, MassDOT is moving forward with the development of a new and timely Statewide Strategic Transportation Plan. This new Strategic Transportation Plan will link the *youMove Massachusetts* themes with a rigorous, data-driven planning tool that can help MassDOT identify and prioritize its major initiatives across modes over the next decades. The Strategic Transportation Plan will also help to more fully clarify MassDOT policy positions on major issues and describe how those policies can inform the modal divisions' decision-making at all levels. Further, it will provide a blueprint and a resource for MPO members and for the general public to understand the project priorities and programmatic goals for the Commonwealth's transportation network, as well as help guide the development of future MPO Regional Transportation Plans.

C.2 Current MassDOT Initiatives

C.2.1 Capital Investment Plan

Among the requirements of recent transportation reform legislation in Massachusetts are those of Section 11 that requires MassDOT to prepare and publish a five-year capital investment plan beginning with the period of fiscal years 2011 through 2015. The following is a summary of the other major elements of Section 11:

- Every five calendar years, beginning not later than April 30, 2010, MassDOT must publish in the Massachusetts Register a comprehensive state transportation plan for the five succeeding years.

- The plan must ensure a safe, sound, and efficient public highway, road, and bridge system, to relieve congestion, reduce greenhouse gas emissions, and improve the quality of life in the Commonwealth by promoting economic development and employment.

- The plan must cost-effectively meet the transportation needs of all residents, including urban, suburban and rural populations.

- The plan must be based on objective engineering assessments of condition, safety, and service and provide for at least 5% of the annual estimated construction, reconstruction, and repair needs of the highways and bridges of the Commonwealth.

- The distribution of funds and projects in the plan must ensure that not less than 75% of the annual percentage of the total statewide collections of motor vehicle fuel tax generated by each MassDOT highway district is spent in the district where generated, except that the minimum percentage is 85% in any district in which the revenue generated by registered vehicles that have a Fast Lane transponder exceeds the average revenue generated by such vehicles statewide.

The first five-year investment plan was completed in September of 2010. Given current TIP/STIP development schedules, the first three years of this plan reflect decisions made in mid-late 2009, and reflect the priorities of the MPOs and the Commonwealth based upon information related to need, readiness, and available financial resources at that time. Programs and projects included in the Capital Investment Plan may themselves change as a result of the new FFY 2011-2014 STIP to be finalized by October 1, 2010. In addition to the programs and projects from the existing STIP, the capital investment plan also includes programmatic federal funding assumptions for FFYs 2014 and 2015. These years have not yet been programmed through the state and MPO processes and, as such, less specificity about project selection exists. It remains to be seen how, when and to what degree decisions made in the State capital planning process will affect and influence Regional Transportation Plans and the regional planning process itself.

C.2.2 GreenDOT Directive

On June 2, 2010, the Massachusetts Department of Transportation (MassDOT) launched the GreenDOT Policy Directive, a comprehensive environmental responsibility and sustainability initiative intended to make MassDOT a national leader in “greening” the state transportation system. MassDOT will promote sustainable economic development, protect the natural environment, and enhance the quality of life for all of the Commonwealth’s residents and visitors through the full range of its activities, from strategic planning to construction and system operations. This will enable MassDOT to use resources in a manner that serves its existing customers while preserving resources for future generations. GreenDOT will be driven by three primary goals: reduce greenhouse gas (GHG) emissions; promote the healthy transportation options of walking, bicycling, and public transit; and support smart growth development.

GreenDOT calls for MassDOT to incorporate sustainability into all of its activities, from strategic planning to project design and construction to system operation. The initiative includes greenhouse gas reduction targets mandated under the Global Warming Solutions Act.

The transportation sector generates more than one-third of the total greenhouse gas emissions produced in Massachusetts. GreenDOT sets a goal of reducing greenhouse gas emissions over 2 million tons by 2020, a reduction of about 7.3 percent below 1990 transportation sector emission levels. If left unchecked, 2020 transportation emissions would increase by 19.0 percent over 1990 levels. Instead, the GreenDOT initiative, combined with other state and federal government policies, is expected to reduce 2020 transportation emissions by almost 30 percent below this "business as usual" level.
The GreenDOT initiative will achieve the greenhouse gas reductions through a range of measures. In cooperation with regional planning agencies, MassDOT will set statewide greenhouse gas reduction targets, and meet these targets by balancing highway system expansion projects with other projects that support smart growth development and promote public transit, walking and bicycling. Examples include transit and rail projects, complete streets planning that includes bicycle and pedestrian accommodations, and investments in greener, more efficient fleet vehicles and renewable power.

D. REGIONAL GOALS & OBJECTIVES

D.1 CMMPO Guides Development of the RTP

Federally required, the RTP is developed through a cooperative effort of the Central Massachusetts Metropolitan Planning Organization (CMMPO). The CMMPO is the body that determines transportation policy and the priority of improvement projects in the Central Massachusetts planning region. Membership of the CMMPO is comprised of the CMRPC, the Worcester Regional Transit Authority (WRTA), the Massachusetts Department of Transportation (DOT) and its Highway Division, the Worcester city manager, and selectmen from each of five surrounding subregions. Lending direction to the compilation of the 2012 RTP document throughout the development process, the CMMPO, cognizant of the federal requirement to maintain financial constraint, worked to prioritize the region's competing transportation needs.

D.2 Regional Transportation Plan Vision

The 2007 CMMPO Regional Transportation Plan vision, largely continued intact for this current effort, follows:

The Central Massachusetts Metropolitan Planning Organization (CMMPO) believes that a safe, efficient, and well-maintained transportation system, along with prudent land use planning and economic development, is an essential component of sustainable public policy aimed at improving people's lives. The CMMPO envisions Central Massachusetts in 2030 as a region of 40 well-connected, livable communities with minimal traffic congestion and improved air quality. Alternative, creative transportation methods that integrate multiple travel modes through the use of technology will safely and efficiently move people between homes, jobs, and services and move products between places of manufacture and sale.

As part of this vision, the CMMPO Regional Transportation Plan (RTP) strives for social and geographic equity for the people of Central Massachusetts while identifying and planning for critical improvements to the region's transportation system. The CMMPO recognizes that funding limitations will continue to challenge the ability to expand and enhance transportation infrastructure and travel options while simultaneously maintaining the public investment in existing facilities and services. However, like other metropolitan areas across the nation, the CMMPO has developed this long-range plan to describe the desired future of transportation for the region as well as provide prioritized action items for achieving it.

D.3 CMMPO Emphasis and Priorities

With full consideration of state and federal requirements and emphasis areas, the CMMPO considered the following possible local priority areas at the beginning of the RTP planning process:

- Maintenance
- Equity
- Security
- Congestion
- Safety
- Access & Connectivity
- Livability
- Climate Change
- Planning
- Technology

Public and CMMPO Advisory Committee feedback indicated that maintenance, congestion, access & connectivity and livability were the most preferred areas to which attention and funding should be directed.

D.4 Goals & Objectives of the Transportation Planning Program

The following Goals and Objectives further define the desired future vision.

Goal I. *Attain a safer more secure & better-maintained transportation system across all modes and for all populations*

Objective I-A. Define and maintain acceptable conditions and optimal functionality of the region's transportation assets.

Objective I-B. Identify and improve critical locations of safety concern in order to achieve a reduction in the number of injuries and fatalities occurring as people and freight move throughout our region's transportation system.

Objective I-C. Utilize the management systems, travel demand model, and other regional data to identify and prioritize areas of need to better inform selection of projects.

Objective I-D. Continue to encourage coordination among transportation security agencies, expand on identified risks to transportation infrastructure, and prepare evacuation analyses for the region under various scenarios.

Goal II. Promote livable communities and improved air quality through context-sensitive design and reduced traffic congestion

Objective II-A. Improve and encourage the use of public transit, ridesharing services, and pedestrian and bicycle facilities so as to achieve a reduction in the percentage of commuter trips utilizing single-occupant vehicles (SOVs), as measured in the 2010 US Census Journey-to-Work data and American Community Survey annual data. Develop/assess alternative strategies to help reduce greenhouse gases (GHG) and that address issues of climate change.

Objective II-B. In conjunction with the MassDOT-Highway District Offices, assist communities that propose potential TIP projects with utilization of the Massachusetts Project Development and Design Guidebook, which outlines a multi-modal and context-sensitive approach to roadway design.

Objective II-C. Ensure consistency of recommended and implemented transportation improvement projects with local and statewide growth management and economic development plans by reviewing available planning documents and maintaining coordinated communication with community stakeholders throughout the development of major local land use projects and the CMMPO RTP and TIP.

Goal III. Develop an alternative, creative transportation system that integrates multiple travel modes and includes the use of technology

Objective III-A. Monitor the connectivity of the physical regional infrastructure within and across the regional planning boundary so that it can be better incorporated in the prioritization and selection of transportation improvement projects.

Objective III-B. Seek out appropriate uses of technology for improving the management of existing transportation infrastructure. Review all project proposals for appropriate technology consideration. Provide an ongoing forum for communication and coordination between appropriate transportation-related agencies in order to deploy the Central Massachusetts Regional ITS Architecture.

Goal IV. Maintain and improve the existing coordinated transportation planning process

Objective IV-A. Review and update, as needed, the CMMPO Public Participation Program to open up the transportation planning process and further respond to public concerns to encourage an increase in the number of people and communities that regularly participate.

Objective IV-B. Account for geographic equity by tracking the number of projects programmed and funding expended within each planning subregion and adjusting planning activities and project priorities as appropriate.

Objective IV-C. Review and update, as needed, the Memorandum of Understanding Relating to the Comprehensive, Continuing, Cooperative Transportation Planning and Programming Process for the Central Massachusetts Region to clarify and document the roles and responsibilities of the CMMPO and the CMMPO Advisory Committee.

Objective IV-D. Provide a forum at the planning level to coordinate system maintenance, operation, and management to improve the efficiency of the existing transportation system.

We note here in particular that Goal I is in alignment with the federal Highway Safety Improvement Program (HSIP) and the state's Strategic Highway Safety Plan (SHSP), and that Goal II is in alignment with federal and state Livability principles as fully described in Chapter IV.

E. PROACTIVE PUBLIC OUTREACH

E.1 CMMPO & Advisory Committee

E.1.1 CMMPO Meetings

The Central Massachusetts Metropolitan Planning Organization (CMMPO) is the region's transportation policy and programming body. As required by *SAFETEA-LU*, the CMMPO oversees the development and update of a Regional Transportation Plan document, every four years in the Central Massachusetts planning region.

The CMMPO discussed the development of the updated 2012 Regional Transportation Plan at nearly all their monthly meetings starting in March 2010 and continuing to the present. The CMMPO has ten voting members and major decisions often require a written summary of the action.

The regular meetings of the CMMPO were held at the offices of the Central Massachusetts Regional Planning Commission (CMRPC) in Worcester.

E.1.2 CMMPO Advisory Committee Meetings

The CMMPO Advisory Committee is a group founded by the CMMPO to provide input on a wide range of both technical and non-technical subjects. The Advisory Committee consists of a number of individuals from a variety of backgrounds with expertise in both transportation and transportation-related topics such as land use and conservation.

As directed by the CMMPO, the Advisory Committee discussed the development of the updated 2012 Regional Transportation Plan at nearly all their monthly meetings starting in March 2010 and continuing to the present. The Advisory Committee, often through general consensus, advanced a number of suggestions for consideration by the CMMPO throughout the 2012 RTP update effort. The group was particularly active in the confirmation of the RTP's classic transportation planning goals and the development of newly refined RTP objectives.

E.2 Subregional Public Meetings

Public outreach meetings for the RTP are traditionally held in different communities throughout the region. These meetings, depending on location, allow the CMMPO to gain urban, suburban and rural perspectives on local transportation challenges and potential improvement projects. For the preparation of the 2012 RTP document, public outreach meetings were held in the communities of Warren, Sutton, Shrewsbury, Oxford and Princeton, as well as in the city of Worcester, thus covering all of the area's subregions.

For detailed information concerning the subregional meetings - legal advertisements, public notices, agendas, minutes, attendance listings - please refer to the 2012 RTP's extensive *Technical Appendix*.

E.3 Public Input Summary

Listed below is a summary of the various comments received during the public outreach process. They are organized by individual meeting locations and dates. More detailed information is available in the Technical Appendix document. Finally, included below is an attempt to summarize comment received into broader general suggestions and concerns - concepts that were seen to be repeated in one form or another in many locations and with respect to several particular situations, local and regional. Section E.3.7 provides this overall summary of comments.

E.3.1 West Subregion: Shepard Municipal Building, Monday, June 7, 2010

Major Comment: Access Pike from envisioned Route 19 interchange
General Sentiment: Congestion on routes leading easterly to Worcester
Other Comments:

- A meeting attendee stated that he has commuted to Worcester every day for the past 10-12 years and the congestion on the roadways has increased significantly. There is a need to reduce congestion.
- People need to be made aware of alternative roads available. Another commenter noted that when one road backs up, others follow suit.
- High schools located on major routes are often high-traffic destinations that are one of the many reasons for slow travel times and congestion.
- The number of access points to the MassPike is limited. The once-considered idea of a MassPike interchange with Route 19 could be a major benefit to the community.
- Park & Ride lots are needed to serve WRTA Route #33 along Route 9.
- Concern about the general condition of local transportation infrastructure, including MassPike and other bridges that appear to be in bad condition. Bridges in the region are deteriorating too rapidly, and need to be repaired soon. Some are believed to be not very safe.
- Passenger rail line along the MassPike (I-90) corridor was suggested.
- Current improvement projects may not benefit local communities optimally in the future. New economic development can greatly affect the surrounding area and it is difficult to plan for that.
- Pavement is generally in bad condition, and that it should last longer than it appears to do. It was suggested to use shredded tire material in the pavement mix.
- There is a perceived need for improved north-south highway routes in the West Subregion.

E.3.2 Southeast Subregion: Sutton Municipal Center, Wednesday, June 16, 2010

Major Comment: Route 146/Boston Road issues, need for passenger rail
General Sentiment: Need to implement planned BRV Bikeway, like RI
Other Comments:

- Safety, congestion, and maintenance are major concerns
- Over the long term, the Route 146/Boston Road flyover is top priority (affects safety and congestion), then the Blackstone Valley Bikeway, then access roads for Route 146.
- Passenger rail between Providence and Worcester is important. Increased passenger rail would take more cars off of the road and decrease the need for maintenance. The development of planned commuter villages along train lines could connect people to work and other services so they wouldn't need a car unless they wanted one.
- Transit travel along Route 9 west into Worcester could be enhanced with designated parking for transit riders.
- Land Use and Transportation Planning need to be more coordinated:
    - There is a need for sidewalk/walkability planning in the development process, especially for school areas
    - The fee to ride school buses and the increase of available parking at schools has led to more traffic in school zones. This affects the pavement conditions and congestion (especially at beginning and end of school day) in proximity to schools. Instead of bus fees, charge parking fees and subsidize bus trips.
    - There is a need for appropriate siting for senior centers – i.e. walkable infrastructure and topography. It does not make sense to place senior centers in locations that are inaccessible except by vehicle.
    - There is a need for mixed-use zoning and planning. Current zoning prevents walkable communities.
    - Abandoned industrial buildings that grew up along freight lines could be converted to housing for commuter rail stop, transit-oriented communities.
- Route 146 is important as a connector from the state of Rhode Island to the city of Worcester and its importance in economic development in the Blackstone Valley. There is a need for increased affordable and accessible commuter bus trips between Worcester and Providence as well as public awareness of those services. There is a need for increased coordination between Massachusetts and Rhode Island to focus on the Worcester/Providence connection.
- The proposed changes to Boston Road/Route 146 interchange are not enough, and will result in funding poorly spent. All the work for the flyover should be done at once, instead of piecemeal.
- At the Route 146/Boston Road intersection, congestion on either side of Boston Road is amplified at peak travel time due to signal timing.
- Infrastructure maintenance is top priority. We cannot allow small problems to develop into large problems. The road network needs to be serviceable and easily maintained despite the economic climate.
- In terms of equity, the urban/rural distinction is grey now that highway, rail, bike, and bus have connected the two.
- Because the number of cars on the road is increasing, there is a need to focus on other modes of transportation. Increased freight rail between Worcester and Providence would reduce freight

truck traffic along Route 146. Need for more open discussion with freight stakeholders between Worcester and Providence.

- There needs to be greater equity across all modes of transportation, especially for bike. Bikeways in the Southeast subregion benefit economic development as they draw recreation and tourism. In areas where it makes sense, bikeways for commuting should be an investment. Bikeways are an important safety and lifestyle issue. Bikeways should be created for all non-motorized transportation (foot, bike, horse, rollerblade, skateboard, etc) and separated from the roadways.
- Older road structures and New England climates make maintenance a top priority.
- Route 146 should be a limited-access throughway with minimal curb cuts. Access roads at each exit should be the focus for economic development.
- A study should be completed to increase east-west movement in the southeast subregion. An east-west bikeway should be considered along with an east-west connector road. There is a need for an east-west connector road between I-395 and I-495. This will create a “grid” with I-395, Route 146, and I-495. Also, areas for economic development should be focused along this anticipated route to keep higher traffic off of local roads.
- Bus transit along Route 146 should connect workers to jobs. Education, awareness, and new GPS technology investment could increase WRTA ridership.
- Public transportation needs a “destination.” A southeast subregional park could create such a destination for regional employers. The towns could share revenue and bus transit would have a destination in the southeast subregion. There also would be a need for “origins,” such as transit hubs or park-and-rides.
- There is a need to coordinate bus and commuter rail schedules for efficiency.
- There is a need for increased funds for transportation through increased taxes or other sources.
- There is a need for more discussion across state lines where transit, commuter villages, etc are already successful. This type of conversation could give the CMRPC region some guidance for these initiatives in our region.

E.3.3 Northeast Subregion: Shrewsbury Town Hall, Thursday, June 17, 2010

Major Comment: Route 9 congestion
General Sentiment: Need for increased state aid for local roadway repair
Other Comments:

- Road maintenance is important and a balance must be struck between using funds to preserve existing roads and create new roads.
- Congestion varied by town, but is most significant along Route 9; transit along Route 9 might be helpful; congestion is also significant on I-290 during AM commute.
- Safety and connectivity are important; more North-South roadways are needed.
- The land use patterns of the area favor car travel rather than foot travel.
- ITS might be helpful to improve congestion on major roads.
- Future studies might explore the relationship regarding congestion along both Route 20 and Route 9.

E.3.4 Southwest Subregion: Oxford Senior Center, Monday, June 21, 2010

Major Comment: Regional traffic leads to congestion on local roadways
General Sentiment: Need for ongoing maintenance activities; particularly for roads & bridges
Other Comments:

- Congestion is occurring along roads that were built as local roads, but are now being used as inter-community connecting roads, sometimes to avoid even greater congestion on main roads; particularly in the case of "gateway" communities like Auburn, Oxford and Charlton
- Need more recent traffic count data for Route 20
- Automobile is primary means of travel
- Large-scale development creates pressure for large volumes of inter-community travel; need to better coordinate land development and transportation planning; more local development might help to decrease travel distances
- Need to include sidewalks in roadway planning to encourage more walking
- Auburn has a lot of highways, sometimes creating barriers between adjacent land uses
- Park n' Ride lots may help encourage more use of transit
- Commuter rail service should be extended into Spencer and trolley service might be applicable for shorter distances between towns
- Need to connect Worcester Airport and Union Station
- Need to study having more bike paths to connect sub-regions, particularly using existing utility corridors (tool-kit for community planners)
- Use ITS for better management of Route 20
- Restrict heavy trucks wherever possible to higher capacity roadways

E.3.5 Central Subregion: CMRPC's Union Hall, Union Station, Wed., June 23, 2010

Major Comment: Sustainability, Livability & Economic Development
General Sentiment: Need to plan for public transit, alternative modes
Other Comments:

- Make it easier to use public transit (technology on buses, access and connectivity for buses, improved security, continued maintenance to save money, and moving the WRTA HUB to Union Station from City Hall).
- Union Station could become foundation for Smart Growth in the area (intermodal, economic development, and housing opportunities).
- Attempt to tie economic development, housing and transportation together
- Importance of maintenance and safety of existing roadways and structures.
- Supported proposed upgrading of existing rail system in Central Massachusetts for future rail development with possible commuter rail system, as well as more trips to and from Boston.
- Discussion of improved access using Route 9 to the west, as well as combining the Route 9 congestion project with airport access needs.
- Improving bike and pedestrian safety. Should encourage educational efforts to 'share the road'.
- Maintaining sustainability, livability and access as new projects such as the CSX expansion develop.
- Increase availability of commuter rail.

- Signage for Canal District on highways should be considered.
- Make Kelly Square safer.
- Growth of bike paths observed and encouraged.
- Additional commuter trains will help allow coordination with bus schedules in the city (especially if Union Station becomes a hub).
- Encourage use of transit buses (offering “perks” to those who leave car at home and ride WRTA).
- Do not expand city parking; create reasons for people to live and visit the city without cars.
- Idea of “zip-cars” would allow alternative to use of personal vehicles.
- “Car-less society” – adopting alternative methods of transportation.
- Need for Park and Ride facilities.
- Combined use of technology, Park and Rides, and ITS will create better transportation options thus creating better economic development in the long run.
- Educating the surrounding communities, schools, social organizations, and employers that not using a personal vehicle will not only help with emissions but will help the local economy.
- Finding destinations and creating clear paths for pedestrians.
- Consider closing select roads to vehicular traffic to allow increased pedestrian activity.

E.3.6 North Subregion: Princeton Town Hall Annex, Wednesday, June 30, 2010

Major Comment: Access between I-190 and Route 68
General Sentiment: Bicycle and pedestrian accommodation
Other Comments:

- Consider increasing the number of entry points at major arterials such as Laurel St in order to reduce congestion on I-190
- Commuters from Rutland need an access on I-190 north of Holden
- There is a growing interest in expanding the role of transit in the North subregion; access to convenient rail should be a long-term vision, including passenger rail to the Holden Industrial Park via the Fitchburg Branch loop to the Town of Holden and the City of Worcester.
- For the short-term, alternatives are needed to improve the efficiency of the existing highway infrastructure such as investments in 1) High Occupancy Vehicle (HOV) lanes, 2) Park and Ride Lots at strategic intermodal sites, and 3) Transit Service to high employment sites such as the technology parks
- More funding is needed for sidewalks
- Design roads for all users rather than building exclusive bike lanes
- Should consider using higher quality asphalt pavement on roads to reduce the need for frequent repairs
- Need to look at fixing Route 56 north to Route 122A
- Local engineering costs of 10-15% are not affordable by many communities

E.3.7 Overall Summary

- General; Fiscal Constraint
  - *Secure funding for large projects*
  - *Secure additional funding for transit options*
  - *Secure funding for intelligent system use*

- Maintenance
  - *Maintain current infrastructure sufficiently*
  - *Improve alternatives like sidewalks*
  - *Build better initially, thus needing less maintenance*

- Equity
  - *Allocate/obtain more funding for transit and rail*
  - *Remember there are 40 communities when planning bus routes and roadways*

- Security
  - *Use ITS for security as well as for improved operations*

- Congestion
  - *Congestion hurts the economy- it's more than an inconvenience to commuters*
  - *The towns immediately surrounding Worcester suffer most*
  - *More access to I-190 could help alleviate congestion*
  - *Local roads can be improved to carry regional traffic better*
  - *Coordination with school authorities in solving drop-off /pick-up effects*

- Safety
  - *Kelly Square in Worcester needs to be improved*
  - *Pedestrian safety: provide education, better and more pavement markings*
  - *Bike safety: provide and disseminate education to bikers and motorists*

- Access & Connectivity
  - *Link public transit with other modes as well as with its own internal uses*
  - *Do more than install a hub concept – connect outside the city*
  - *More local passenger rail is needed (over time)*
  - *E/W connectivity across Worcester and south of the city is sorely lacking*
  - *Worcester airport and various park & ride locations need connections*
  - *Walkability is popular and in demand*

- Livability
  - *Promote connectivity and linkage between modes*
  - *Assist communities in implementation*
  - *Bikeway opportunities exist and should be taken advantage of*
  - *Complete streets are indeed encouraged and sought*

- Planning
    - *Work with communities*
    - *Encourage and support economic development coordination*
    - *Encourage mixed-use zoning*
    - *Regionalization – work together*

- Technology
    - *Bus equipment should be upgraded as much as possible for trip planning*
    - *Signal coordination is desirable on major arteries for public transit*

E.4 Stakeholder Meetings

A series of meetings were held with transportation stakeholders in the region throughout the RTP update and development process. This allowed staff to learn what issues and challenges the existing multi-modal transportation network presents to the stakeholders while also seeking a vision for the future. This proactive outreach allowed for interaction with a broad range of participants from a variety of expertise and backgrounds. A listing of the stakeholders is provided below. The RTP's accompanying Technical Appendix includes further detail on the meetings that were held.

Annual Environmental Consultation Session, CMRPC, July 2010
- Department of Environmental Protection (DEP)
- Department of Conservation & Recreation (DCR)

Environmental & Climate Change
- Regional Environmental Council (REC)
- John H. Chafee Blackstone River Valley National Heritage Corridor Commission (JHCBRVNHCC), November 2010

Environmental Justice
- Common Pathways
- TPAG Elderly & Disabled Transportation Task Force
- Mass. Mobility Task Force (United We Ride Program)
- WRTA Transit Consumer Advocacy Committee
- Regional Workforce Development

Freight
- Growth Options for the 21st Century (GO21), railroad advocacy group, Pamela Mann, spokesperson, January 2010
- New England Rail Expo, Grafton & Upton Railroad presentation, March 2010
- State Rail Plan public meetings, April & September 2010
- Providence & Worcester Railroad 166th Annual Shareholder meeting, April 2010 (held at CMRPC offices)
- MassCentral Railroad Ribbon Cutting Ceremony, South Barre, September 2010

- New England Automotive Gateway (NEAG) intermodal facility, East Brookfield/Spencer, George Bell, operator, October 2010
- Regional Freight Advisory Committee meetings

Health
- Mass. In Motion

Bicycle & Pedestrian
- Bicycle & Pedestrian Task Force

Economic Development
- Worcester Office on Economic Development
- Regional Planners Forum
- Worcester Regional Chamber of Commerce
- Blackstone Valley Chamber of Commerce

Legislative
- U.S. Congressional Delegation, including Representative James McGovern
- Central Massachusetts Legislative Delegation

Academic Institutions
- Clark University

Homeland Security

E.4.1 Environmental Justice Neighborhood Conversations

CMRPC staff partners with Common Pathways, a Massachusetts Department of Public Health Community Health Network, which is a local coalition of public, non-profit and private sectors working together to build healthier communities in Massachusetts through community-based planning and health promotion. Located in central Massachusetts, Common Pathways creates shared learning by diverse residents and key institutional stakeholders on vital issues of the day, as identified by indicators. Their process promotes effective citizen and organizational discourse leading to informed action, facilitates broad- based resident/organizational representation in identifying a common set of community indicators, and proactively assures access to participation in the local democratic process for diverse groups and individuals.

In the summer of 2010, Common Pathways held “Neighborhood Conversations” with a broad group of stakeholders, as shown below. As part of the proactive RTP outreach process, CMRPC staff on the Transportation Subcommittee requested Common Pathways to include general transportation need questions as part of the Neighborhood Conversations.

Neighborhood Conversations Participants

- Albanian Relief Organization
    - Transportation is difficult to use and access

- This is true in particular for the elderly who do not drive and have no activities during the day. They thus stay home alone

- Belmont Hill Seniors
  - There is a lack of transportation in the city
  - No other transportation to senior centers or outlets for physical activity
  - Many have disabilities but are too old to use the shopping bus
  - EverCare used to cover transportation, but budget cuts stopped that
- Children's Friend: School Age Mothers Program
  - Transportation availability is a barrier to eating healthier foods and physical activity
- Iraqi Women's group
  - Buses and taxis are too expensive
- Edward M. Kennedy Community Health Center (EMKCHC) / Burmese families

  Burmese Men
  - They like the bus system for public and school transportation

  Burmese Women
  - Cars are confusing
  - Initially scared to cross the road
  - Bus drivers are rude due to communications issues
  - Transportation is a major issue – it takes one hour to walk from the hospital to home
  - They like the bus in general
- Parent/Professional Advocacy League
  - Lots of hills in Worcester make it hard to get around on foot or by bike
  - Buses are dirty and not always safe
- Women Together
  - They do not like public transportation in Worcester
  - Transportation resources are lacking
- Green Island
  - Transportation is good
- Family Fun Friday
  - Transportation/buses are major sources of stress
- Granby Street Youth Group
  - Public transportation system is problematic
  - Bad bus drivers at times
  - Bus stop signs get removed
  - It is difficult to walk in winter due to the snow
- Plumley Women's Group
  - Having better transportation options to get to appointments would decrease stress
  - Icy roads make it difficult to get around
  - Taxis are expensive
  - There are no biking trails
  - Winter snow routes for buses make it difficult for people who work
  - Bus strikes make it difficult for people who work
- Persons with Disabilities
  - Like public transportation in general
  - Mass Health has been an unreliable source of transportation to medical appointments
  - Healthcare providers often run late which makes it difficult to schedule transportation

    - Transportation limits their ability to access different food option resources
    - Bus drivers do not always make announcements regarding the route number and stop locations (This has since been addressed by WRTA)
    - Bus strikes leave people stranded
    - Bus drivers should have sensitivity training for people with disabilities
- Worcester Refugee Mental Health
    - Bus system hard to navigate if you cannot read
- Faith Community
    - There is a lack of transportation and walking opportunities in Main South
    - The lack of transportation in the city is bad (cannot leave neighborhood, cannot access better food, cannot find better housing, cannot find better job without car)
- Barbara Haller and City Councilors
    - It needs to be easier to ride a bike in Worcester

E.4.2 Submitted Public Comment

Further, all submitted public comment and other materials associated with the update and development of the 2012 RTP document is included in the accompanying Technical Appendix.

E.5 Online Survey

In addition to public and stakeholder meetings, an online survey was conducted. A news article was prepared to encourage participation and the online survey was promoted at all public and stakeholder meetings. The number of people who participated was smaller than that of a similar survey held in conjunction with the 2007 RTP. However, this input, while not the result of a scientifically designed or statistically balanced sample, is still considered a valuable addition to input received in other venues.

Highlights of the results are as follows:

- Somewhat surprisingly, 77% of the respondents were 40 years of age or older.
- Approximately 70% travel primarily by auto and generally find that the reliability of their commute, level of traffic congestion, level of safety and quality of traffic signaling and signage are at least average or better.
- Just under 20% travel by public transit; however, in total, 55% of respondents are not satisfied with the availability of transit, which may indicate that many people are using autos when they would like to have the option to use transit.
- Similarly, 42% were not satisfied with the availability of sidewalks.
- When asked where resources should be preferably allocated, 30% suggested improving public transit/commuter rail, 25% indicated maintenance of existing infrastructure, and 10% each selected congestion alleviation, improvements in bike and pedestrian facilities, and the provision of access to and connectivity within all modes of transportation.

F. DETAILED SAFETEA-LU GUIDANCE

The following excerpt from early SAFETEA-LU guidance specific to the preparation of the RTP is indicative of the broad scope of both the document and the required outreach effort. Full text is provided here for reference.

§ 450.322 Development and content of the metropolitan transportation plan

(a) The metropolitan transportation planning process shall include the development of a transportation plan addressing at least a 20-year planning horizon as of the effective date. In nonattainment and maintenance areas, the effective date of the transportation plan shall be the date of a conformity determination issued by the FHWA and the FTA. In attainment areas, the effective date of the transportation plan shall be its date of adoption by the MPO.

(b) The transportation plan shall include both long-range and short-range strategies/actions that lead to the development of an integrated multimodal transportation system to facilitate the safe and efficient movement of people and goods in addressing current and future transportation demand.

(c) The MPO shall review and update the transportation plan at least every four years in air quality nonattainment and maintenance areas and at least every five years in attainment areas to confirm the transportation plan's validity and consistency with current and forecasted transportation and land use conditions and trends and to extend the forecast period to at least a 20-year planning horizon. In addition, the MPO may revise the transportation plan at any time using the procedures in this section without a requirement to extend the horizon year. The transportation plan (and any revisions) shall be approved by the MPO and submitted for information purposes to the Governor. Copies of any updated or revised transportation plans must be provided to the FHWA and the FTA.

(d) In metropolitan areas that are in nonattainment for ozone or carbon monoxide, the State air quality agency shall coordinate the development of the transportation control measures (TCMs) in a State Implementation Plan (SIP) with the MPO. For TCM substitutions or additions made under section 176(c)(8) of the Clean Air Act (42 U.S.C. 7506(c)(8)), the MPO, State air quality agency, and the EPA must concur on the equivalency of any substitute TCMs and the addition of new TCMs to the SIP.

(e) The transportation plan update process shall include a mechanism for ensuring that the MPO, the State(s), and the public transportation operator(s) agree that the data utilized in preparing other existing modal plans providing input to the transportation plan are valid. In updating the transportation plan, the MPO shall base the update on the latest available estimates and assumptions for population, land use, travel, employment, congestion, and economic activity. The MPO shall approve transportation plan contents and supporting analyses produced by a transportation plan update.

(f) The metropolitan transportation plan shall, at a minimum, include:

(1) The projected transportation demand of persons and goods in the metropolitan planning area

over the period of the transportation plan;

(2) Existing and proposed transportation facilities (including major roadways, transit, multimodal and intermodal facilities, pedestrian walkways and bicycle facilities, and intermodal connectors) that should function as an integrated metropolitan transportation system, giving emphasis to those facilities that serve important national and regional transportation functions over the period of the transportation plan. In addition, the locally preferred alternative selected from an Alternatives Analysis under the FTA's Capital Investment Grant program (49 U.S.C. 5309 and 49 CFR part 611) needs to be adopted as part of the metropolitan transportation plan as a condition for funding under 49 U.S.C. 5309;

(3) Operational and management strategies to improve the performance of existing transportation facilities to relieve vehicular congestion and maximize the safety and mobility of people and goods;

(4) Consideration of the results of the congestion management process in TMAs that meet the requirements of this subpart, including the identification of SOV projects that result from a congestion management process in TMAs that are nonattainment for carbon monoxide or ozone;

(5) Assessment of capital investment and other strategies to preserve the existing and projected future metropolitan transportation infrastructure and provide for multimodal capacity increases based on regional priorities and needs;

(6) Design concept and design scope descriptions of all existing and proposed transportation facilities in sufficient detail, regardless of funding source, in nonattainment and maintenance areas for conformity determinations under the EPA's transportation conformity rule (40 CFR part 93). In all areas (regardless of air quality designation), all proposed improvements shall be described in sufficient detail to develop cost estimates;

(7) A discussion of potential environmental mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the metropolitan transportation plan. The discussion shall be developed in consultation with Federal, State, and Tribal land management, wildlife, and regulatory agencies. The MPO may establish reasonable timeframes for performing this consultation;

(8) Pedestrian walkway and bicycle transportation facilities in accordance with 23 U.S.C. 217(g);

(9) Transportation and transit enhancement activities, as appropriate; and

(10) A financial plan that demonstrates how the adopted transportation plan can be implemented, while operating and maintaining existing facilities and services. For the purpose of developing the transportation plan, the MPO, public transportation operator(s), and State shall cooperatively develop estimates of funds that will be available to support metropolitan transportation plan implementation, as required under § 450.314(a)(1). All necessary financial resources from public and private sources that are reasonably expected to be made available to carry out the

transportation plan shall be identified. The financial plan shall include recommendations on any additional financing strategies to fund projects and programs included in the metropolitan transportation plan. In the case of new funding sources, strategies for ensuring their availability shall be identified. In developing the financial plan, the MPO shall take into account all projects and strategies proposed for funding under title 23, U.S.C., title 49, U.S.C., Chapter 53, or with other Federal funds; State assistance; local sources; and private participation. For nonattainment and maintenance areas, the financial plan shall address the specific financial strategies required to ensure the implementation of TCMs in the applicable SIP. In addition, the financial plan may include, for illustrative purposes, additional projects that would be included in the adopted transportation plan if additional resources beyond those identified in the financial plan were available.

(g) The MPO shall consult, as appropriate, with State and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation concerning the development of the transportation plan. The consultation shall involve, as appropriate:

(1) Comparison of transportation plans with State conservation plans or maps, if available; or

(2) Comparison of transportation plans to inventories of natural or historic resources, if available.

(h) The metropolitan transportation plan should include a safety element that incorporates or summarizes the priorities, goals, countermeasures, or projects for the MPA contained in the Strategic Highway Safety Plan required under 23 U.S.C. 148, as well as (as appropriate) emergency relief and disaster preparedness plans and strategies and policies that support homeland security and safeguard the personal security of all motorized and non-motorized users.

(i) The MPO shall provide citizens, affected public agencies, representatives of public transportation employees, freight shippers, providers of freight transportation services, private providers of transportation, representatives of users of public transportation, representatives of users of pedestrian walkways and bicycle transportation facilities, representatives of the disabled, and other interested parties with a reasonable opportunity to comment on the transportation plan using the participation plan developed under § 450.316(a).

(j) The metropolitan transportation plan shall be published or otherwise made readily available by the MPO for public review, including (to the maximum extent practicable) in electronically accessible formats and means, such as the World Wide Web.

(k) A State or MPO shall not be required to select any project from the illustrative list of additional projects included in the financial plan under paragraph (f)(9) of this section.

(l) In nonattainment and maintenance areas for transportation-related pollutants, the MPO, as well as the FHWA and the FTA, must make a conformity determination on any updated or amended transportation plan in accordance with the Clean Air Act and the EPA transportation conformity regulations (40 CFR part 93). During a conformity lapse, MPOs can prepare an interim metropolitan transportation plan as a basis for advancing projects that are eligible to proceed under a conformity lapse. An interim metropolitan transportation plan consisting of eligible projects from the most recent conforming transportation plan and TIP may proceed immediately without revisiting the requirements of this section, subject to interagency consultation. An interim metropolitan transportation plan containing eligible projects that are not from the most recent conforming transportation plan and TIP must meet all the requirements of this section.

REGIONAL CHARACTERISTICS

II

II. REGIONAL CHARACTERISTICS

A. INTRODUCTION

The Central Massachusetts Region, also referred to as the Central Massachusetts Regional Planning District, is made up of the City of Worcester and the 39 surrounding towns of south-central Worcester County and is one of 13 planning regions in the state. The region is diverse, extending from the urban core of Worcester, the second largest city in the Commonwealth, through the suburban neighborhoods of the nearby towns, to the rural fields and farms of the Brookfields, Hardwick, and New Braintree. It is a transportation crossroads for New England, located at the junction of four major interstate highways and three major railroads. It is centered about 50-60 miles from the major urban areas of Boston, Springfield, Providence RI, and Hartford CT. From Princeton on the north to Douglas on the Rhode Island state line is about 35 miles, and it's about the same distance from Warren in the west to Westborough in the east. The total area of the region is about 960 square miles. It contains the headwaters and main trunk of the Blackstone River, one of the major river basins of Massachusetts and Rhode Island stretching from Worcester to Narragansett Bay near Providence, and includes the John H. Chafee Blackstone River Valley National Heritage Corridor in Massachusetts. Parts of several other river basins are also found within the Region, including the Chicopee, French-Quinabaug, Nashua and Concord-Sudbury-Assabet.

Historically the region was a center for agriculture, manufacturing, and education. In recent years both agricultural and manufacturing activity has declined significantly, although still important to the local economy. New, high-tech and biotech firms have come to the region, taking advantage of the well-educated workforce. In addition, healthcare systems are also significant employers.

The trend since the 1950s has been toward increasing residential development outside the central city at the expense of the city's population, although the city has seen a growing interest in urban living. Interstate 495, the fastest growing industrial corridor in the state, brushes the eastern edge of the region and has encouraged rapid residential development in the nearby towns including those in Central Massachusetts. The transportation infrastructure in the region has facilitated the trend of residing in this area while commuting daily to eastern Massachusetts to work and that trend, too, is expected to continue. As of 2000, more than 20% of the workers residing in Central Massachusetts commuted to jobs outside the region in eastern Massachusetts. More current information will be available next year, and the percentage will likely remain about the same. The region is a net exporter of workers as well, with nearly twice as many workers leaving the region daily for jobs elsewhere as come in from other regions.

B. CENTRAL MASSACHUSETTS TODAY

B.1 Description of the Region

The 40 cities and towns that comprise the Central Massachusetts Regional Planning District ("Region") have been divided into subregions based on commonalities of economics and transportation infrastructure. A map of the five subregions is shown in Figure I-2 and their makeup within the region is as follows:

The ***west subregion*** (comprised of the towns of Brookfield, East Brookfield, Hardwick, Leicester, New Braintree, North Brookfield, Spencer, Warren, West Brookfield) has I-90 clipping the extreme southwest corner and has no exits located within the subregion. Its population growth is slightly lower than the average regional growth, and it has the lowest number of jobs. Its projected job growth is significantly less than the regional average. It still maintains the most undeveloped land in the region.

The City of Worcester alone is considered the ***central subregion***. I-290 traverses it from the south in a north-south direction and then at I-190 turns abruptly east and exits on the east border where it connects to I-495, the second loop around Boston. I-190 continues from I-290 on the northern boundary of the City to Route 2 in the Leominster/Fitchburg area. The Massachusetts Turnpike passes to the south of the City with three relatively easy access points. Route 146 traverses the City through the south-southeast side connecting Worcester to Providence, RI. The central subregion is expected to be home to the largest increase in jobs, although not the largest percent increase in jobs as it already includes 43% of the jobs for the entire region.

Route 146 almost mathematically bisects the ***southeast subregion*** (Blackstone, Douglas, Grafton, Hopedale, Mendon, Millbury, Millville, Northbridge, Sutton, Upton, Uxbridge) in a northwest to southeast direction, providing increasingly easy access to Worcester and relatively easy access to Providence, RI. The Massachusetts Turnpike skirts the northern portion of this subregion making a direct connection to Boston and Springfield. I-495 is situated just to the east of this subregion and I-395 is situated just to the west of this subregion. The southeast subregion has the easiest access to several of New England’s largest cities and other major destinations than any other subregion. For that reason population is growing faster, and is expected to continue growing faster, by number and percent, than in any other subregion in the Central Massachusetts region. This subregion was the only one that did not lose jobs in the past decade, and growth is expected to continue at a modest rate. The towns in this subregion have worked cooperatively with each other. As one example, several towns united to create a Route 146 multi-town overlay district.

The Massachusetts Turnpike traverses the northern portion of the ***southwest subregion*** (Auburn, Charton, Dudley, Oxford, Southbridge, Sturbridge, Webster). This subregion has two interchanges: one on the eastern side of the subregion at I-395 which connects Worcester to Norwich, Conn., and one on the western side of the subregion at I-84 which connects to Hartford. Moderate population and job growth is expected in this subregion.

I-190 skirts the eastern edge of the ***north subregion*** (Barre, Holden, Oakham, Paxton, Princeton, Rutland, West Boylston), as its only interstate highway. In the year 2000, the population in the north subregion was the lowest of all subregions. It now has the second lowest and is expected to keep that position through the year 2035. Population is expected to outpace jobs for the foreseeable future in this subregion.

I-290 nearly bisects the ***northeast subregion*** (Berlin, Boylston, Northborough, Shrewsbury, Westborough) and I-495 nips its eastern edge. The Massachusetts Turnpike traverses in an east-west direction just south of the subregion, crossing into its southeastern corner with an interchange at I-495. I-190 passes to the west of the northeast subregion. It is currently the second largest home to jobs in the region, with one town, Westborough, employing more people than it has residents. The subregion is expecting high job growth between 2000 and 2035. The northeast subregion is the only subregion where jobs are expected to grow at a faster rate than population.

B.2 Land Use: Economic Development, Housing, and Environment

As discussed in Chapter I, transportation planning should be conducted in concert with overall land use planning. The landmark agreement by the U.S. Department of Transportation, U.S. Environmental Protection Agency, and the U.S. Department of Housing & Urban Development reinforces the concept that the transportation system is inextricably linked to the natural and built environment, and that planning for transportation must account for impact to/from economic development, housing, and the environment. A detailed description of this partnership is outlined is the Regional Environmental Overview section.

With considerable development pressure facing the Region, Central Massachusetts' land use pattern is constantly changing. Its former agricultural landscape has given way to new subdivisions, shopping centers, and industrial parks. The early pattern of development in the 1700's and 1800's also entailed the presence of manufacturing centers located on rivers and streams as a source of power for mills and factories. Around these mills sprouted self-contained villages to supply workers, and since there was automobile transport, the surrounding area by necessity contained farms and forests with residents engaged in production of food and crafts to meet local needs. These villages today lend each community its own distinctive character and are cherished by residents. But growth and development outside of these town centers has taken on a vastly different character. With permissive development regulations, growth has taken on characteristics of "sprawl," resulting in large lot subdivisions, strip corridor commercial development, and new residences rising as continuous frontage development along once rural country roads. Farms and forests are disappearing, impacting wildlife and natural communities, while requiring ever-increasing costly solutions for maintaining environmental quality. Slowly, the region's New England character is eroding.

According to Massachusetts Audubon's *Common Ground* database, the region experienced the second highest number of acres of land converted from agriculture and forest for development for all 14 regions of the state. At the same time, the region ranked sixth among the State's regions for the number of acres protected. The influence of highways on development patterns is also clear, as much of the commercial and industrial development took place near major regional routes, including Routes 9, 12, 16, 20, 122, 122A, 140, and 146. In spite of this development, open space still makes up 66% of the regional land use as of 2005, as shown in Figure II-1 on the following page. Single-family residential makes up the second highest use at 11% for the region. In Worcester, the highest use is multi-family residential at 34%, while open space occupies 27%, and single-family only makes up 7%, as shown in Figure II-2.

As is demonstrated by the activities occurring within each subregion, the region today is an area in transition with regard to economic development, inexorably bound to the fortunes of Massachusetts but struggling to chart its own course. The boom period of the 1990s gave way to a series of recessions that have stubbornly refused to abate, at least in terms of new job creation. Between 2000 and 2010, employment in the region declined 8%, following a trend in Massachusetts as a whole. Population growth in the region was more robust than in most areas of the state, due in part to housing prices pushing more people westward and the high overall quality of life factors found in the region. Despite CMRPC projections for healthy future growth, particularly employment growth, the projected rates of

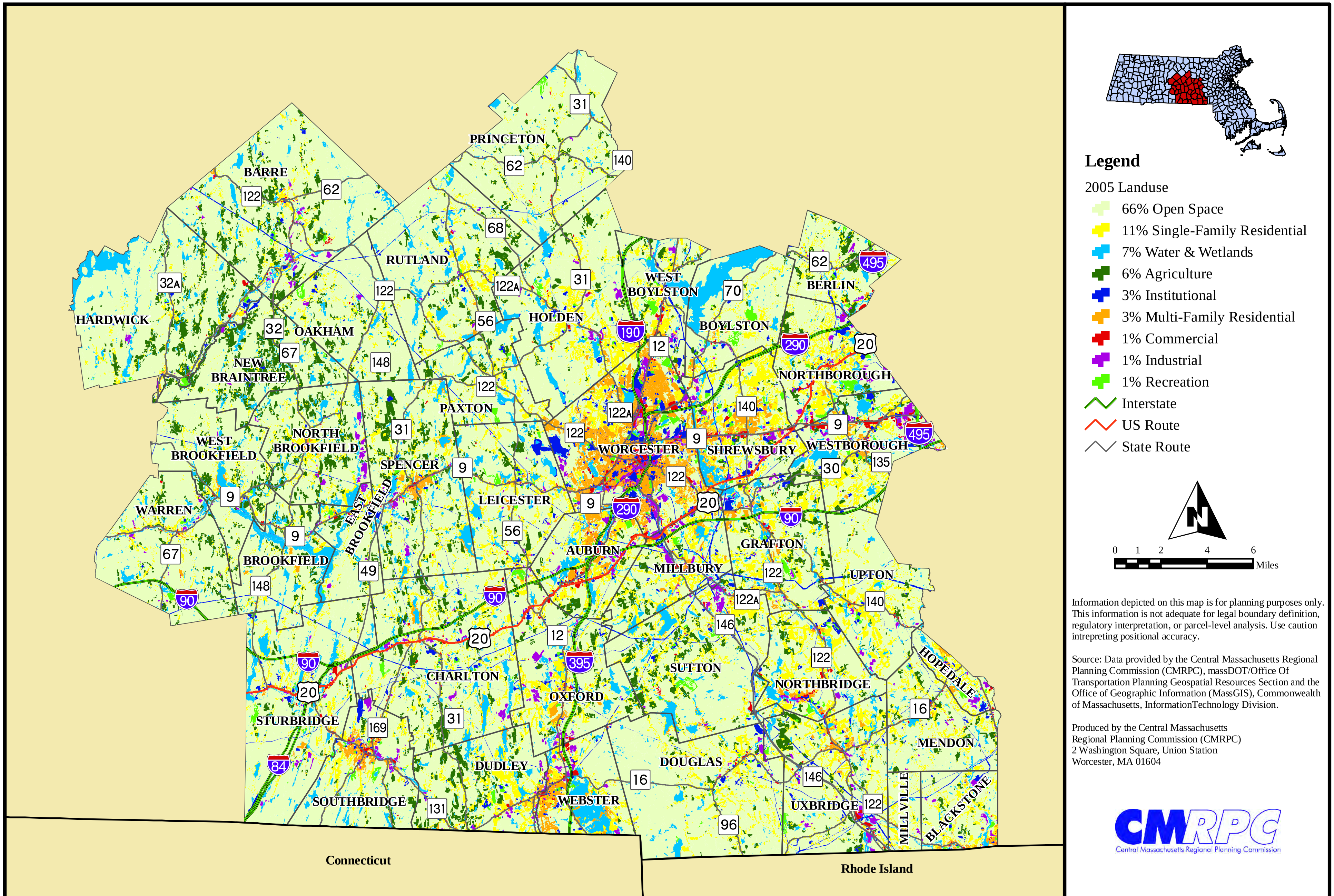


Figure II-1 2005 Regional Landuse

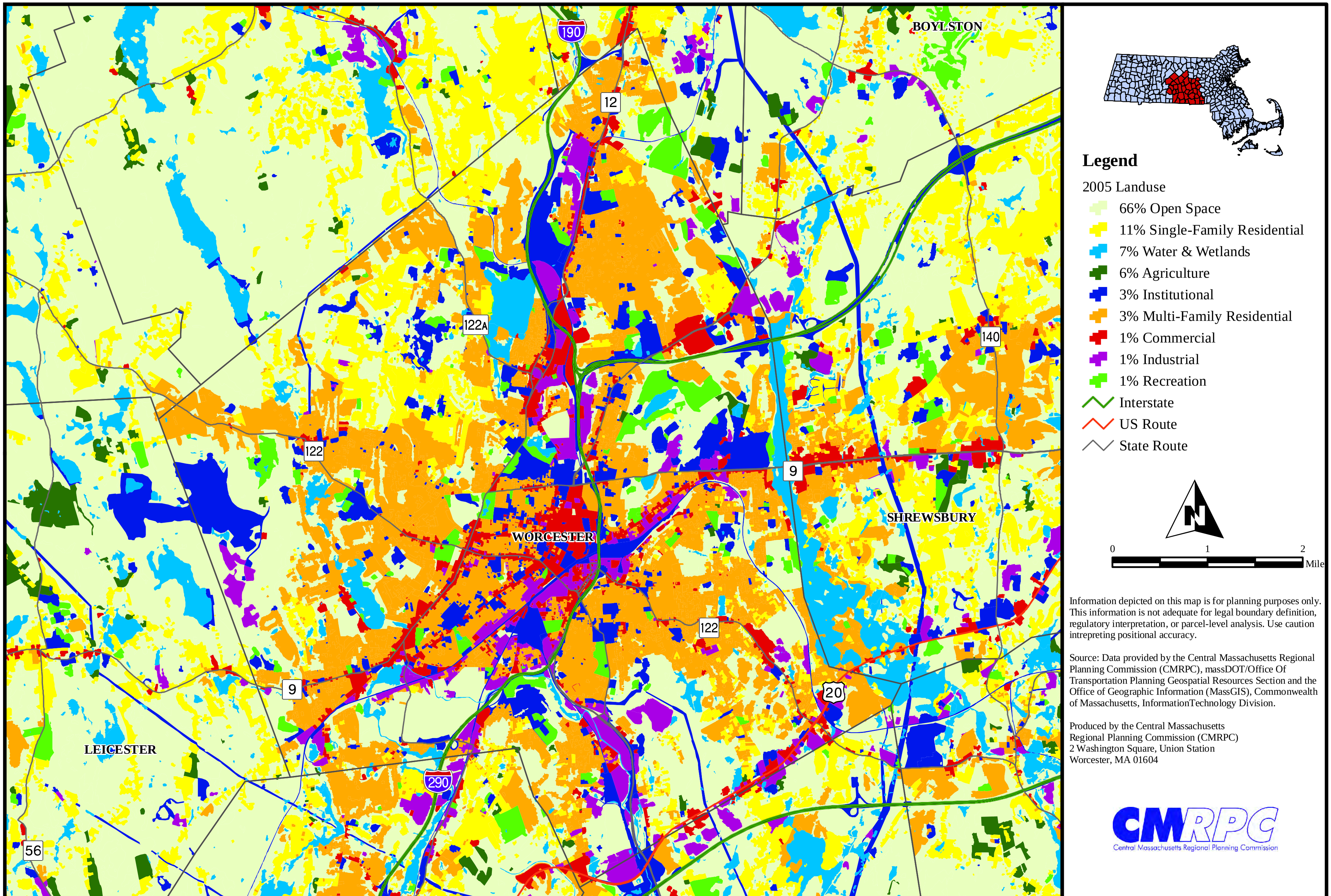


Figure II-2   2005 Worcester Landuse

growth may not be achieved if the growth of the remainder of the state stalls or declines. This has serious implications for both the State and the Region. There are certainly some hopeful signs for improvement, but it will take a concerted and cooperative effort by the communities of Central Massachusetts to provide a brighter future for their residents.

Until the 2008 economic issues, housing construction in the region continued at a brisk pace. Most housing analysts believe the causes of this healthy market are the relatively low cost of housing in the region compared to the Boston and MetroWest markets to the east, and the availability of a still abundant supply of land. The region's central location and excellent highway access make it possible for workers with jobs in Boston or along I-495 to live within driving distance of work while owning a less expensive home and enjoying a rural or suburban life style.

Though housing is less expensive than housing to the east, it is not necessarily considered affordable to many. As noted in the previous land use figures, much of the region's housing stock is single-family, with the exception of Worcester. In addition, the region struggles to meet the Chapter 40B Subsidized Housing Inventory (SHI) goal of 10% in each community. As of December 2010, only four communities met the 10% goal, and with the new 2010 U.S. Census figures released in March 2011, it's expected that only Northborough and Worcester will be shown to have affordable housing exceed 10% of their housing stock. The majority of CMRPC communities have an SHI of 5% or less.

The Northeast and Southeast subregions, which are closest geographically to Boston and MetroWest, are prime locations for reasonable commutes to good paying jobs and attract professional wage earners who can afford the significant cost of building a new home. It also appears that units once targeted for the Northeast subregion are now shifting to the Southeast. Development constraints and reduced capacity in water and sewer systems in Northeast communities may be factors in this trend. The North subregion contains a combination of rapidly and slow growing communities, but on the whole also remains very strong in terms of population growth.

One of the greatest advantages that Central Massachusetts and the state have had is the presence of a highly educated workforce. In 1990, 2000, and 2008 no state except the District of Columbia had a larger percentage of its over 25-year old population with Bachelor's degrees or higher (38.1% in 2008, according to the US Census). In 2008 Massachusetts had 16.4% of its over 25-year old population with advanced degrees, again second only to the District of Columbia.

There was a time when agriculture and manufacturing were the mainstays of the Massachusetts economy, but that time has passed and the region and the state must adjust accordingly. Most people of working age would prefer a good-paying job that is satisfying and secure, but as the nature of the economy changes, changes in the makeup of employment will occur. The better jobs in the future will require a technically skilled and knowledgeable workforce and part of this responsibility lies with the community. Communities must re-examine their approach to businesses, particularly from a development and permitting perspective, with the goal of attracting the jobs that are beneficial to both the community and the workers. While many of the workers in Central Massachusetts work in the town where they live or in a town nearby, an increasing number commute to jobs outside the region, placing an increasing burden on our aging transportation system. As noted, manufacturing jobs in general are at lower levels (although more recently stabilizing) in Central Massachusetts, while jobs in the service industries, health care and education are increasing in number.

SAFETEA-LU guidelines encouraged proactive engagement with the environmental community, as part of the public outreach process. Accordingly in 2007, stakeholders from the greater region were invited to contribute to this discussion. In 2009, a spatial database which identified environmental resources in the region was developed which was used in a pilot project for the SR-140 corridor study. The resulting environmental consultation maps were used in outreach efforts to assist the communities of Princeton, Sterling and Westminster make recommendations that could avoid conflicts or mitigate the adverse impacts of the proposed roadway project to vulnerable areas. In the next steps the agency can expand this effort to identify Planning and Environment Linkages (PEL) in the region by participating in the FHWA's PEL initiative to identify sensitive subareas in the region with the cooperation of State, local and Federal agencies.

The natural environment in the region is largely intact especially in rural communities situated on the outskirts of the region but communities along the interstate highways are densely populated with fragmented land uses. The major river basins in the region are the Blackstone, French, Mill, Quaboag, Quinebaug, and the Ware rivers. The two largest reservoirs in the state the Quabbin Reservoir just northwest of the region and the Wachusett Reservoir in the north supply a major portion of drinking water for cities and towns in the Commonwealth. In addition the region is surrounded by several State Forests found in the towns of Brimfield, Douglas, Upton, Sutton, Spencer, Sturbridge and Princeton. These are among the chief natural features of the region. To preserve these natural features an environmental consultation process was established to enable early coordination with local communities to address environmental concerns and issues when preparing roadway plans for the region. This early intervention can avoid conflicts and impacts of transportation projects in a cost effective and efficient manner.

The Department of Conservation and Recreation (DCR), the Department of Environmental Protection (DEP) and the National Heritage and Endangered Species Program (NHESP) are among the agencies which manage and regulate the land uses permitted in protected areas in the Commonwealth. These agencies maintain, update and periodically release spatial data about their programs. Spatial data about open space, water supply, wildlife habitat and other sensitive eco system are consolidated to produce *Environmental Consultation Maps* for the region (Figures II-3 – II-6). Data in these Geographic information Systems (GIS) layers identify land set aside for conservation, recreation, water supply protection and wildlife habitat for endangered and protected species in the region. They can identify highly sensitive avoidance areas and those in need of conservation. These *Environmental Consultation* maps can provide more detail on environmental features using a buffer zone within a half mile radius of a transportation project.

a) Department of Conservation and Recreation (DCR)

The DCR seeks to protect, promote and enhance the natural, cultural and recreational resources in the Commonwealth. Geographic Data layers are managed by the following divisions within DCR.

1) Division of State Parks and Recreation -This division protects land and resources on privately and municipally held land through technical assistance, grant and planning programs, policy development, and other services.

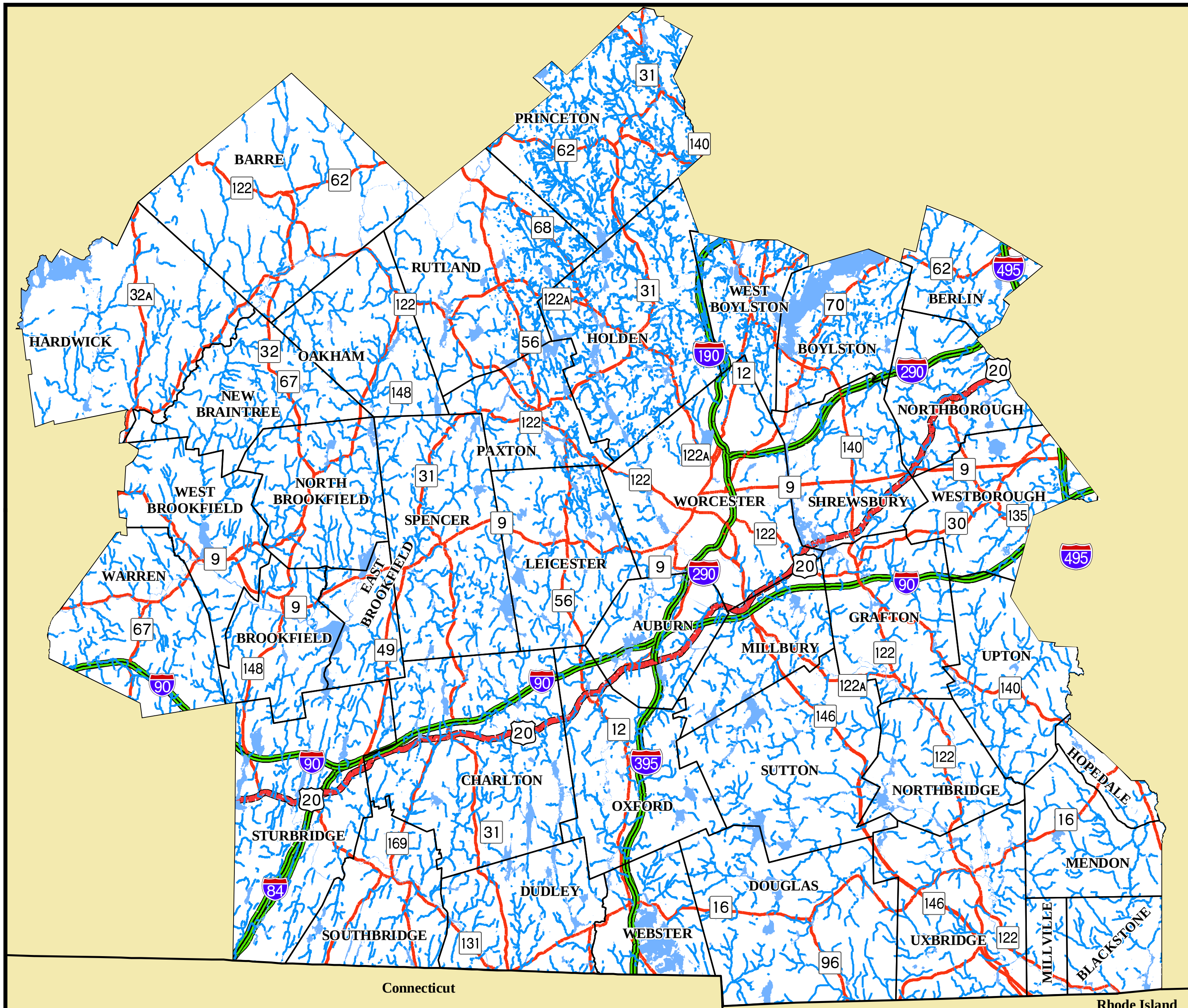
2) Forest Stewardship Program - This non-regulatory program is designed to help landowners protect the inherent ecosystem values of their forest.
3) Division of Water Supply Protection - Manages and protects the drinking water supply watersheds for Greater Boston.
   i) Water Supply: Care must be taken to avoid adverse environmental effects close to reservoirs with drinking water supplies. These surface water supplies can be protected from runoff from impermeable roadway surfaces which contaminate drinking water and threaten fish and wildlife with hazardous residues from salt, gasoline by products and other chemicals from accidental spills. Large reservoirs, watersheds, Wildlife Conservation Easements (WCE) and Watershed Management Areas (WMA) include (Figure II-3),
      - Quabbin Reservoir Watershed in Hardwick and Barre
      - Ware River Watershed in Rutland, Princeton, Oakham, Holden, Barre
      - Wachusett Reservoir Watershed in Boylston, West Boylston, Rutland, Princeton and Holden,
      - Kettle Brook Reservoir in Paxton
      - Leadmine Mountain WCE in Sturbridge
      - Muddy Brook WMA in Hardwick
      - Quaboag WMA in Brookfield, East Brookfield, West Brookfield, Warren, Sturbridge
      - Breakneck Brook WMA in Southbridge, Sturbridge

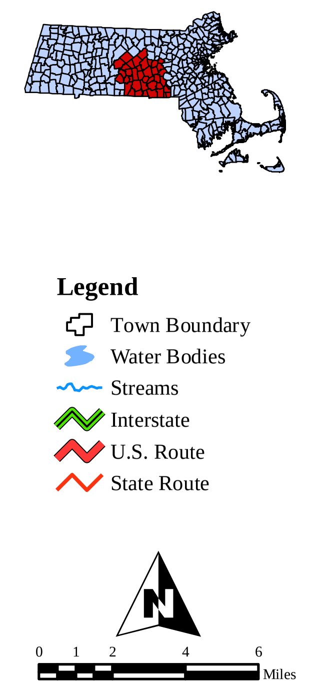
   ii) Recreation & Conservation: Adequate care in implementing roadway projects can reduce potential conflicts between boating, fishing, hiking, biking, equestrian and ski trails. Large conservation and recreation areas in the region include (Figure II-4),
      - Douglas State Forest
      - Sutton State Forest
      - Upton State Forest in Upton, Northbridge, Westborough, Hopedale
      - Wells State Park in Sturbridge
      - Leominster State Forest in Princeton
      - Wachusett Mountain State Reservation in Princeton
      - George H. Nichols Reservoir in Westborough, Shrewsbury

iii) Open Space in Perpetuity : Large tracts of land designated to remain in the natural state where development or roadway construction is precluded include (Figure II-4),
      - Ware River Watershed in Barre
      - Raccoon Hill WMA, in Barre
      - Various DCR lands in Millbury, Paxton and West Boylston.

b) Department of Environmental Protection (DEP)

The Massachusetts DEP is responsible for ensuring clean air and water, safe management and recycling of solid and hazardous wastes, timely cleanup of hazardous waste sites and spills, and the preservation of wetlands and coastal resources. It includes the following programs:





Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), massDOT/Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

Produced by the Central Massachusetts Regional Planning Commission (CMRPC)
2 Washington Square, Union Station
Worcester, MA 01604

CMRPC
Central Massachusetts Regional Planning Commission

Figure II-3 Central Massachusetts Regional Environmental Consultation: Surface Water Features

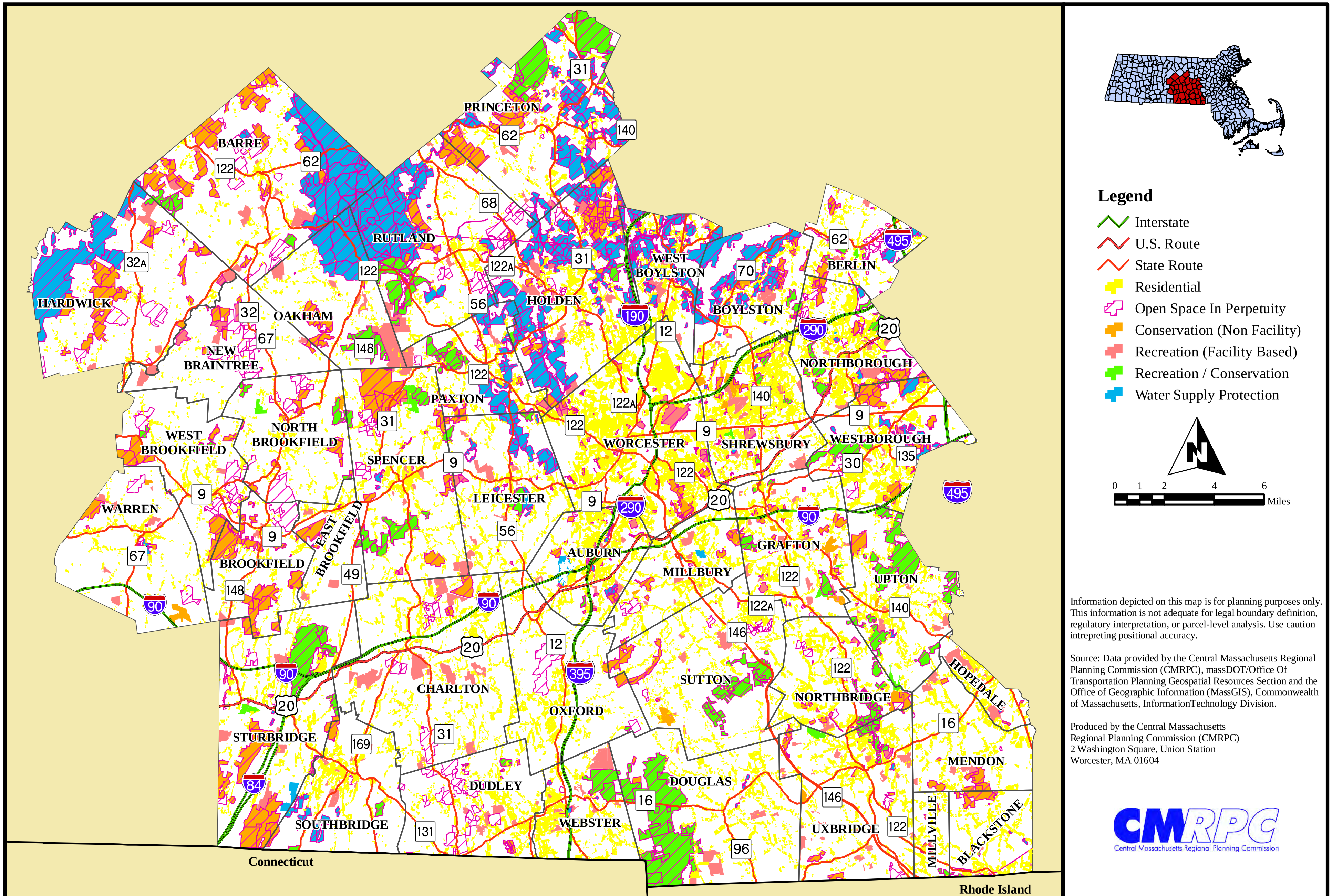


Figure II-4 Central Massachusetts Regional Environmental Consultation: General Landuse

1) Division of Watershed Management (DWM) & Watershed Planning Program (WPP) DEP policies are required to maintain the water quality, prevent soil erosion and protect surrounding watersheds. Land uses which require clearing land for roadways may have environmental consequences that affect stream conditions. Wherever roadway plans impact monitored and impaired waterways, mitigation efforts can reduce adverse impacts. Avoiding removal of old growth forests for cut and fill for roadway construction can prevent soil erosion which leads to flooding in vulnerable watersheds.

2) Bureau of Resource Protection (BRP) - The Wetlands Protection Act preserves wetlands with flood control measures to prevent pollution and storm damage to groundwater supplies, fisheries, shellfish, and other wildlife habitat. The BRP requires a careful review of proposed work that may impact wetlands. Since environmental impact statements (EIS) are mandatory for all roadway projects during the 'design phase', mitigation efforts addressed during the 'planning phase' can prevent delay or termination during the 'design phase'.

Regulated waterways, water bodies and wetlands include (Figure II-5),

- *Prince River* in Barre
- *Seven Mile River* in Spencer
- *Quinsigamond River* in Grafton *Webster Lake* in Webster
- *Whitin Reservoir* in Douglas
- *Wickaboag Pond* in West Brookfield
- *Granite Reservoir* in Charlton
- Large wetlands in the towns of Rutland, Charlton and Barre.

c) National Heritage & Endangered Species Program (NHESP)

The NHESP seeks to maintain native biological diversity of endangered and protected wildlife in the state. Fragmentation of wildlife corridors which allow animals to move and migrate in their natural habitat can be mitigated by promoting connectivity in natural areas. Innovative roadway solutions which allow wildlife corridors under roads, bridges and culverts can provide safe crossing points for both small and large animals like salamander and deer. The effects of human activity can be minimized with fencing and vegetation which reduce noise levels and lower air pollution. During the 'construction phase' preventive measures such as siltation fences and hay bales can reduce erosion.

1) Protected Habitats: Significant wildlife habitats in the region are as follows (Figure II-6),

- *Core Habitat* in Berlin, Brookfield
- *Natural Habitats* in Barre, Berlin, Douglas
- *Natural Landscape* in Dudley, East Brookfield

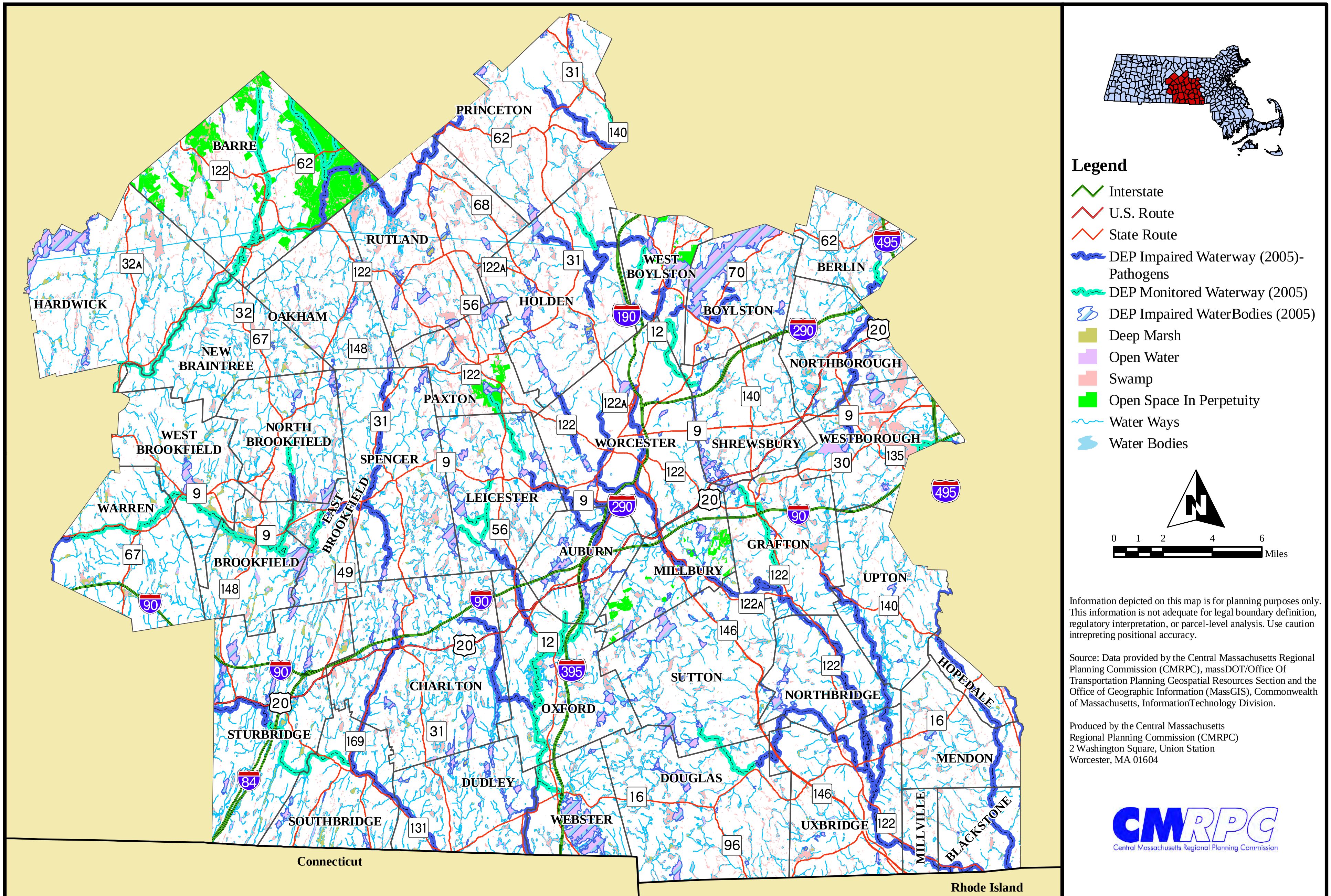


Figure II-5 Central Massachusetts Regional Environmental Consultation: DEP Waterways Overview

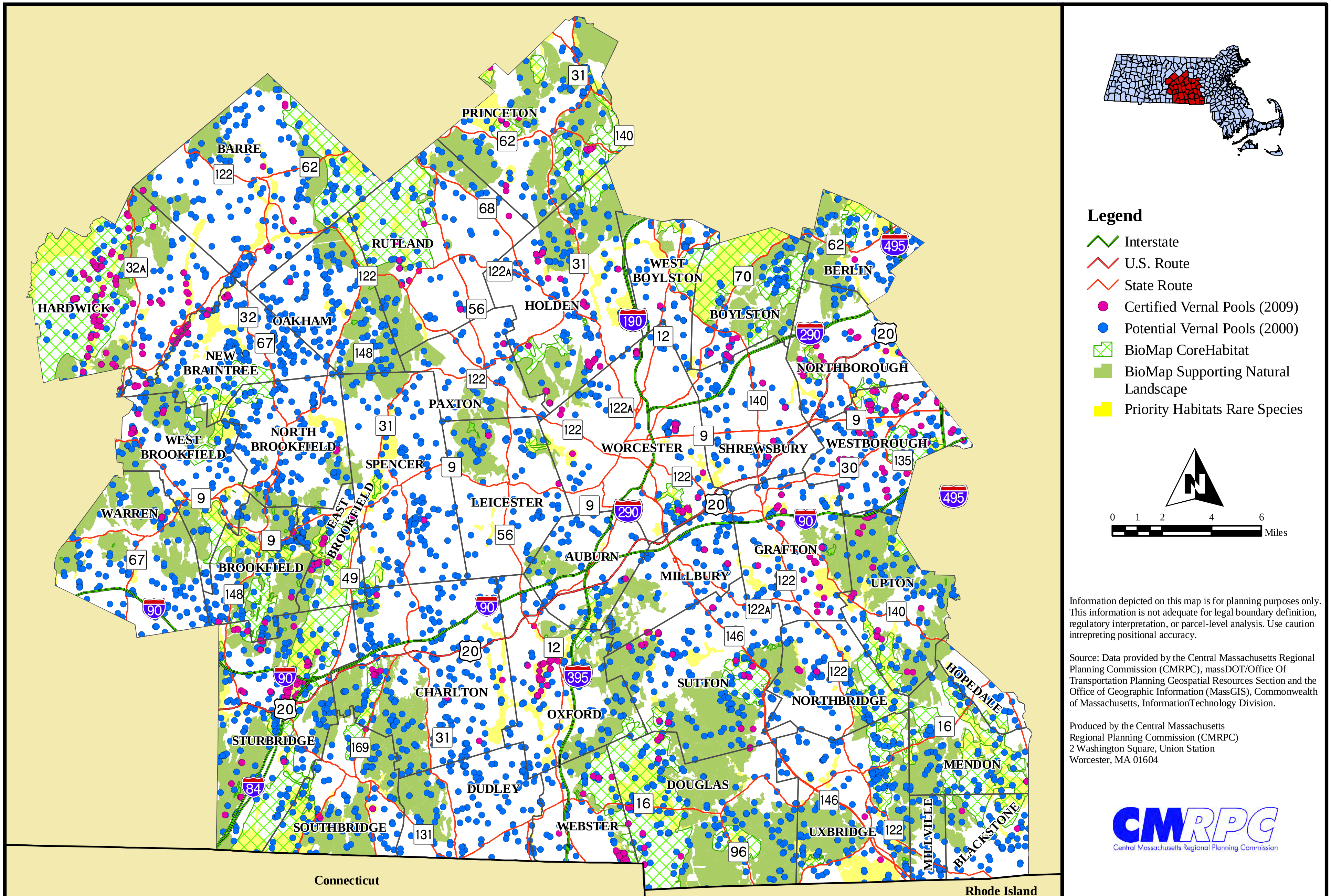


Figure II-6 Central Massachusetts Regional Environmental Consultation: Natural Heritage & Endagered Species Program Overview

2) Wetlands Protection: Certified Vernal Pools are granted protection under the Wetlands *Protection Act* to safeguard wildlife micro-habitats for rare aquatic plants and small animals such as salamander, frogs, beetles and fairy shrimp. There are over 4,000 vernal pools scattered throughout the region (Figure II-6), 400 of which are certified. The towns of Hardwick, Sturbridge and Westborough have the largest number of *Certified Vernal Pools* in the region.

B.3 Water Supplies, Wastewater, and Communications

Excepting for the moment transportation facilities, which will be discussed separately, infrastructure includes the basic support systems and services for the region, including drinking water supplies, wastewater treatment, and communications facilities. Most of these we take for granted, but there are reasons to be concerned for the future. Because Massachusetts and New England have been settled for some time, much of the supporting infrastructure is old and in need of repair or expansion to accommodate growing demand. Here in Central Massachusetts, shortfalls in drinking water supplies are projected for many communities by the end of this current planning horizon in 2035. Many of the suburban and rural communities rely almost totally on private wells and these are increasingly problematic as the demand increases and groundwater pollution is on the rise. Several years ago the water supply for the town of Millbury was crippled when unanticipated contamination was discovered in the principal well, and some communities regularly mandate water-use limitations in the drier months. There is a need for more public discussion about the future requirements for secure and safe water supplies for the Central Massachusetts communities.

While many communities have some existence of wastewater infrastructure, sewer lines are generally restricted to small areas of the communities. In addition to denser town centers, water and sewer lines often follow along major roadways. Communities can use such infrastructure, in conjunction with the transportation system, to guide future growth. Water and wastewater infrastructure is often critical to land development, both residential and economic, and its absence can be used to deter development where it is not desired.

Broadband communications for the high speed transfer of voice and data is available in most of the region, however, some communities in the north and west edges of the region are either underserved or not served by this basic technology.

B.4 Transportation as a Land Use Element

Transportation is a key consideration for both quality-of-life issues and economic development and is the main focus of concern in this document. There is ample evidence that the region and the state are losing ground. The physical infrastructure – roads, bridges, and transit systems – is typically old and in need of upgrading or repair. The demands on that infrastructure, as evidenced in the items above, are growing faster than the population. Take the highways, for example: the vehicle-miles traveled by trucks and automobiles have increased by 0.6 percent per year between 2007 and 2010 for the Worcester Metropolitan Area, while the population has grown only 0.28 percent per year; furthermore, the number of lane-miles of new highways has increased barely at all. These statistics are telling us that there are more vehicles on the roads that are driving more miles than ever before, and despite the recent increases in fuel prices, this trend is expected to continue. Most transportation professionals concede that it's probably impossible and certainly impractical to build enough new roads to keep up with demand here in Massachusetts and the northeast, and that means that the existing roads will become even more congested in the future. Today roughly 75-80% of available state and federal highway funds are used to maintain the existing system, leaving barely 20% for system improvements or expansion, and it is generally acknowledged that the funding projected to be available in the foreseeable future would not be adequate to prevent deterioration of the roadways.

Bridges represent a critical part of the transportation infrastructure in this part of the country, where there are many rivers, streams and other barriers to cross. To see the effect of the loss of bridges on a community, one need look no further than the town of Ipswich where flooding rendered four of the town's key bridges unsafe for motorized travel, virtually crippling the town. In this region, the town of Millville was nearly cut in half when a major bridge over the Blackstone River was closed for safety reasons. Many of our bridges are old and structurally deficient, making repairs or replacements both difficult and costly. As will be detailed in Chapter III, this situation is improving slowly with recent funding increases, but will continue to be problematic in the future.

If enough new roads can't be built to keep up with increasing travel demand, how can people get to where they need to go for work or other reasons? Part of that answer might be in increased public transportation and improved walkability and bikeability. Buses and trains today carry a relatively small fraction of the daily commuters in this region, but they have the potential to do even more. The problem is that increased transit capacity requires large investments in capital equipment, infrastructure, and operating funds. The City of Worcester has called increased commuter rail service to Boston a top transportation priority, and additional train service is expected in the next several years. While this is certainly a good start, increased commuter rail service alone will not have a measurable impact on highway congestion. On the other hand, improved infrastructure for bicycling and walking can have a measureable impact on highway congestion, particularly in densely developed areas. Trips that can be made by walking or bicycling reduce the number of single-occupancy vehicles on the roadways and provide congestion relief.

To help advocate and improve public transportation services, as well as improved bicycle and pedestrian infrastructure, what is needed is a regional, inter-regional, and interstate effort that will involve cooperation between public and private entities. Communities can and should do their part by encouraging residential and commercial/industrial developments to be located and constructed in ways that would allow greater use of public transit, walking or bicycletransportation now and in the future. In too many cases development has occurred in ways where travel by other than automobile is difficult if not impossible.

C. PROJECTED FUTURE CONDITIONS

In the last 30 years, population and employment growth in the Central Massachusetts Region have outpaced the rest of state; however, this growth has not occurred uniformly throughout the region[1]. The CMRPC subregions, shown previously in Figure I-2, are useful for examining the actual demographic trends in Central Massachusetts from 2000 to 2010 as well as projecting likely future trends. Tables II-1 through II-3 found on the following pages depict the population, households, and employment for each town in the six subregions current and projected from 2000 through 2035.

[1] This is based on a comparison of U.S. Census and ES202 data from 1980 through 2010. We note that the CMMPO region has not grown as quickly as the nation as a whole.

Some Basic Definitions:

Population - All people living in a geographic area.

Household - A person or group of people who occupy a housing unit as their usual place of residence. The number of households equals the number of occupied housing units in a census.

Employment - The total number of persons on establishment payrolls employed full or part time who received pay for any part of the pay period.

In spring of 2010, MassDOT - Office of Planning released the draft future demographic control totals for all the State's subregions. The Central Massachusetts region's population and employment totals as released were in keeping with the demographic trends the region was experiencing in the past decade. In December 2010, MassDOT released the final regional control totals for population, households and employment for the years 2017, 2020, 2025, 2030 and 2035. Municipal household and population data for the years 2000 and 2010 were taken from the US Census Bureau. Employment data for the years 2000 through 2009 were derived based on tabulations done by the Massachusetts Executive Office of Labor and Workforce Development. CMRPC staff then distributed the control totals for the future years mentioned above to the town level based upon past growth trends, land use and infrastructure capacity, planned future projects, and stakeholder input, including that of the CMMPO and CMMPO Advisory Committee. Transportation staff worked very closely with the community development and land use staff throughout the entire process, making sure their input and comments were incorporated.

In March 2011, CMRPC released regional population and employment projections, for the period 2010 to 2035. Future year projections through 2035 are not predictions *per se*, nor are they expressions of an ideal future. They are simply educated assessments which offer a picture of likely socio-economic changes in the region, including the population, number of households and number of jobs by municipality. In providing these projections to each municipality, CMRPC hopes to inform discussion on how communities shape their policies to address expected growth. Together CMRPC and the towns it serves can move the region toward building the future most desired by those who live and work within its boundaries.

Primarily, the demographic data described above has been derived in order to inform this Regional Transportation Plan, out of which flows the Central Massachusetts Transportation Improvement Program, the annual list of projects slated to receive federal funding. These two documents are prerequisites for the region's eligibility for federal transportation funding. The projections are also used in the region's Travel Demand Forecast model, which estimates the current and future use of the region's transportation infrastructure and aids in analyzing projects being considered for both the RTP and the TIP.

Table II-1: Municipal Population Projections by Subregion

Population	Census*			CMRPC Projections**				
	2000	2010	% Growth	2017	2020	2025	2030	2035
North Subregion								
Barre	5,113	5,398	6%	5,550	5,630	5,740	5,900	6,100
Holden	15,621	17,346	11%	18,000	18,320	18,780	19,440	20,080
Oakham	1,673	1,902	14%	1,950	1,980	2,020	2,080	2,140
Paxton	4,386	4,806	10%	4,950	5,030	5,130	5,280	5,410
Princeton	3,353	3,413	2%	3,520	3,590	3,680	3,810	3,930
Rutland	6,353	7,973	25%	8,550	8,750	9,020	9,400	9,680
West Boylston	7,481	7,669	3%	7,950	8,090	8,300	8,590	8,860
Total North Population	***43,980***	***48,507***	**10%**	***50,470***	***51,390***	***52,670***	***54,500***	***56,200***
Northeast Subregion								
Berlin	2,380	2,866	20%	3,070	3,140	3,230	3,360	3,480
Boylston	4,008	4,355	9%	4,510	4,590	4,700	4,850	5,040
Northborough	14,013	14,155	1%	14,820	15,150	15,620	16,290	16,990
Shrewsbury	31,640	35,608	13%	36,970	37,640	38,590	39,950	41,230
Westborough	17,997	18,272	2%	18,850	19,190	19,680	20,370	21,100
Total Northeast Population	***70,038***	***75,256***	***7%***	***78,220***	***79,710***	***81,820***	***84,820***	***87,840***
Southeast Subregion								
Blackstone	8,804	9,026	3%	9,360	9,530	9,770	10,110	10,440
Douglas	7,045	8,471	20%	8,840	9,000	9,230	9,550	9,860
Grafton	14,894	17,765	19%	18,830	19,260	19,850	20,970	22,210
Hopedale	5,907	5,911	0%	6,080	6,180	6,300	6,480	6,660
Mendon	5,286	5,839	10%	6,060	6,170	6,320	6,550	6,740
Millbury	12,784	13,261	4%	13,770	14,020	14,380	14,880	15,340
Millville	2,724	3,190	17%	3,310	3,370	3,460	3,580	3,690
Northbridge	13,182	15,707	19%	16,450	16,810	17,330	18,070	18,870
Sutton	8,250	8,963	9%	9,300	9,470	9,700	10,040	10,360
Upton	5,642	7,542	34%	7,880	8,030	8,230	8,520	8,850
Uxbridge	11,156	13,457	21%	14,260	14,580	15,030	15,950	16,990
Total Southeast Population	***95,674***	***109,132***	***14%***	***114,140***	***116,420***	***119,600***	***124,700***	***130,010***

*United States Census Bureau

**Projections- accepted/endorsed/approved March 2011

Table II-1: Municipal Population Projections by Subregion *Continued*

Population	Census*			CMRPC Projections**				
	2000	**2010**	**% Growth**	**2017**	**2020**	**2025**	**2030**	**2035**
Southwest Subregion								
Auburn	15,901	16,188	2%	16,540	16,780	17,130	17,620	18,190
Charlton	11,263	12,981	15%	13,600	13,910	14,330	14,930	15,650
Dudley	10,036	11,390	13%	11,710	11,880	12,120	12,470	12,830
Oxford	13,352	13,709	3%	14,140	14,400	14,760	14,760	14,870
Southbridge	17,214	16,719	-3%	17,090	17,350	17,720	17,720	18,000
Sturbridge	7,837	9,268	18%	9,700	9,920	10,220	11,660	12,570
Webster	16,415	16,767	2%	17,130	17,390	17,750	17,750	17,850
Total Southwest Population	***92,018***	***97,022***	***5%***	***99,910***	***101,630***	***104,030***	***106,910***	***109,960***
West Subregion								
Brookfield	3,051	3,390	11%	3,480	3,530	3,600	3,700	3,810
East Brookfield	2,097	2,183	4%	2,210	2,240	2,280	2,340	2,450
Hardwick	2,622	2,990	14%	3,050	3,100	3,170	3,260	3,360
Leicester	10,471	10,970	5%	11,290	11,460	11,700	12,040	12,360
New Braintree	927	999	8%	1,030	1,050	1,070	1,110	1,130
North Brookfield	4,683	4,680	0%	4,810	4,880	4,980	5,130	5,280
Spencer	11,691	11,688	0%	12,050	12,270	12,570	13,010	13,490
Warren	4,776	5,135	8%	5,330	5,430	5,570	5,770	5,940
West Brookfield	3,804	3,701	-3%	3,790	3,850	3,930	4,050	4,160
Total West Population	***44,122***	***45,736***	***4%***	***47,040***	***47,810***	***48,870***	***50,410***	***51,980***
Central Subregion								
Worcester	***172,648***	***181,045***	***5%***	***186,220***	***189,040***	***193,010***	***198,660***	***204,010***
Regional Total	**518,480**	**556,698**	***7%***	**576,000**	**586,000**	**600,000**	**620,000**	**640,000**

*United States Census Bureau

**Projections- accepted/endorsed/approved March 2011

Table II-2: Municipal Household Projections by Subregion

Households	Census*			CMRPC Projections**				
	2000	2010	% Growth	2017	2020	2025	2030	2035
North Subregion								
Barre	1,889	2,025	7%	2,130	2,190	2,250	2,330	2,420
Holden	5,715	6,394	12%	6,890	7,100	7,340	7,520	7,900
Oakham	578	685	19%	690	710	740	770	800
Paxton	1,428	1,546	8%	1,640	1,680	1,740	1,860	1,860
Princeton	1,166	1,279	10%	1,320	1,360	1,410	1,470	1,520
Rutland	2,253	2,791	24%	3,330	3,480	3,700	3,880	4,020
West Boylston	2,413	2,616	8%	2,620	2,710	2,800	2,910	3,010
Total North Households	***15,442***	***17,336***	***12%***	***18,620***	***19,230***	***19,980***	***20,740***	***21,530***
Northeast Subregion								
Berlin	872	1,125	29%	1,180	1,230	1,260	1,330	1,380
Boylston	1,573	1,698	8%	1,810	1,870	1,930	2,000	2,080
Northborough	4,906	5,110	4%	5,360	5,530	5,770	5,900	6,280
Shrewsbury	12,366	13,424	9%	14,770	15,290	15,790	16,470	16,120
Westborough	6,534	6,924	6%	7,100	7,380	7,650	8,070	8,500
Total Northeast Households	***26,251***	***28,281***	***8%***	***30,220***	***31,300***	***32,400***	***33,770***	***34,360***
Southeast Subregion								
Blackstone	3,235	3,403	5%	3,490	3,590	3,710	3,870	4,020
Douglas	2,476	3,000	21%	3,350	3,500	3,690	3,860	4,000
Grafton	5,694	6,892	21%	7,620	7,900	8,240	8,670	9,330
Hopedale	2,240	2,194	-2%	2,340	2,390	2,460	2,540	2,620
Mendon	1,815	2,022	11%	2,230	2,330	2,420	2,550	2,540
Millbury	4,927	5,294	7%	5,410	5,560	5,740	5,870	6,180
Millville	923	1,094	19%	1,180	1,220	1,270	1,380	1,320
Northbridge	4,800	5,896	23%	6,200	6,430	6,690	6,900	7,350
Sutton	2,811	3,213	14%	3,440	3,580	3,720	3,890	4,030
Upton	2,042	2,733	34%	3,050	3,180	3,290	3,550	3,440
Uxbridge	3,988	5,056	27%	5,410	5,600	5,860	6,180	6,710
Total Southeast Households	***34,951***	***40,797***	***17%***	***43,720***	***45,280***	***47,090***	***49,260***	***51,540***

*United States Census Bureau/American Community Survey
**Projections - accepted/endorsed/approved March 2011

Table II-2: Municipal Household Projections by Subregion *Continued*

Households	Census*			CMRPC Projections**				
	2000	2010	% Growth	2017	2020	2025	2030	2035
Southwest Subregion								
Auburn	6,346	6,542	3%	6,680	6,820	7,010	7,120	7,480
Charlton	3,788	4,608	22%	5,100	5,330	5,590	5,800	6,210
Dudley	3,737	4,062	9%	4,370	4,480	4,620	4,780	4,780
Oxford	5,058	5,272	4%	5,450	5,590	5,780	5,780	5,870
Southbridge	7,077	6,866	-3%	7,040	7,170	7,360	7,360	7,500
Sturbridge	3,066	3,611	18%	3,970	4,100	4,260	4,780	5,290
Webster	6,905	7,088	3%	7,220	7,360	7,550	7,550	7,610
Total Southwest Households	***35,977***	***38,049***	***6%***	***39,830***	***40,850***	***42,170***	***43,170***	***44,740***
West Subregion								
Brookfield	1,204	1,375	14%	1,410	1,450	1,490	1,540	1,590
East Brookfield	778	828	6%	840	860	880	930	970
Hardwick	997	1,094	10%	1,150	1,150	1,190	1,220	1,270
Leicester	3,683	4,021	9%	4,000	4,090	4,220	4,380	4,520
New Braintree	318	370	16%	370	380	390	410	420
North Brookfield	1,811	1,862	3%	1,870	1,910	1,950	2,020	2,090
Spencer	4,583	4,744	4%	4,790	4,900	5,060	5,160	5,480
Warren	1,889	2,021	7%	2,160	2,220	2,300	2,390	2,470
West Brookfield	1,362	1,479	9%	1,460	1,500	1,530	1,570	1,630
Total West Households	***16,625***	***17,794***	***7%***	***18,050***	***18,460***	***19,010***	***19,620***	***20,440***
Central Subregion								
Worcester	***67,028***	***68,613***	***2%***	***72,670***	***74,040***	***76,040***	***78,250***	***80,750***
Regional Total	**196,274**	**210,870**	**7%**	**223,110**	**229,160**	**236,690**	**244,810**	**253,360**

*United States Census Bureau/American Community Survey
**Projections - accepted/endorsed/approved March 2011

Table II-3: Municipal Employment Projections by Subregion

Employment	2000*	2010**	% Growth	CMRPC Projections**				
				2017	2020	2025	2030	2035
North Subregion								
Barre	1,161	1,230	6%	1,250	1,510	1,520	1,530	1,530
Holden	3,923	3,520	-10%	3,630	3,700	3,760	3,800	3,830
Oakham	138	210	52%	220	220	220	220	220
Paxton	703	850	21%	940	950	950	960	960
Princeton	805	740	-8%	750	750	750	760	760
Rutland	1,076	1,060	-1%	1,100	1,120	1,140	1,150	1,160
West Boylston	3,817	3,730	-2%	3,850	3,930	3,990	4,040	4,070
Total North Employment	***11,623***	***11,340***	***-2%***	***11,740***	***12,180***	***12,330***	***12,460***	***12,530***
Northeast Subregion								
Berlin	666	480	-28%	590	600	620	620	630
Boylston	1,429	1,800	26%	1,910	1,960	2,000	2,040	2,060
Northborough	6,923	5,800	-16%	7,090	7,270	7,430	7,560	7,640
Shrewsbury	14,556	13,010	-11%	13,650	14,410	14,740	14,990	15,160
Westborough	26,574	23,610	-11%	24,770	26,320	26,930	27,390	27,690
Total Northeast Employment	***50,148***	***44,700***	***-11%***	***48,010***	***50,560***	***51,720***	***52,600***	***53,180***
Southeast Subregion								
Blackstone	1,192	1,030	-14%	1,040	1,050	1,050	1,060	1,060
Douglas	887	830	-6%	870	890	910	920	930
Grafton	4,634	4,100	-12%	4,230	4,310	4,380	4,430	4,470
Hopedale	1,831	1,620	-12%	1,630	1,650	1,660	1,670	1,670
Mendon	1,501	1,280	-15%	1,300	1,310	1,310	1,320	1,320
Millbury	3,884	5,050	30%	5,290	5,350	5,390	5,420	5,440
Millville	202	270	34%	280	280	280	280	280
Northbridge	4,715	5,320	13%	5,510	5,660	5,790	5,880	5,950
Sutton	1,554	2,110	36%	2,250	2,300	2,350	2,390	2,420
Upton	1,071	1,010	-6%	1,020	1,030	1,030	1,040	1,040
Uxbridge	2,828	3,080	9%	3,120	3,160	3,180	3,190	3,200
Total Southeast Employment	***24,299***	***25,700***	***6%***	***26,540***	***26,990***	***27,330***	***27,600***	***27,780***

*Massachusetts Division of Employment & Training (now Division of Unemployment Assistance, DUA)

**Projections - accepted/endorsed/approved March 2011

Table II-3: Municipal Employment Projections by Subregion *Continued*

Employment	2000*	2010**	% Growth	CMRPC Projections**				
				2017	2020	2025	2030	2035
Southwest Subregion								
Auburn	12,299	9,940	-19%	10,250	10,450	10,630	10,750	10,840
Charlton	2,839	3,740	32%	4,000	4,350	4,450	4,520	4,570
Dudley	2,978	2,720	-9%	2,830	2,860	2,880	2,890	2,900
Oxford	3,532	3,760	6%	3,900	3,980	4,040	4,090	4,120
Southbridge	6,690	5,820	-13%	5,860	5,930	5,970	5,990	6,010
Sturbridge	5,163	4,470	-13%	4,700	4,790	4,870	4,920	4,960
Webster	6,667	6,690	0%	6,900	7,040	7,160	7,240	7,300
Total Southwest Employment	***40,168***	***37,140***	***-8%***	***38,440***	***39,400***	***40,000***	***40,400***	***40,700***
West Subregion								
Brookfield	499	460	-8%	470	470	470	470	470
East Brookfield	387	420	9%	430	430	430	430	430
Hardwick	342	390	14%	410	410	410	410	410
Leicester	2,251	2,290	2%	2,320	2,350	2,370	2,380	2,390
New Braintree	157	210	34%	220	220	220	220	220
North Brookfield	1,251	910	-27%	920	980	980	990	990
Spencer	3,758	3,090	-18%	3,110	3,150	3,170	3,180	3,190
Warren	1,293	600	-54%	600	600	600	600	600
West Brookfield	956	830	-13%	840	850	850	860	860
Total West Employment	***10,894***	***9,200***	***-16%***	***9,320***	***9,460***	***9,500***	***9,540***	***9,560***
Central Subregion								
Worcester	***107,536***	***95,920***	***-11%***	***98,950***	***102,410***	***104,120***	***105,400***	***106,250***
Regional Total	**244,668**	**224,000**	**-8%**	**233,000**	**241,000**	**245,000**	**248,000**	**250,000**

*Massachusetts Division of Employment & Training (now Division of Unemployment Assistance, DUA)

**Projections - accepted/endorsed/approved March 2011

C.1 Key Findings

- Between years 2010 and 2035 the region is expected to add approximately 80,000 people, nearly 40,000 household units, and approximately 25,000 jobs. It seems notable that these numbers are all lower than the projections in the last Regional Transportation Plan (adding approximately 110,000 people, 53,000 household units, and 37,000 jobs). By comparison, in the 30 years between 1980 and 2010, the region added 122,000 people to its population and over 40,000 jobs (Figures II-7 and II-8).

Population & Housing

- Currently the Central Massachusetts Region is home to 556,698 people, 8.5% of the Massachusetts population

- Currently the Central Massachusetts Region contains approximately 210,870 occupied housing units, 7.7% of the state's housing units
- The communities in the CMRPC region can be grouped in the following three categories based on the past growth trends, available land and infrastructure for future growth, and planned future residential projects. All rates of growth were projected only to the nearest percent, and were discussed with the stakeholders before converting the rates into projected counts. Please see Figure II-7 and II-8 depicting the various communities.
  - **Low growth communities** (expected to remain close to the 2010 numbers): Auburn, Barre, Brookfield, Dudley, East Brookfield, Hardwick, Hopedale, Leicester, New Braintree, North Brookfield, Oakham, Paxton, Southbridge, Webster, West Brookfield, and Worcester.
  - **Medium growth communities** (expected to grow at a rate close to the regional average): Blackstone, Boylston, Douglas, Holden, Mendon, Millbury, Millville, Oxford, Princeton, Shrewsbury, Spencer, Sutton, Upton, Warren, West Boylston, and Westborough.
  - **High growth communities** (expected to grow more rapidly than the region as a whole): Berlin, Charlton, Grafton, Northborough, Northbridge, Rutland, Sturbridge, and Uxbridge.

Employment

- In 2000 the Central Massachusetts Region was home to approximately 245,000 jobs, about 7% of the jobs in Massachusetts. This number has decreased to 224,000 in 2010, and in 2035 the region is expected to host 250,000 jobs, about 7.3% of the total jobs in Massachusetts. This trend seems to be on par with historical data.
- Due to the current economic recession many economists predict that it will be several years, perhaps between 2017 and 2020, before employment numbers climb back to the 2005 levels.
- The communities in the CMRPC region can be grouped in the following three categories based on the past employment and planned future projects. All rates of growth were projected only to the nearest percent, and were discussed with the stakeholders before converting the rates into projected counts. Please see Figure II-9 and II-10 depicting the various communities.

- **Low growth communities** (expected to remain close to the 2010 numbers): Blackstone, Brookfield, East Brookfield, Hardwick, Hopedale, Leicester, Mendon, Millbury, Millville, New Braintree, North Brookfield, Princeton, Southbridge, Spencer, Upton, Uxbridge, Warren, and West Brookfield.
- **Medium growth communities** (expected to grow at a rate close to the regional average): Auburn, Barre, Dudley, Grafton, Holden, Oakham, Oxford, Paxton, Rutland, Sturbridge, Webster, West Boylston, and Worcester.
- **High growth communities** (expected to grow more rapidly than the region as a whole): Berlin, Boylston, Charlton, Douglas, Northborough, Northbridge, Shrewsbury, Sutton, and Westborough.

The demographic projections presented here are estimates based on available data and short-term and long-term trends. They provide information to decision makers who can take actions and make choices that might ultimately affect the actual results. Markets and the nature of the transportation and working environments are likely to change between now and 2035, impacting the actual numbers in uncertain ways. Nevertheless, best educated estimates are made in order to have some rational basis for planning.

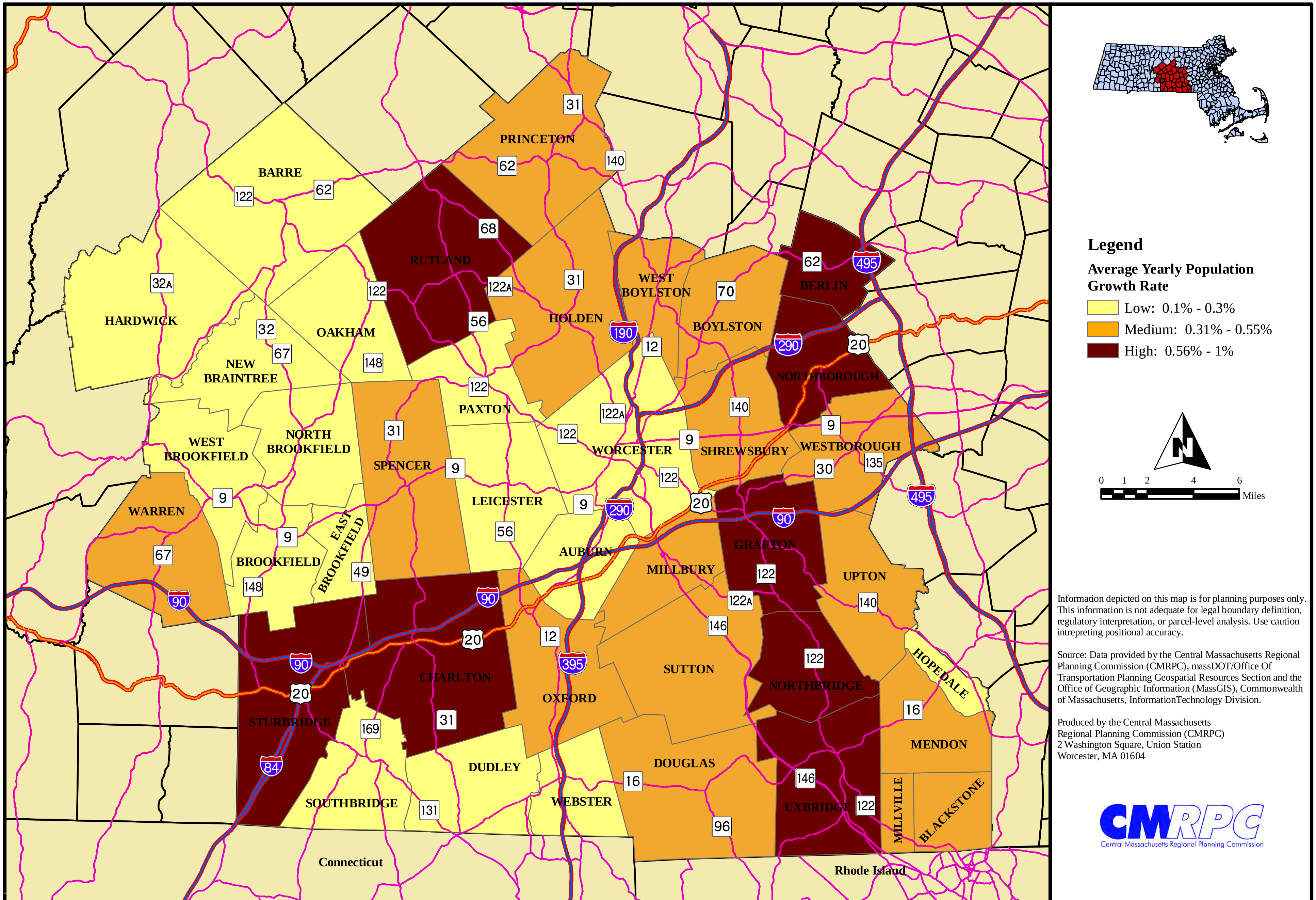


Figure II-7 Projected Population Growth Rate, 2010 - 2035

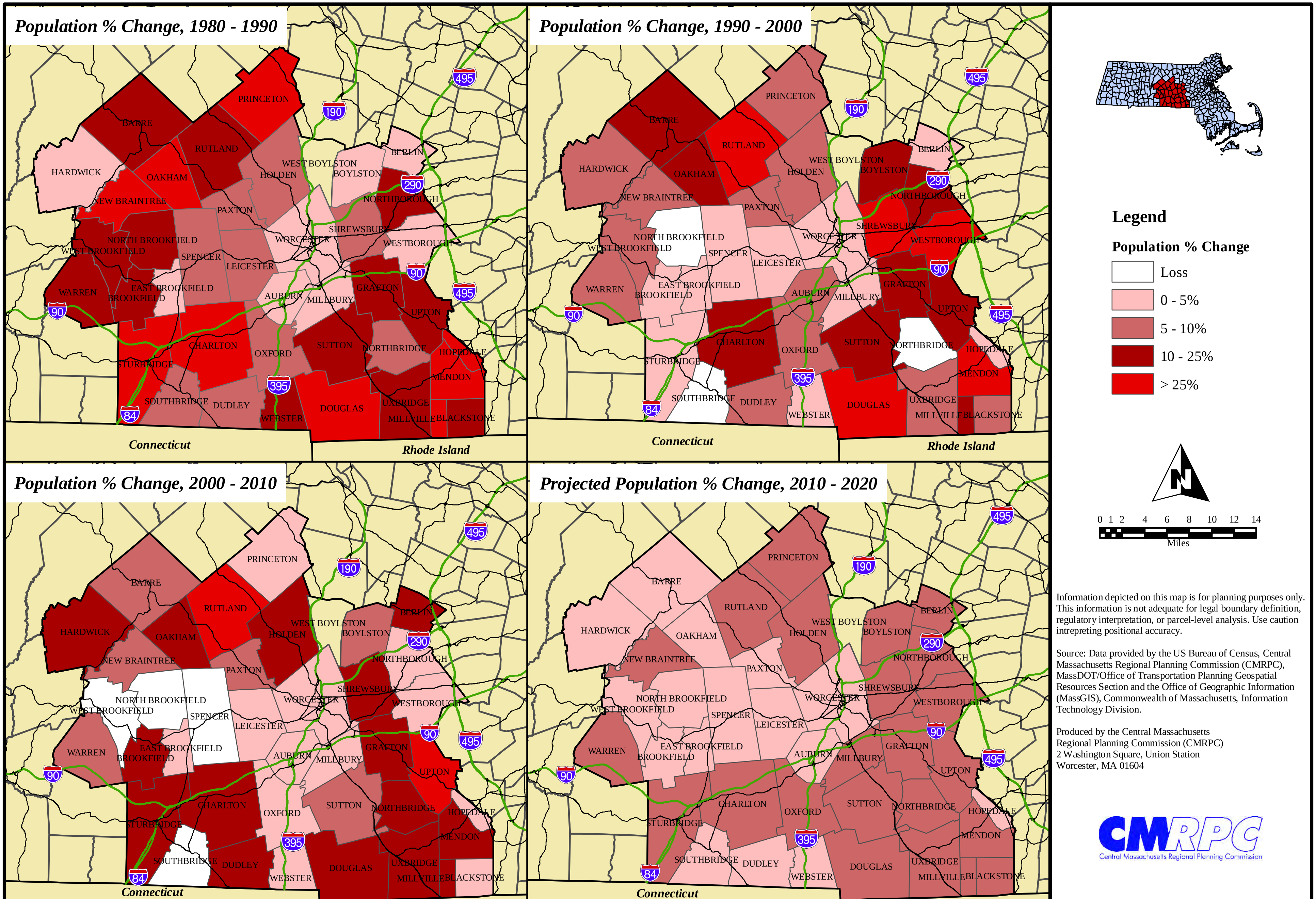
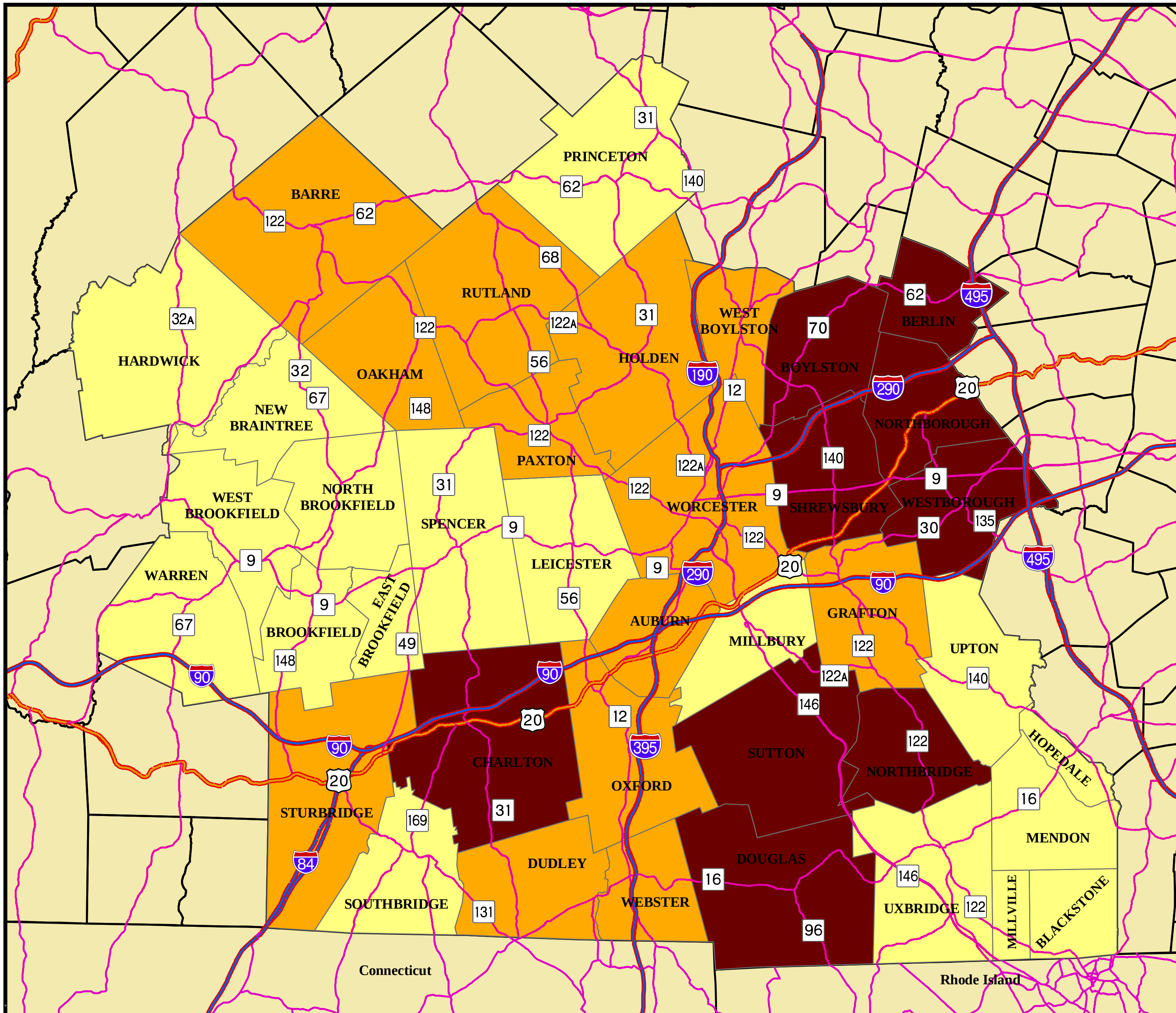


Figure II-8 Regional Population Percentage Changes, 1980 - 2020



Legend

Average Yearly Employment Growth Rate

- Low: 0.1% - 0.4%
- Medium: 0.41% - 0.65%
- High: 0.66% - 1%

0 1 2 4 6 Miles

Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), massDOT/Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

Produced by the Central Massachusetts Regional Planning Commission (CMRPC)
2 Washington Square, Union Station
Worcester, MA 01604

CMRPC Central Massachusetts Regional Planning Commission

Figure II-9 Projected Employment Growth Rate, 2010 - 2035

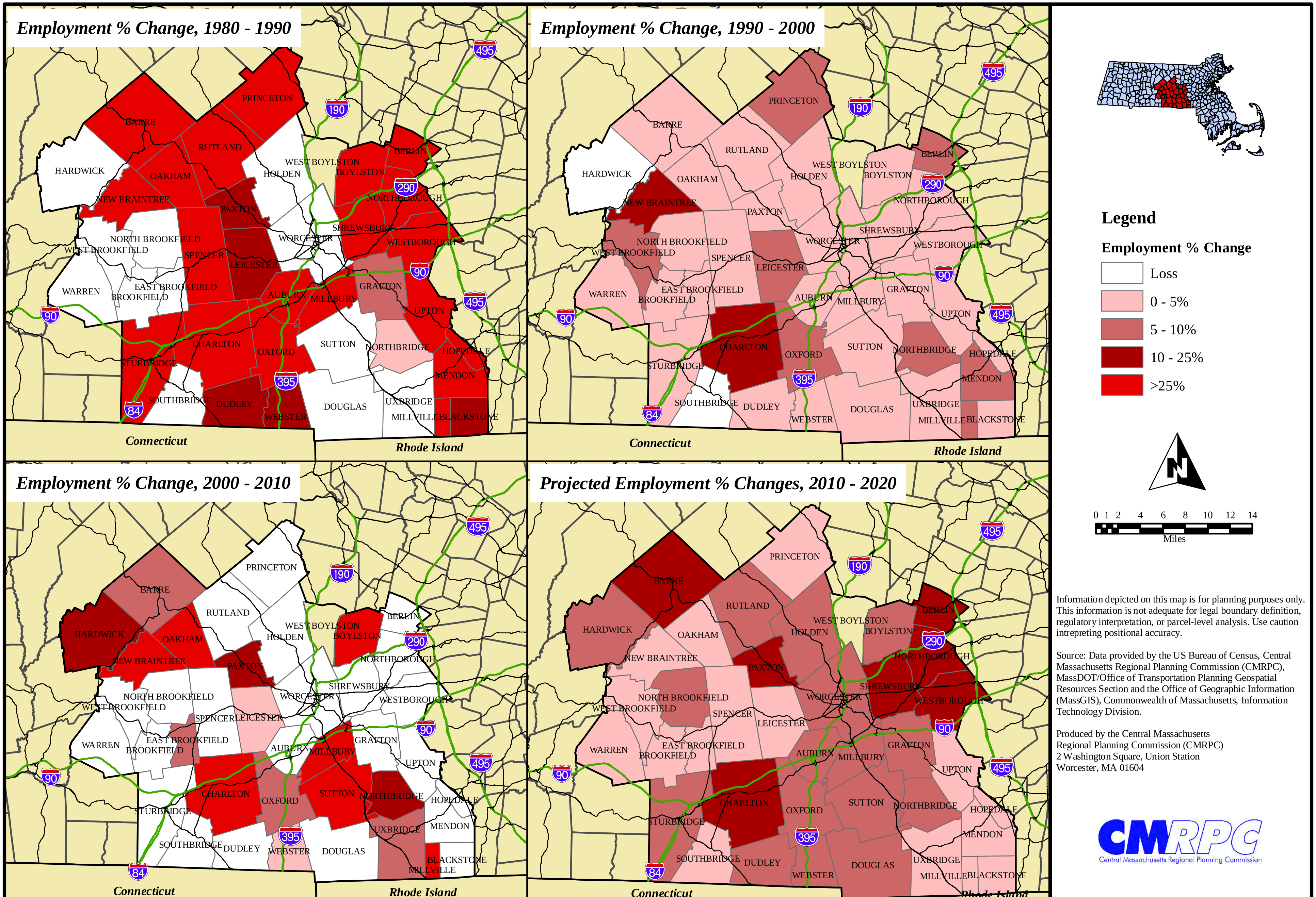


Figure II-10 Regional Employment Percentage Changes, 1980 - 2020

C.2 Future Trends in Population, Employment and Land Use – Regional Policy Plan's Goals for Central Massachusetts

Projections of future conditions are rarely found to be completely accurate in hindsight due to the complexities of anticipating evolving forces. Often basic assumptions that would seem to be very stable over a long period of time can suddenly and unexpectedly change, yielding quite different outcomes than some had anticipated. Keeping in mind that projecting is a difficult business, understanding how these trends might play out over time may spur new initiatives that will yield a more satisfactory outcome.

1. The region will continue to experience growth rates above the state average. Land is readily available and relatively less expensive than in other regions, and its central location makes it a desirable location for development.
2. This pressure for growth will bring about price increases, not only for private homes and apartments, but for communities who will also struggle to provide services that new residents and businesses require. Municipalities will have to make hard choices and perhaps reduce services.
3. Communities will compete for new commercial and industrial development to help offset the costs of growth. Since current market forces favor shopping plazas and industrial parks with ample parking, this new growth will continue to occur along state numbered routes and major streets. This will make it more difficult to manage impacts within communities as they will also spill over into adjacent communities.
4. With a vast amount of developable land remaining, the region will likely absorb growth from other regions where such land is in short supply. As communities on the eastern edge of the region, such as Shrewsbury and Westborough, reach buildout, communities in the Blackstone Valley and western and southern portions of the region will be pressed to absorb the demand for new development. Development will likely take place on land less suitable for development, such as steeply sloping land, raising concerns of erosion and low density sprawl.
5. Traffic growth will inevitably occur as new residents and businesses move into the region. State policies today discourage new highway construction, so existing roadways will have to be managed to maximize traffic flow. This Regional Transportation Plan identifies actions throughout the region to mitigate this increase in traffic over our roadways.
6. Demands on public water supplies could quickly take up existing capacity. Communities will need to be careful stewards of the capacity that exists today in order to serve new development well into the future. It is likely that some communities may soon reach the limit of water they can provide. In that case, new development in rural areas will be limited to that which can be accommodated by on-site wells and septic systems. Communities with excess capacity will likely experience additional development pressure to meet regional demand.
7. Communities today are beginning to revise their zoning and land use controls to create a higher density of development under the banner of Smart Growth. Local officials are starting to see the benefits of a more compact pattern of development in effort to relieve pressure on the rural areas of their towns. City and town centers could benefit from this trend and areas now in decline could experience revitalization.
8. Many strip commercial developments in older suburbs have reached the end of their useful life. With a lack of readily developable land in such communities, it is likely that redevelopment of

such sites will become economical, providing opportunities to undo planning patterns of the past and elevate the quality of development if more progressive design standards are put into place.

9. As the data presented above indicates, the Region's farmland is in a state of decline. State actions can help to stem the tide of farmland conversion to development. But it is clear that the State will be unable to protect all of the agricultural land that remains. State and local resources should be concentrated in areas where clusters of farms remain in order to help to retain a viable agricultural economy. Many communities are now enacting Right to Farm Bylaws and creating Agricultural Commissions to help farmers stay in business.
10. Greater suburbanization could cause a gradual decline in environmental quality, and it is likely that state and local regulators will impose increasingly costly remedies to maintain the environmental health of the Region. As development occurs in rural areas, large tracts of open space will become fragmented and have consequences on the ability of native flora and fauna to survive.
11. Increasing fuel and energy prices and the desire to create more sustainable communities is beginning to create more of a demand for alternative modes including local transit, commuter rail, bicycle and pedestrian facilities. The region will face an increasing need to improve access to these modes, while simultaneously needing to meet the needs of maintaining the existing roadway infrastructure.

C.2.1 Goals & Policies For Growth

The CMRPC *2020 Growth Strategy* provides a set of coherent policies that can provide guidance to the planning and development community for managing the region's future growth under a "smart growth" approach. The challenge of the Strategy is to establish consistent goals that can apply to such a diverse region. Relevant policies are needed that can establish a framework for guiding development in the twenty-first century. The goals and policies that the CMRPC has adopted are designed to assist individual communities in meeting this challenge. They are:

A. To accommodate projected growth within acceptable plan guidelines.

1. Encourage communities to study current patterns of urban land consumption and consider zoning actions to preserve open land, retain community character and limit low-density residential development.
2. Encourage in each community the employment of a professional planner, either full-time, part-time or under a joint sharing arrangement with neighboring communities.
3. Create opportunities for inter-community dialogue on growth and development changes, and the sharing of information and ideas.
4. Improve the use of the CMRPC Local Planning Assistance program, GIS computer mapping services and Town Planning Matching Grant program through development and funding of a new marketing plan.
5. Control sprawl in rural areas by establishing densities consistent with farming and restrict commercial uses not appropriate for rural centers.
6. Promote the use of planning techniques that can achieve a measure of compactness in urban village centers that possess appropriate public infrastructure.

B. To capitalize on the region's potential for new job creation opportunities.

1. Within the City of Worcester and older suburban towns, encourage reinvestment and reuse of sites, especially “brownfield” sites where feasible.
2. Provide information about the region’s economic development potential through the conduct and maintenance of an industrial site survey.
3. Promote economic growth in locations with public utilities that can be developed as clusters or nodes and eventually become linked to public transit.
4. Expand and coordinate public and private training programs to enable all members of the region’s labor force to improve technical, teamwork and problem solving skills.
5. Encourage collaboration among government, industry and public and private institutions in marketing this area as a place where “value” and opportunity can be found.

C. To provide a basis for public infrastructure investments.

1. Identify potential centers of growth and the associated public infrastructure needed for continued development.
2. Guide state infrastructure expansions and other public improvements to desired growth centers.
3. Encourage the growth of the area’s transportation system in conformance to land development constraints as well as local and regional plans.
4. Preserve the region’s existing transportation infrastructure and only consider new additions to accommodate unexpected but desired changes.

D. To provide a common frame of reference for all city and town planning.

1. Distribute the "2020 Growth Strategy" report to city and town officials, and at their request, meet with them to explain the development issues and the CMRPC growth forecasts.
2. Promote the use of CMRPC growth forecasts and recommendations for controlling sprawl when addressing local officials about developing a community Master Plan.
3. Encourage community-driven planning processes that bring people together to identify growth issues, develop a vision, set goals, and determine actions to improve their communities.

E. To provide a foundation for the development of regional land use management and sharing of municipal services.

1. Promote an ongoing dialogue about regional growth management techniques including advisory reviews of boundary zoning cases and developments of regional impact among planning officials in each of the six subregions.
2. Explore the creation of a planning database that would be accessible to all communities through the CMRPC Internet site.
3. Extend GIS services to member communities and the provision of data to assist local officials in identifying areas for sustainable development.
4. Assist in the redevelopment of the Region’s numerous brownfield sites.

To accomplish these objectives, the Plan lists 19 action items that CMRPC and its member communities can undertake to combat sprawl. The initiatives in Table II-4 seek to accomplish a variety of broad purposes:

- To promote greater awareness of alternatives to conventional development practices;
- To promote the enactment of state legislation to empower communities to implement innovative growth strategies;
- To collect and disseminate information to improve decision-making at the local level; and
- To undertake regional strategies where communities can work cooperatively on common problems or to resolve inter-municipal disputes.

Table II-4
Central Massachusetts 2020 Growth Strategy
Regional Growth Management Initiatives

Statewide	
1.	Promote the enactment of a Statewide Comprehensive Planning System.
2.	Work with state agencies to ensure compliance with Executive Order 385's requirement for consistency of state investment plans with adopted local and regional plans.
3.	Work with other planning organizations to reform M.G.L. c.41, §81-P, which allows landowners to subdivide their land by the use of Approval Not Required (ANR) plans.
4.	Change Massachusetts law to allow Cluster Residential Development by right at the municipality’s option.
5.	Solicit the Massachusetts Municipal Association and the state’s planning community to actively promote legislation that would authorize cities and towns to use impact fees.
6.	Encourage the Region’s legislators to consider legislation that would allow tax-revenue sharing among municipalities.
7.	Reform Massachusetts’ “Anti-Snob” Zoning Law (M.G.L. c. 40B).
Regional	
8.	Establish Subregional Coordinating Councils to promote inter-local dialogue and regional cooperation on growth issues.
9.	Use the Commission’s vote on the Central Massachusetts Metropolitan Planning Organization to influence the investment of federal and state transportation infrastructure funds in designated growth areas.
10.	Design a new model “Compact Growth” manual for planning boards in Central Massachusetts.
11.	Work with area legislators and elected officials to pass legislation providing a state matchi program for municipal open space acquisition.
12.	Explore with planning officials in all subregions the need and utility of CMRPC advisory reviews on boundary zoning changes and large-scale developments.
13.	Create a regional information clearinghouse and database for use by local planning boards well as prospective developers.
14.	Conduct an in-depth study of all industrially zoned sites in the region.
15.	Undertake a major inventory and priority setting of natural resource areas for future protection/acquisition.

16.	Create a greater awareness among area legislators for smart growth management through regular dialogue with members of the Central Massachusetts Legislative Caucus.
17.	Support applications for federal and state grants from communities who have in place an approved program to attract affordable housing.
18.	Actively participate in other regional initiatives.

D. ASSURING TRANSPORTATION EQUITY

In 1994 President Clinton expanded the impact of the 1964 Civil Rights Act by issuing Executive Order 12898 that called for all federal agencies to ensure that their programs do not disproportionately cause high and adverse effects on minority and low-income populations and to ensure that all potentially affected communities have the opportunity for full and fair participation in the transportation decision-making process. As a recipient of federal funds, the CMMPO is bound to assure equity in transportation planning decisions for all communities, and to support metropolitan community development and social goals. To carry out the intent of the Executive Order, however, it was necessary to identify those low income and minority communities or neighborhoods.

When first instituted, an Environmental Justice Task Force of community leaders who represent the interests of minority and low-income families reviewed various ways to define what would constitute a <u>neighborhood of environmental justice concern</u>. By consensus, the Task Force recommended the U.S. Census Block Group be used as the definition of a "neighborhood", and that the following two criteria be used for designation:

- Block Groups where the median household income is less than or equal to 65% of the statewide median as determined by the 2000 US Census (65% * $50,502 = $32,826). (2010 data that was collected is not comparable to 2000 data and a new method using alternate data will need to be developed for updating purposes)

OR

- Block Groups where the percentage of minority population is greater than or equal to 25 percent.

These are two of the criteria adopted by the Massachusetts Executive Office of Environmental Affairs (EOEA) in establishing its policy for Environmental Justice.
Using these definitions,

- 27.7% of the CMRPC block groups meet the criteria for neighborhoods of environmental justice (EJ) concern (120 of 433).
- 76.7% of those EJ block groups lie within the City of Worcester (92 of 120).
- 23.3% of those EJ block groups lie outside the City of Worcester (28 of 120).

Figures II-11and II-12, Neighborhoods of Environmental Justice Concern, show those U.S. Census Block Groups within the region that meet one or both of the criteria.

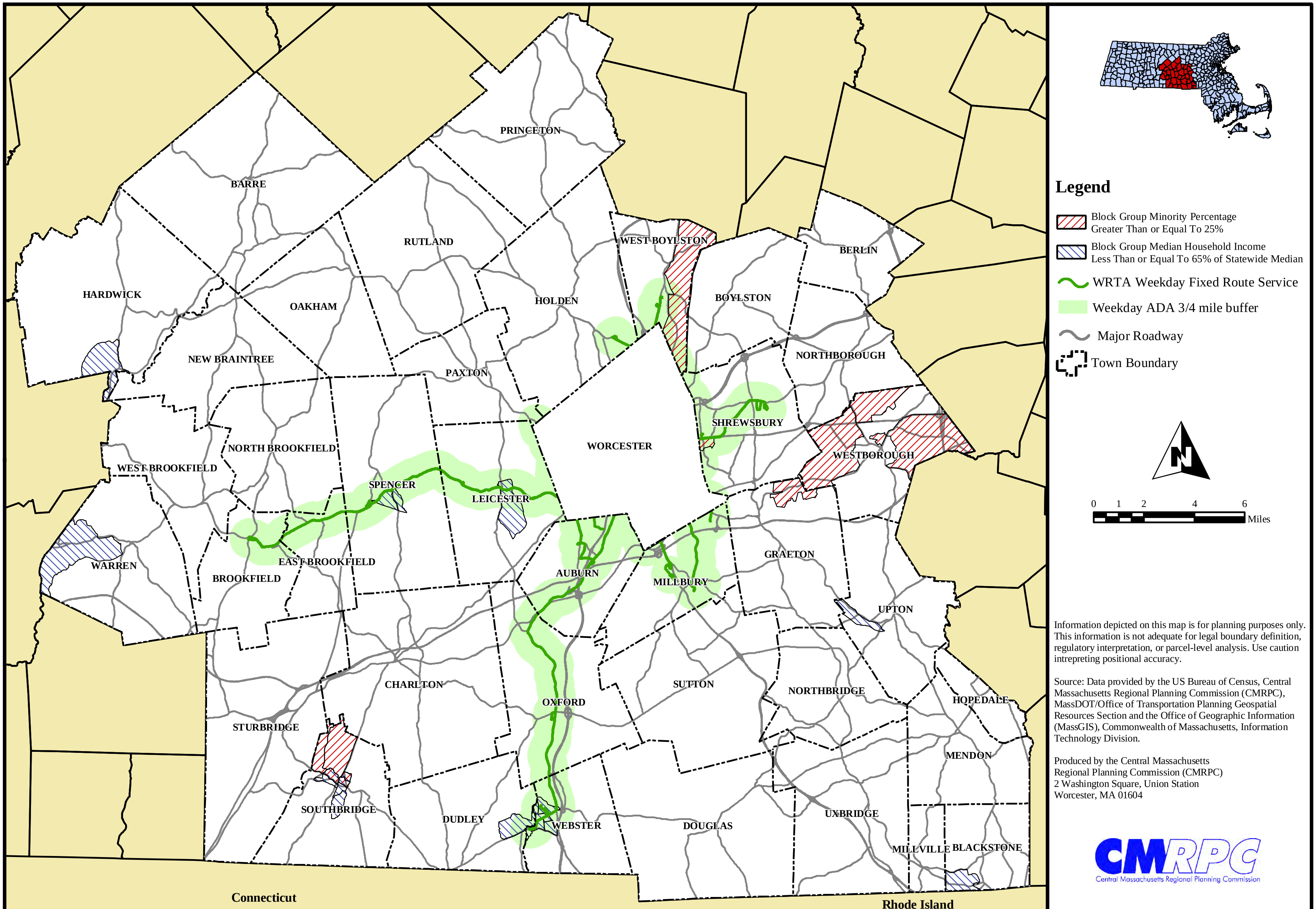


Figure II-11 Neighborhoods of Environmental Justice Concern

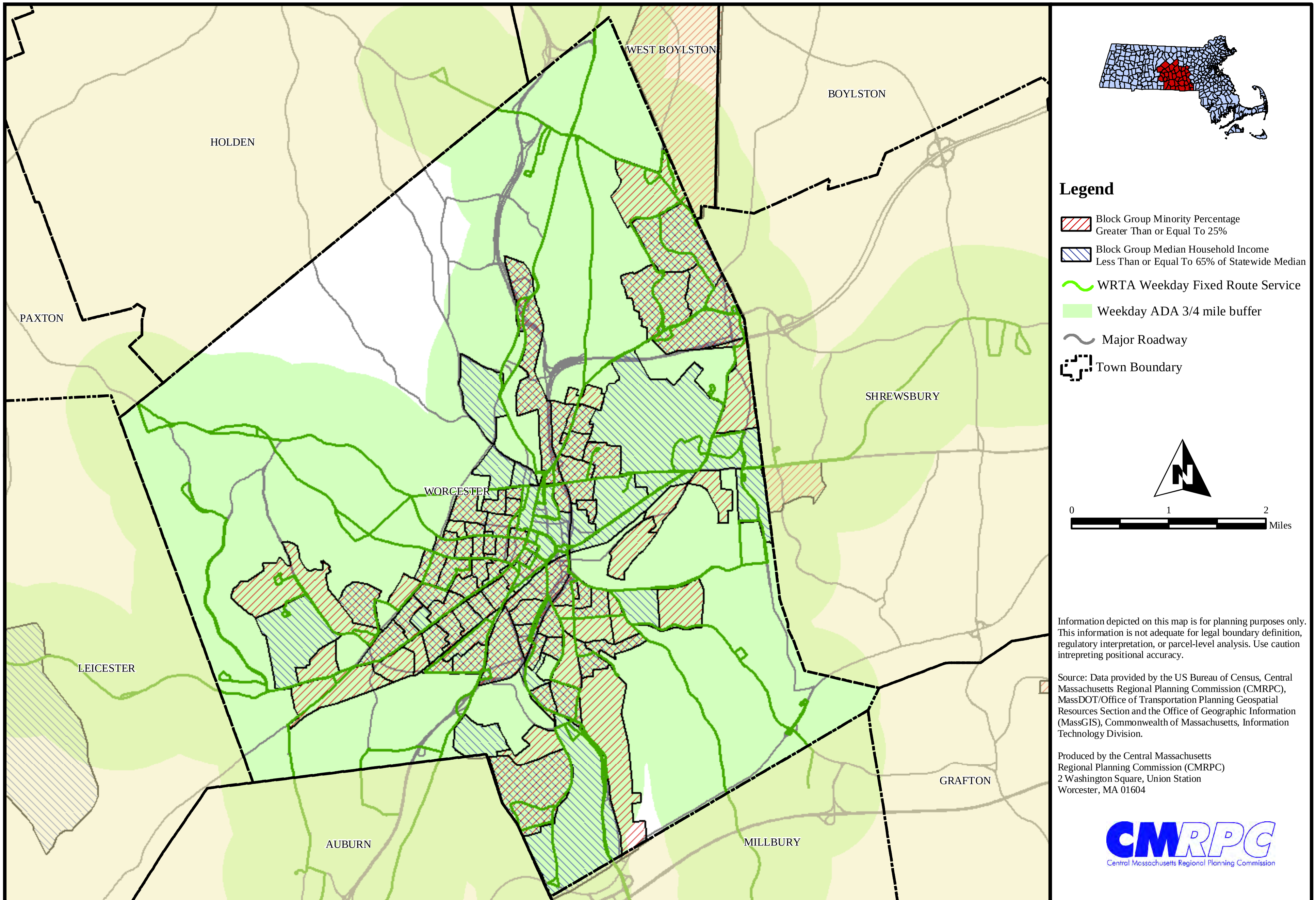


Figure II-12 Neighborhoods of Environmental Justice Concern: City of Worcester

Since the mid-2000s, CMMPO staff has involved itself with various community groups who represent and offer access to Environmental Justice communities. Most notably, on an ongoing basis, CMMPO staff partners with Common Pathways, a Massachusetts Department of Public Health Community Health Network, which is a local coalition of public, non-profit, and private sectors working together to build healthier communities in Massachusetts through community-based planning and health promotion. Located in Central Massachusetts, Common Pathways creates shared learning by diverse residents and key institutional stakeholders on vital issues of the day, as identified by indicators. Their process promotes effective citizen and organizational discourse leading to informed action, facilitates broad-based resident/organizational representation in identifying a common set of community indicators, and proactively assures access to participation in the local democratic process for diverse groups and individuals.

Over the past several years, the Transportation Subcommittee of Common Pathways has targeted working with the Worcester Regional Transit Authority to increase and diversify its ridership through employer forums, and has worked with the City of Worcester to address snow removal policies to improve the ability of residents to walk, bike, and take transit during the winter months.

In the Summer of 2010, Common Pathways held Neighborhood Conversations with a broad group of stakeholders/citizens. As part of the RTP outreach process, CMRPC staff sitting on the Transportation Subcommittee requested Common Pathways to include general transportation needs questions in their Neighborhood Conversations, providing excellent feedback on the needs of specific populations. The need for expanded transit and better facilities for biking and walking are the most frequently mentioned needs of Environmental Justice populations.

Both the scope of the Regional Transportation Plan (RTP) and its action items were affected by input received from outreach efforts. The RTP reflects the concerns that public transportation planning must account for more personalized service to accommodate the growing population of low-income individuals in the region. In addition, roadway congestion, while not a factor only found in minority and low-income areas, must also consider the effect it has on area land uses and air quality in low-income and minority neighborhoods.

REGIONAL TRANSPORTATION SYSTEM

III

III. REGIONAL TRANSPORTATION SYSTEM

A. INTRODUCTION

The transportation system in the CMMPO region is a collection of roads, bridges, transit services, freight facilities, bicycle routes, pedestrian facilities and intermodal connectors that need to work as an integrated system within and throughout the 40 communities and beyond. The transportation system is maintained and operated by a number of different agencies, including but not limited to the Massachusetts Highway Department, the Massachusetts Bay Transportation Authority, the Massachusetts Port Authority, the Department of Conservation and Recreation, and local entities.

In 2007, the Massachusetts Transportation Finance Commission issued a report stating that, over the next twenty years, the cost just to maintain the transportation system exceeds anticipated funding by $19 billion. Of the anticipated funding gap, nearly $10 billion was attributed to the maintenance of the Commonwealth's roads and bridges.

The following sections describe each of the modes and inventory existing conditions. Roads, bridges, sidewalks, trails, railroad tracks, ports, and airstrips are all transportation assets (any structure affixed to the ground that assists in the movement of people and goods). An effective asset management program assists decision makers in optimizing strategies for evaluation, providing, and maintaining assets in a serviceable condition. Asset management begins with an inventory of current system infrastructure and its operating condition.

III-A. REGIONAL HIGHWAY SYSTEM

A. GUIDING PRINCIPLES

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was signed into law in August 2005. SAFETEA-LU furthers the spirit of previous legislation that has governed the highway planning activities of the CMMPO since 1991. The national law refines and continues important planning concepts such as safety, geographic equity, innovative finance, congestion relief, mobility and productivity, efficiency, and environmental quality.

At the state level, the Commonwealth of Massachusetts established the principles of “Fix it First” and “Communities First” in its Statewide Road and Bridge Policy. “Fix it First” stipulates that priority be given to the repair of existing roadways and bridges. “Communities First” insists upon collaboration with communities in order to design context-sensitive roadway and bridge projects. According to the policy statement, context-sensitive projects are expected to “protect and enhance the surrounding community and landscape while addressing mobility for all transportation modes.”

Both the federal and state policies are reflected in the CMMPO 2012 RTP Goals and Objectives, many of which are especially relevant to the regional highway system and are listed below (also found in Chapter I Section E.3):

Goal I. *Attain a safer more secure & better-maintained transportation system across all modes and for all populations*

Objective I-A. Define and maintain acceptable conditions and optimal functionality of the region’s transportation assets.

Objective I-B. Identify and improve critical locations of safety concern in order to achieve a reduction in the number of injuries and fatalities occurring as people and freight move throughout our region’s transportation system.

Objective I-C. Utilize the management systems, travel demand model, and other regional data to identify and prioritize areas of need to better inform selection of projects.

Objective I-D. Continue to encourage coordination among transportation security agencies, expand on identified risks to transportation infrastructure, and prepare evacuation analyses for the region under various scenarios.

Goal II. *Promote livable communities and improved air quality through context-sensitive design and reduced traffic congestion*

Objective II-A. Improve and encourage the use of public transit, ridesharing services, and pedestrian and bicycle facilities so as to achieve a reduction in the percentage of commuter trips utilizing single-occupant vehicles (SOVs), as measured in the 2010 US Census Journey-to-Work data and American Community Survey annual data. Develop/assess alternative strategies to help reduce greenhouse gases (GHG) and that address issues of climate change.

Objective II-B. In conjunction with the MassDOT-Highway District Offices, assist communities that propose potential TIP projects with utilization of the Massachusetts Project Development and Design Guidebook, which outlines a multi-modal and context-sensitive approach to roadway design.

Objective II-C. Ensure consistency of recommended and implemented transportation improvement projects with local and statewide growth management and economic development plans by reviewing available planning documents and maintaining coordinated communication with community stakeholders throughout the development of major local land use projects and the CMMPO RTP and TIP.

Goal III. Develop an alternative, creative transportation system that integrates multiple travel modes and includes the use of technology

Objective III-A. Monitor the connectivity of the physical regional infrastructure within and across the regional planning boundary so that it can be better incorporated in the prioritization and selection of transportation improvement projects.

Objective III-B. Seek out appropriate uses of technology for improving the management of existing transportation infrastructure. Review all project proposals for appropriate technology consideration. Provide an ongoing forum for communication and coordination between appropriate transportation-related agencies in order to deploy the Central Massachusetts Regional ITS Architecture.

B. HIGHWAY NETWORK DESCRIPTION

B.1 Interstates, US, and State Numbered Routes

The highway network in Central Massachusetts connects the region's 40 communities to each other and to major New England cities such as Boston, Providence, Springfield, Hartford and Albany. Interstates 84, 90, 190, 290, 395, and 495, US Route 20, and State Routes 9 and 146 provide the majority of this access. The City of Worcester and the Towns of Auburn, Millbury, and Sturbridge house the major crossroads of these facilities within the region while a string of I-495 interchanges along the eastern edge of the region continue to attract significant traffic from Central Massachusetts. Figure III-1 shows the region's Interstate, US, and State Numbered Highways.

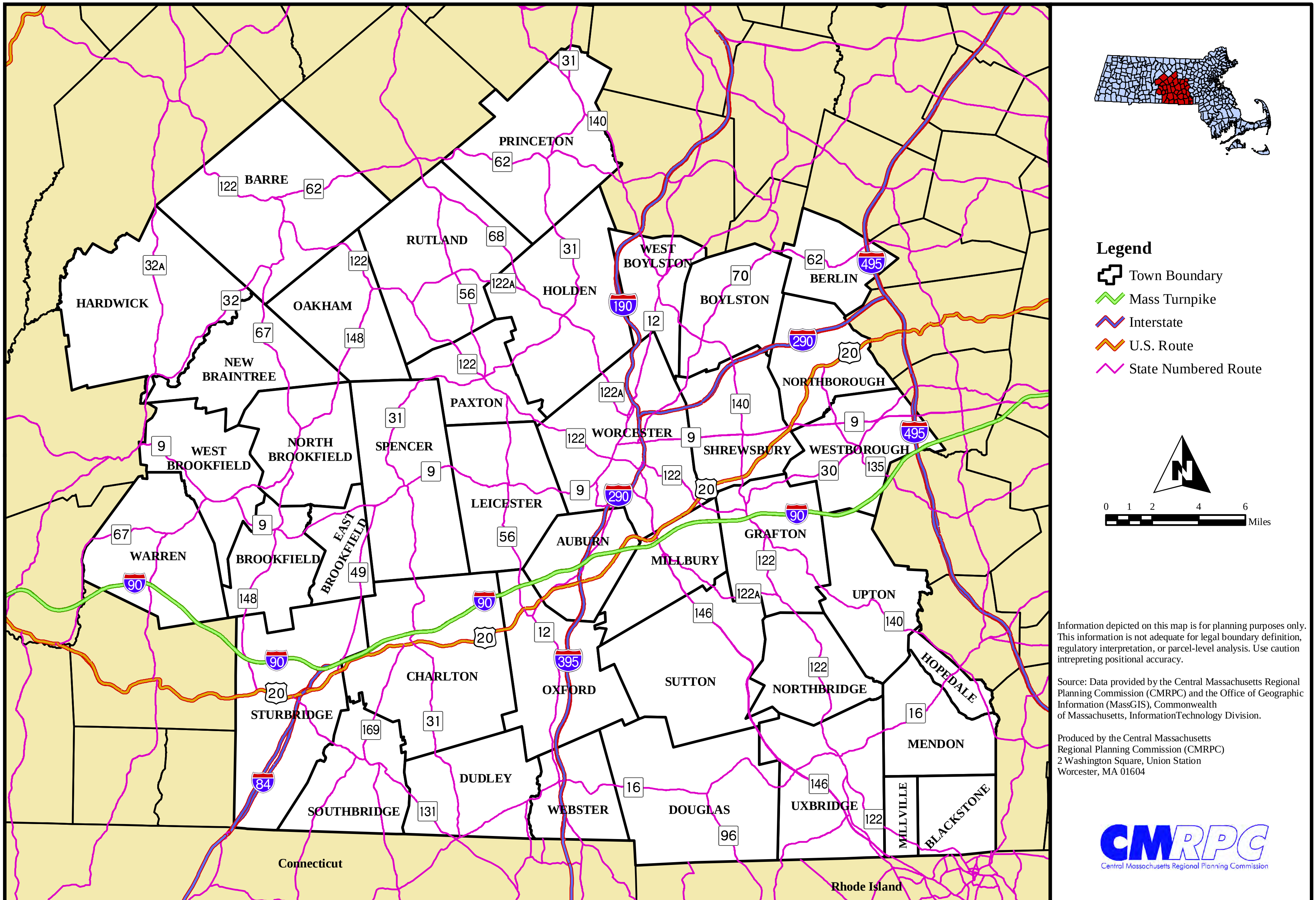


Figure III-1 The Region's Interstate, U.S. and State Numbered Routes

B.2 National Highway System (NHS)

The National Highway System (NHS) is an interconnected network of principal arterial routes that serve major population centers, international border crossings, seaports, airports, public transportation facilities, intermodal freight facilities, and major travel destinations. Established through a cooperative effort between state, regional, and local officials, the NHS also meets national defense requirements and serves interstate and interregional travel. Mandated by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), the NHS was officially designated on September 30, 1995.

NHS roadways in the Central Massachusetts region are shown in Figure III-2. As required, all Eisenhower National System of Interstate and Defense Highways, commonly known as the Interstate Highway System, are included in the NHS. In the region these facilities include I-84, I-190, I-290, I-395, and I-495. The Massachusetts Turnpike, I-90, a toll road, is also part of the NHS. U.S. Route 20 through the region is part of the system of United States Numbered Highways, often called U.S. Routes or U.S. Highways. Although the Interstate Highway System has largely replaced the U.S. Highways for through traffic, these facilities continue to serve critical regional connections. As such, U.S. Route 20 between I-395 and I-495 is part of the NHS. Further, State Route 9 and State Route 146, in their entirety, are included in the NHS network. As indicated on the figure, a number of other roadways are also identified as part of the NHS as they provide critical connections to downtown Worcester, various intermodal facilities for both passengers and freight as well as other major travel destinations.

B.2.1 High Priority Corridors on the NHS

From a wider perspective, the CMMPO is also cognizant of the “High Priority Corridors” on the NHS established under SAFETEA-LU. Although none of the High Priority Corridors are in Massachusetts, those identified in the greater New England and New York area have the potential to impact the region in regards to passenger movement, freight flows and evacuation routes. Some of the identified corridors also have the potential to expand into Massachusetts in the future. The High Priority Corridors in the greater area as included in SAFETEA-LU are as follows:

- The **Interstate Route 87** Corridor from New York City to the Quebec border
- The **Interstate Route 95 Corridor** in Connecticut beginning at the New York state line through Connecticut to the Rhode Island state line.
- The **Interstate Route 91 Corridor** from New Haven, CT, through Hartford to the Massachusetts state line.
- The **East-West Corridor** commencing in Watertown, New York, continuing northeast through New York, Vermont, New Hampshire, and Maine, terminating in Calais, Maine.
- The **Providence Beltline Corridor** beginning at Interstate Route 95 in the vicinity of Hope Valley, RI, traversing eastwardly intersecting and merging into Interstate Route 295, continuing northeastwardly along Interstate Route 95, and terminating at the Massachusetts border. This identified corridor also includes the western bypass of Providence, RI, from Interstate Route 295 to the Massachusetts border.

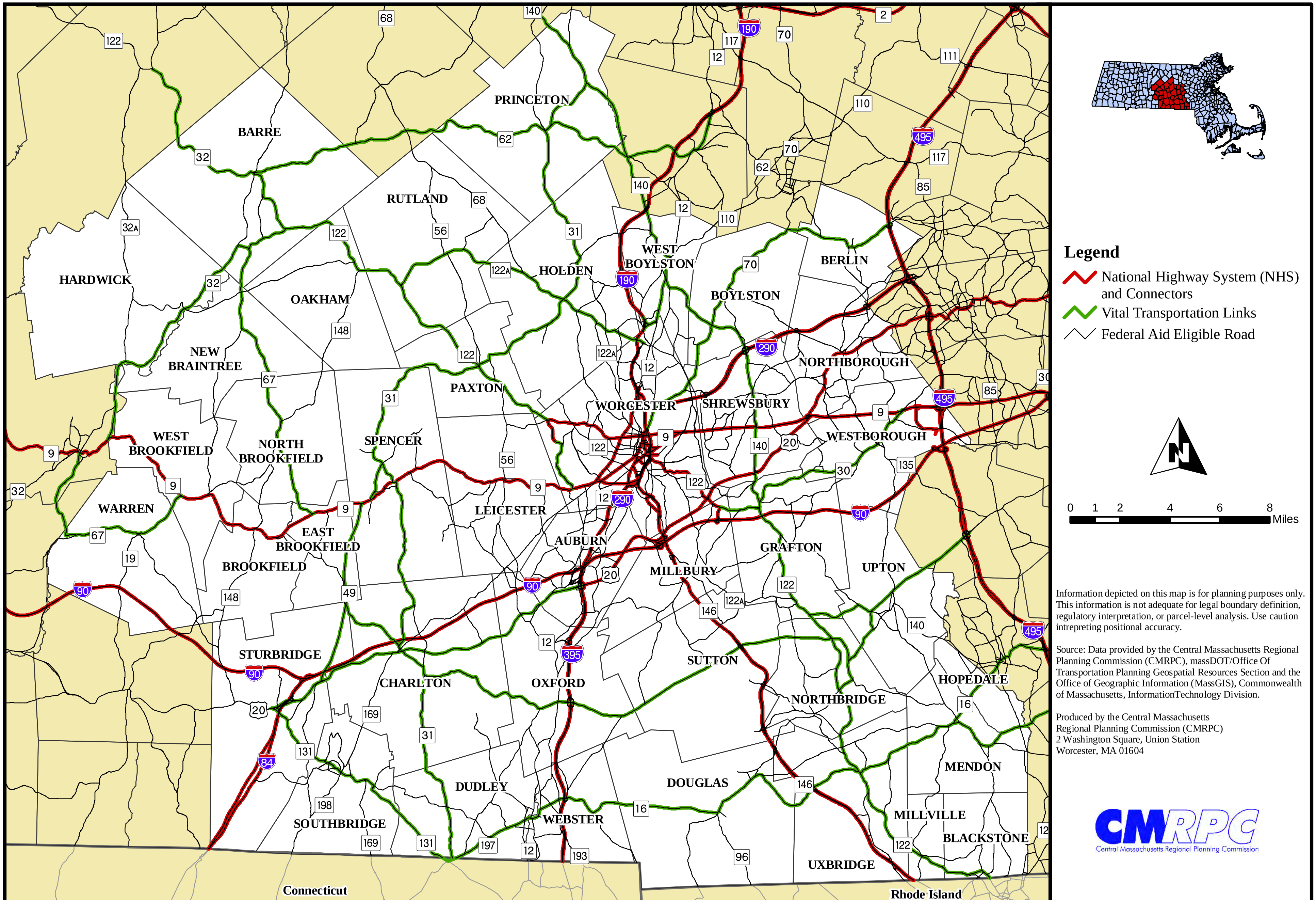


Figure III-2 Vital Transportation Links

B.2.2 NHS Connectors

Major intermodal terminals in the region serving freight and passengers have long been identified. Through ongoing freight planning efforts, these facilities, as well as the roadways that provide primary access, continue to be observed and monitored. Recently, the roadways that provide "to the gate" access to the region's identified major intermodal terminals and the greater NHS network were reviewed and assessed, as requested by FHWA. The region's "NHS Connectors" are shown above in Figure III-2. The major intermodal terminals that serve freight and passengers in the region along with brief descriptions of their respective NHS Connectors are summarized below.

Town of Westborough

CSX Transportation Intermodal Yard, rail to truck transfer, Walkup Street: *Yard to Walkup St. to Flanders Rd. to Connector Rd. to Lyon St. to Computer Dr. to Route 9 Westbound & Yard to Walkup St. to Flanders Rd. to Connector Dr. to Research Dr. to Route 9 Eastbound*

City of Worcester

CSX Transportation, TOFC & bulk commodities terminal, rail to truck transfer, Franklin Street: *Yard to Franklin St. to Grafton St. to I-290 interchange*

P&W Railroad Yard/Intransit Container, rail to truck transfer, Southbridge Street: *Yard to Southbridge St. to Cambridge St. & Yard to Southbridge St. to Quinsigamond Ave. to I-290/State Route 146 interchange*

P&W Railroad Yard/Intransit Container, rail to truck transfer, Wiser Avenue: *Yard to Blackstone River Road (formerly Millbury Street) northbound to State Route 146 interchange*

Worcester Regional Airport, passenger & air freight facility, Airport Drive: *Highland Street from the intersection of Park Avenue (Routes 9, 12 and 122A) to Pleasant Street to Airport Drive, terminating at Goddard Memorial Drive*

B.2.3 Other Potential NHS Connectors

As growth and change continue in the Central Massachusetts region, it may be necessary to designate other roadways as NHS Connectors. As such, a number of sites where intermodal operations might eventually meet the established NHS Connector criteria have been identified and are summarized below.

East Brookfield Flats: During the early 1990's, CSX Transportation predecessor Conrail purchased a rather large land parcel in an area of town known as the East Brookfield Flats. Adjacent to both the railroad's Boston Line and State Route 9, it appeared that Conrail had plans for the property. It should be noted, however, that Conrail knowingly purchased the property despite the town of East Brookfield's by-law prohibiting both Container on Flatcar (COFC) and

Trailer on Flatcar (TOFC) terminal operations. In the future, the "Flats" could again face development pressures or, conversely, eventually become dedicated open space.

MassCentral Railroad's Ware River Line: Site development opportunities adjacent to the MassCentral Railroad's Ware River Line may have the potential to attract rail served business and industry. The asset of the rail line that lies in both the CMRPC and PVPC planning regions is owned nearly entirety by MassDOT and is leased to operator MassCentral. The MassCentral's interchange with both CSX and the New England Central Railroad may also result in the future growth of rail to truck intermodal operations in the Ware River Valley.

New England Automotive Gateway: At this major intermodal facility, new vehicles are transloaded from railcars to car carrier trucks for final distribution to retail dealerships. A spur from CSX Transportation's Boston Line provides rail access to the site while a site drive situated on Route 49 south of Route 9 provides highway access. Most loaded car carrier trucks using the facility travel south on Route 49 to the U.S. Route 20, I-84, MassPike (I-90) interchange in Sturbridge.

Southbridge Municipal Airport: Beginning in the late 1990's, Southbridge Municipal Airport upgraded access roadways, vehicle parking and various aircraft facilities including tie downs, additional hangar space and aircraft fuel storage/distribution systems. The airport facility has the capacity for increased utilization, perhaps to include cargo operations. Recently opened, a new access road named Commercial Drive runs from Route 169 to just north of the airport grounds at the Casella construction debris recycling center. Notably, at this time, an update of the Airport's master plan is currently underway.

C. THE HIGHWAY IMPROVEMENT PROCESS

C.1 Federal-Aid Eligibility

Federal-aid eligibility is primarily determined by functional classification. Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they provide. The highway network plays a dual service role by providing access to property and facilitating travel mobility. Streets and highways are subdivided into three general classifications: local, collector and arterial. The primary function of local facilities is access to properties, especially housing. In contrast, arterials provide high mobility to serve through movements. Collectors serve as connections between local and arterial facilities. When optimally designed, they provide a balance between property access and through mobility. Roadway sections classified as a major collector or higher in rural areas, minor collector or higher in urban areas, are eligible to receive federal funding for transportation improvements. Figure III-3 shows the federal-aid eligible roadways.

Many federal-aid eligible roadways are designated as part of the National Highway System (NHS). Funding associated with the NHS allows construction of projects on non-NHS highways, as well as the construction of any transit project that is eligible under the Federal Transit Act. However, this eligibility requires the project in question to be located within the corridor of a

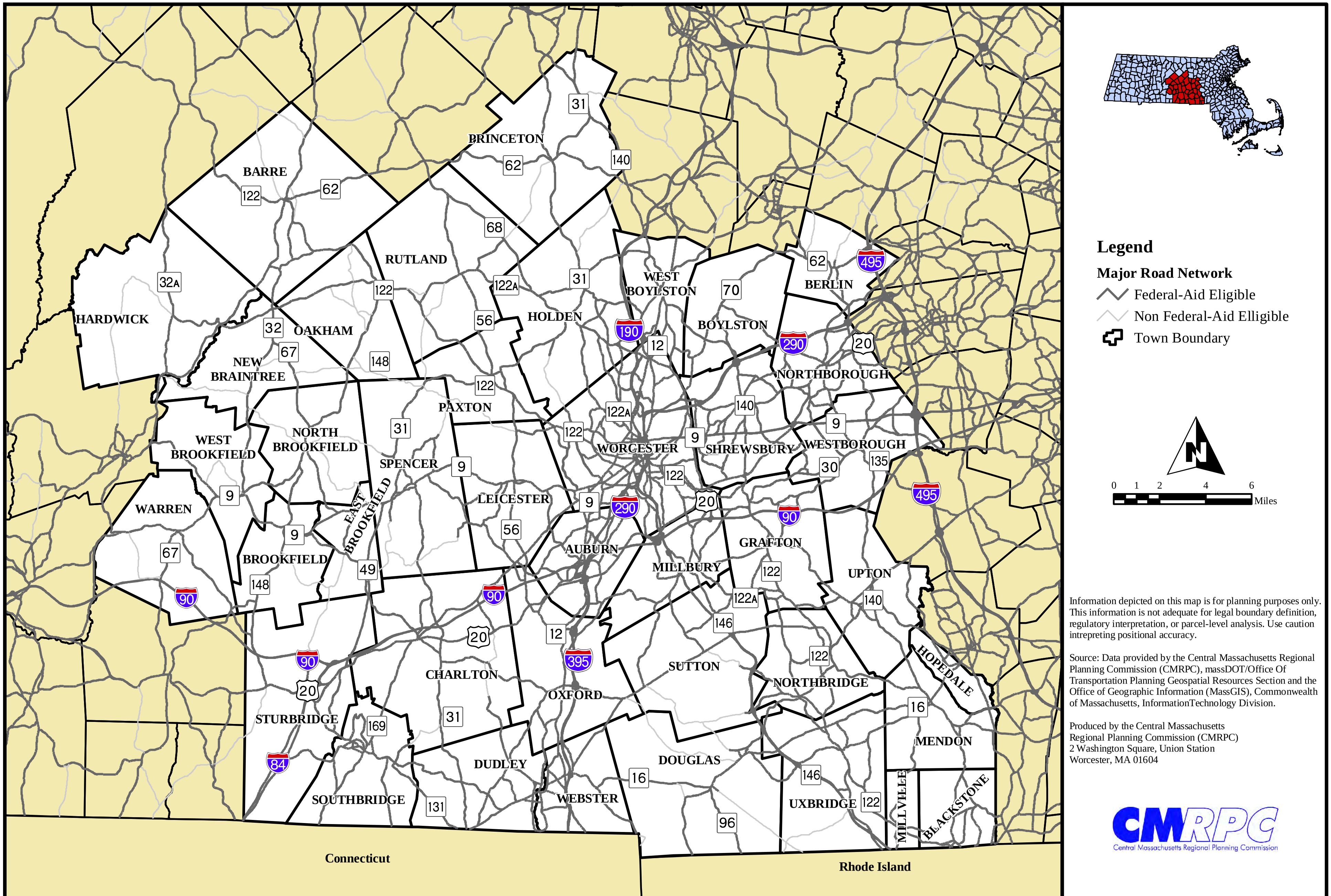


Figure III-3 Federal-Aid Eligible Roadways

fully access-controlled NHS facility, to improve the level of service of the NHS facility, and to be more cost-effective than an improvement to the NHS facility.

Improvements to non-NHS roadways that are federal-aid eligible are funded through the Surface Transportation Program (STP). SAFETEA-LU allows much flexibility with regard to STP funding as these funds may be used for projects on any federal-aid highway, including the NHS, bridge projects on any public road, and transit capital projects, such as public bus terminals and facilities. SAFETEA-LU expands STP eligibilities to include advanced truck stop electrification systems, high crash/high congestion intersections, and environmental restoration and pollution abatement, such as control of noxious weeds and aquatic noxious weeds and reestablishment of native species. Each state must set aside a portion of their STP funds (10 percent or the amount set aside in 2005, whichever is greater) for transportation enhancements activities, which include items such as pedestrian and bicycle facilities, landscaping and scenic beautification and rehabilitation and operation of historic transportation buildings, structures or facilities. The set-aside of 10 percent previously required for safety construction activities (i.e., hazard elimination and highway-rail crossing improvements) was eliminated in 2006, as these activities are funded separately under the new Highway Safety Improvement Program.

C.2 Funding Projects through the Transportation Improvement Program (TIP)

The region's Transportation Improvement Program, referred to as the "TIP," is a federally required planning document that lists all highway, bridge, transit and intermodal projects in the Central Massachusetts planning region that are programmed to receive federal-aid funding. In the most current TIP, projects are listed for federal fiscal years 2012 through 2015. Projects of regional & statewide significance, such as Interstate Maintenance (IM), as well as projects that improve air quality under the Congestion Mitigation Air Quality (CMAQ) program are examples of the types of projects included. Occasionally, non federal-aid (NFA), or state-funded, projects are also listed for information purposes. Cognizant of limited statewide transportation funding resources, the annual program of projects must demonstrate financial constraint within the federal-aid funding targets established for each of the MPO regions by MassDOT-Planning in cooperation with the Massachusetts Association of Regional Planning Agencies (MARPA).

A historic perspective of the Central Massachusetts region's TIP is shown on Figure III-4. The graphic provides an overview of active TIP projects since 1997 through the 2010 federal fiscal year. As indicated on the legend, three different types of projects are included on the Regional TIP graphic: Advertised, Programmed and Supplemental. Each term is defined as follows:

Advertised **–** Projects that have been "advertised" by MassDOT, inviting competitive bids from the construction (and similar) industries. Through established guidelines, MassDOT will select a contractor to implement a project. Essentially all of these projects have been implemented or will soon be completed.

Programmed **–** Projects selected by the MPO to receive a portion of the federal-aid "target" funding allocated to the region by MassDOT.

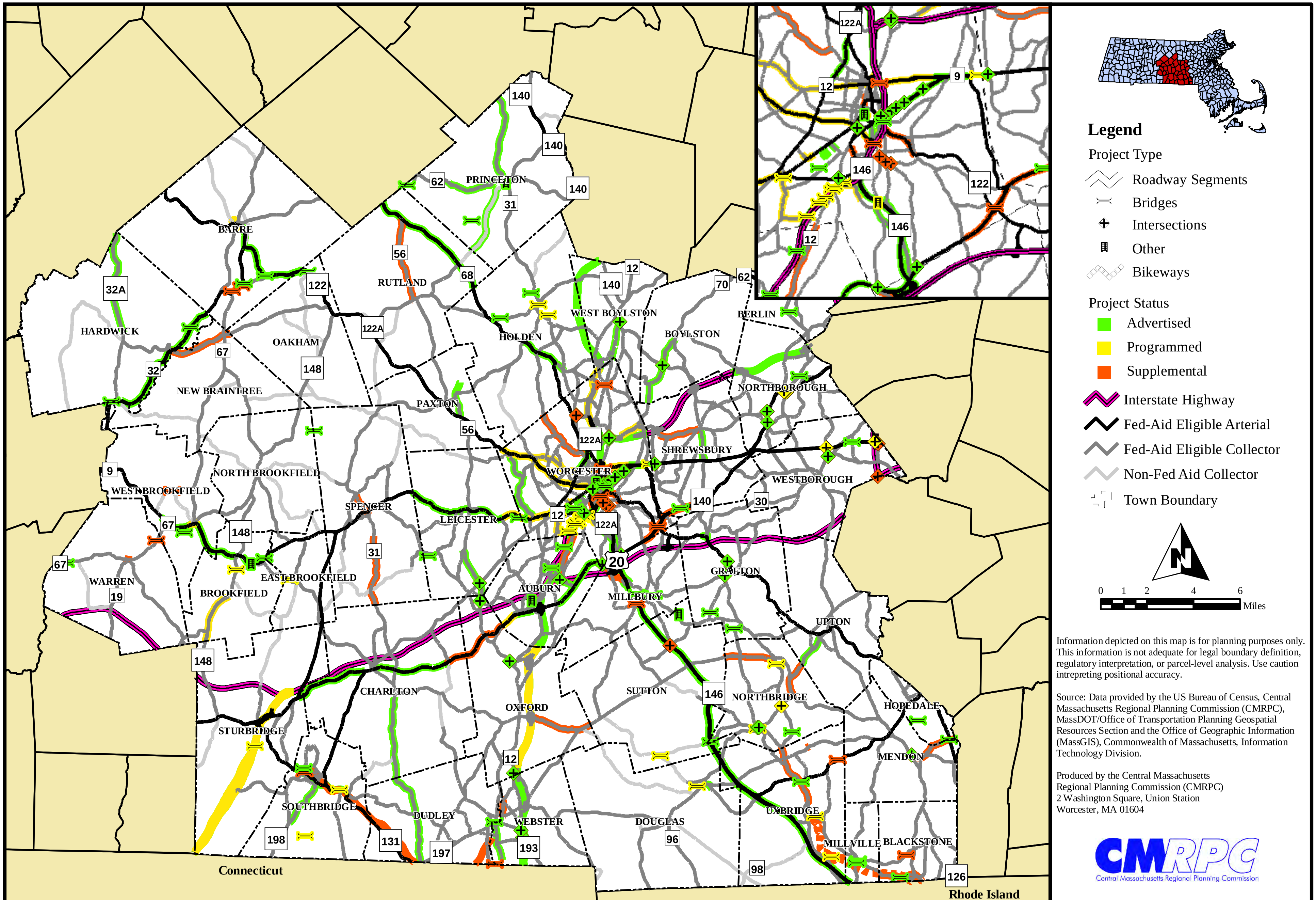


Figure III-4 Central Massachusetts Regional Transportation Improvement Plan Historic Overview

Supplemental **–** Potential improvement projects recognized by the MPO and included for information only. The supplemental project listing is essentially a waiting list of projects eligible for inclusion on the TIP.

The CMRPC transportation staff, working with the membership of the CMMPO, revises the TIP project listing on an annual basis. The annual process has traditionally commenced by a request to the communities to provide updates on any existing projects that have received previous approval as well as any new projects that the host community would like to bring forth for consideration. Often, the host community is responsible for the costs of engineering design and any environmental requirements as well as obtaining any necessary right-of-way to accommodate the project. In order to be considered, project requests must come from the community's highest elected official.

If a given improvement project is seen to have merit, MassDOT requires the host community to complete a Project Need Form (PNF). The PNF is designed to demonstrate a *need* as opposed to describing a proposed improvement project. In most cases, PNFs can be completed by community personnel; consulting services are typically not necessary at this early stage of project development. Each submitted PNF is considered by the MassDOT Project Review Committee (PRC) which meets occasionally. If accepted by the PRC, MassDOT then requires a Project Information Form (PIF) from the host community. Once a project is accepted, the host community is formally notified concerning their ability to seek necessary engineering services through a competitive review and bid process.

Through the CMMPO's formal Public Outreach Program, with full consideration of the principles of Environmental Justice, staff seeks early involvement of local legislators, chief local officials and the general public in the essentially ongoing TIP development process. On a number of occasions over the past few years, outreach efforts have also included periodic *TIP Development Meetings* tailored to a given community or group of communities. At these meetings, an overview of the CMMPO and TIP development process is provided, including a review of host community responsibilities. Specific community projects, proposed for inclusion on the TIP listing, are discussed and, if necessary, prioritized. Community support for a given project or projects is also assessed. Figure III-5 provides a summary of the *TIP Development Meetings* hosted by staff since 2008.

After project proposals are formally submitted by the community's highest elected official, they are screened by the CMMPO and further evaluated by the CMMPO's Advisory Committee, which acts as the technical transportation advisory group to the CMMPO. The prioritization process involves an exchange of project information and evaluation of project importance. An established set of Transportation Evaluation Criteria (TEC) is considered for each eligible project. The CMRPC transportation staff, working with the MassDOT Highway Division District #2 & #3 offices and MassDOT-Planning, accumulates engineering design, right-of-way and environmental status information for each TIP project. If necessary, appropriate community personnel and/or engineering consultants are also contacted to obtain design status updates.

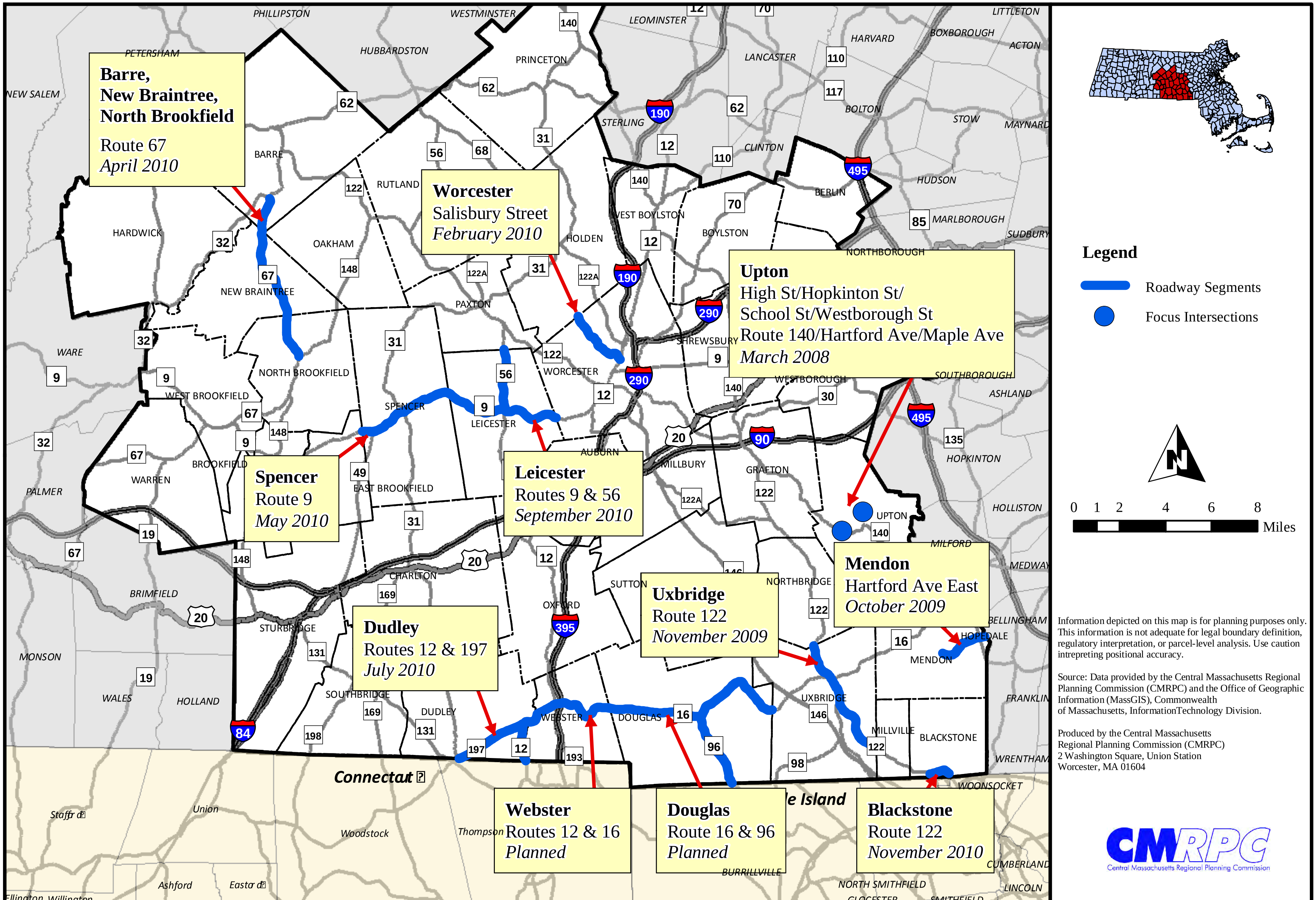


Figure III-5 Recent TIP Development Meetings

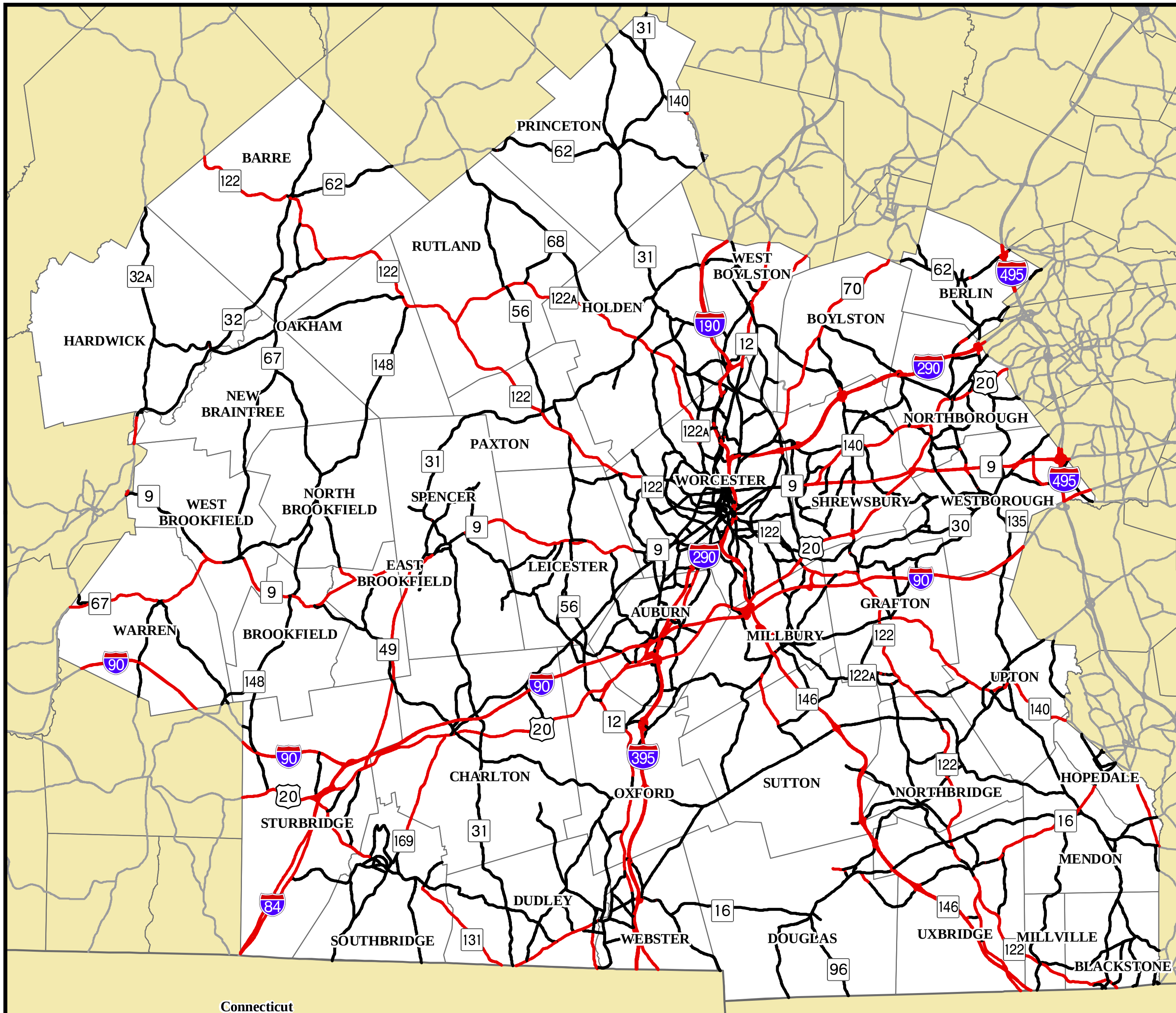
Throughout the development of the TIP, the CMMPO oversees an extensive outreach effort that provides ample opportunity for public involvement. Commencing in the spring, the TIP development process typically culminates in August when the CMMPO convenes to consider endorsement of the finalized project listing. At that time, the CMMPO Endorsed TIP is forwarded to MassDOT-Planning where it is combined with the TIPs produced by all of the MPOs throughout the state. The resulting document, referred to as the State Transportation Improvement Program (STIP), is forwarded to the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA) and the Environmental Protection Agency (EPA) for approval. Only after obtaining these approvals are federal-aid transportation funds released to construct the projects included in the CMMPO Endorsed TIP.

C.3 Maintenance Responsibility

Figure III-6 shows that a significant portion of the federal-aid eligible roadway network is maintained by the region's communities. The interstate highways and a number of major state-numbered routes are maintained by MassDOT. Maintenance responsibilities include ensuring usable and safe pavement condition, clearing snow and ice, cleaning drainage structures, and repairing sidewalks and shoulders.

While the need for an improvement project may be identified by a number of entities, including the CMMPO, the entity responsible for maintaining the facility is also responsible for designing federally-funded improvement projects along that facility. Along with design, this responsibility also includes acquiring the necessary right-of-way and obtaining all required permits. The ability to address these preliminary tasks varies considerably between communities, with many smaller communities at a disadvantage, resulting in some projects languishing within the TIP process for a number of years.

For bridges, MassDOT is responsible for the reconstruction or replacement of bridges over 20 feet in length. The statewide bridge management program includes inspections on all publicly-owned bridges. For those less than 20 feet in length, reports are provided to the owner of the bridge, often a city or town. More detailed information about the region's bridges is provided later in this chapter in section ***D.4.1 Statewide Bridge Management System (BMS)***.



Legend

Maintenance Responsibility

- Massachusetts Highway Department
- City or Town Accepted
- Town Boundary

- Massachusetts Highway Dept
- City or Town Accepted

0 1 2 4 6 Miles

Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), massDOT/Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

Produced by the Central Massachusetts Regional Planning Commission (CMRPC)
2 Washington Square, Union Station
Worcester, MA 01604

CMRPC Central Massachusetts Regional Planning Commission

Figure III-6 Maintenance Responsibility of Federal-Aid Eligible Roadway

C.4 Massachusetts Project Development & Design Guide

As part of the implementation of "Communities First," MassDOT developed the Project Development and Design Guide. This document replaces the former Design Guide (Blue Book), incorporates context sensitive solutions, and addresses all travel modes throughout the design process. The principles outlined below are in line with Livability principles established by the joint agreement between USDOT, HUD and EPA (see Regional Environmental Overview section) and are encouraged to be included in transportation improvement projects proposed by CMMPO communities.

The following are the Guiding Principles for the Project Development and Design Guide[1]:

- **Multimodal Consideration —** to ensure that the safety and mobility of all users of the transportation system (pedestrians, bicyclists and drivers) are considered equally through all phases of a project so that even the most vulnerable (e.g., children and the elderly) can feel and be safe within the public right of way. This includes a commitment to full compliance with sate and federal accessibility standards for people with disabilities.
- **Context Sensitive Design —** to incorporate, throughout project planning, design, and construction, the overarching principles of Context Sensitive Design (a collaborative, interdisciplinary approach that involves all constituents to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility for all users).
- **A Clear Project Development Process —** to establish a clear and transparent project development and design process that can be administered consistently throughout the state. The ideal is a process that results in project consensus among constituents which can be expeditiously accomplished within reasonable project cost.

The Project Development and Design Guide went into effect on January 1, 2006 and can be accessed online at *http://www.mhd.state.ma.us/default.asp?pgid=content/designguide&sid=about*.

[1] MassDOT, *Project Development and Design Guide,* January 2006: I-2.

D. HIGHWAY CONDITION ASSESSMENT

D.1 Transportation Management Systems

Transportation management systems are the focus of a number of ongoing planning efforts within the region. Management systems identify issues through a systematic process of data collection and analysis, develop recommendations to address the issues, and monitor the effectiveness of improvement projects after they are implemented. With the passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), the CMMPO began to supplement its traffic monitoring program with a regional Congestion Management System (CMS), Pavement Management System (PMS), and Intermodal Management System (IMS), which later became known as “Freight Planning.” In 2008, a Data Integration Program was initiated to utilize and analyze all Transportation management systems data in an integrated and cohesive manner.

The goal of the Data Integration Program is: *to provide timely and comprehensive transportation data in an easily-accessible format to:*

1. *CMRPC Transportation staff for use in its work program in support of the CMMPO transportation planning process;*
2. *All CMRPC staff for use in their work activities in support of the agency’s member communities; and*
3. *CMRPC/CMMPO member communities to enhance their local planning efforts.*

This process uses Geographic Information Systems (GIS) technology to maintain, map, and analyze information from the transportation management systems.

GIS provides the platform for the spatial organization and analysis of the transportation performance measures determined by the CMMPO Congestion Management, Pavement Management, Transportation Safety Planning, and Traffic Monitoring programs. Access to this information through a geographic interface will be used to support the development of CMMPO TIP project listings and Regional Transportation Plans (RTPs) as well as serve as a resource for other planning activities.

The Transportation Management System also uses a multimodal approach to map and analyze transit data, bike/ped data, freight information for use in ongoing transportation planning activities and for use in the development and implementation of the Regional Transportation Plan.

Beginning in FY 2007, GIS technology was be utilized to maintain, map, and analyze information from the transportation management systems. Specific products included:

- A database and associated GIS data layer and maps storing intersection locations and types studied as part of the Transportation Safety Planning Program, the calculated vehicle crash rates, and the relationship to regional average crash rates for similar intersections.
- A database and associated GIS data layer and maps storing encountered delay (in car-minutes per hour) at intersections studied as part of the region’s Congestion Management Program (CMP) and their relationship to a regional average delay.

- A database and associated GIS data layer and maps storing travel time growth rates as calculated on roadway segments monitored as part of the region's CMP.

In 2009, WRTA bus-stop and ridership data was mapped and analyzed to help in transit planning activities. Traffic count data has been mapped as points and segments for use by the planning staff and all communities. Regional pavement condition data has been mapped in a usable format and has been used as part of different studies.

Starting in 2009 and updated in 2010, crash data (2004-2008) obtained from MassDOT was mapped and analyzed and crash reports were developed, including those involving bicycle and pedestrian travelers, to aid in the HSIP project selection and justification.

In 2010 traffic count database was integrated with the MassDOT Roadway Inventory Files to produce a regional traffic volume map. This map assists in analyzing various datasets such as pavement condition, congestion, crash locations etc.

Mapping and analysis of the various datasets was performed for presentation and to generate discussion during the RTP public outreach meetings and during project identification process.

D.2 Highway Safety

The Central Massachusetts Metropolitan Planning Organization (CMMPO) recognizes the importance of transportation safety planning for all agencies and users of the regional transportation system. The organization's transportation safety plan employs a multi-modal strategy, encompassing roadway, transit, bicycle, pedestrian and rail travel throughout the Central Massachusetts region. Refer to Chapter V, Transportation Safety Planning for detailed information.

D.2 .1 SAFETEA-LU Emphasis on Safety

SAFETEA-LU authorized a new core federal-aid funding program beginning in FY 2006 to achieve a significant reduction in traffic fatalities and serious injuries on all public roads. It creates a positive agenda for increased safety on our highways by almost doubling the funds for infrastructure safety and requiring strategic highway safety planning, focusing on results. Previous to this legislation, safety programs were typically funded from a set-aside from the Surface Transportation Program.

D.2.2 Massachusetts Statewide Safety Planning Activities

In October 2006, Massachusetts completed its Strategic Highway Safety Plan, one year ahead of the deadline established by SAFETEA-LU. The Plan includes a Memorandum of Understanding between the following state and federal agencies:

- MassDOT, Highway Division
- MassDOT, Office of Transportation Planning
- MassDOT, Registry of Motor vehicle
- Governor's Highway Safety Bureau
- Massachusetts State Police

- Department of Public Health
- Massachusetts Chiefs of Police Association
- Joint Committee on Transportation
- Massachusetts Association of Regional Planning Agencies
- Federal Highway Administration
- Federal Motor Carrier Safety Administration
- National Highway Traffic Safety Administration

D.2.3 Highway Safety Improvement Program

Starting in October 1, 2007, States were required to have a Strategic Highway Safety Plan (SHSP) that identified and analyzed safety problems and opportunities in order to use Highway Safety Improvement Program (HSIP) funds for new eligible activities under 23 USC 148. The Emphasis areas from the SHSP were reviewed and crash data systems will be created and driver behavior will be analyzed as part of ongoing CMRPC safety planning efforts in the upcoming year. The HSIP is a "core funding" program administered by Federal Highway Administration, which apportions funds to States under Section 104(b) (5) for a range of eligible activities focused primarily on infrastructure-related safety improvements. The purpose of the HSIP is to achieve a significant reduction in traffic fatalities and serious injuries on public roads.

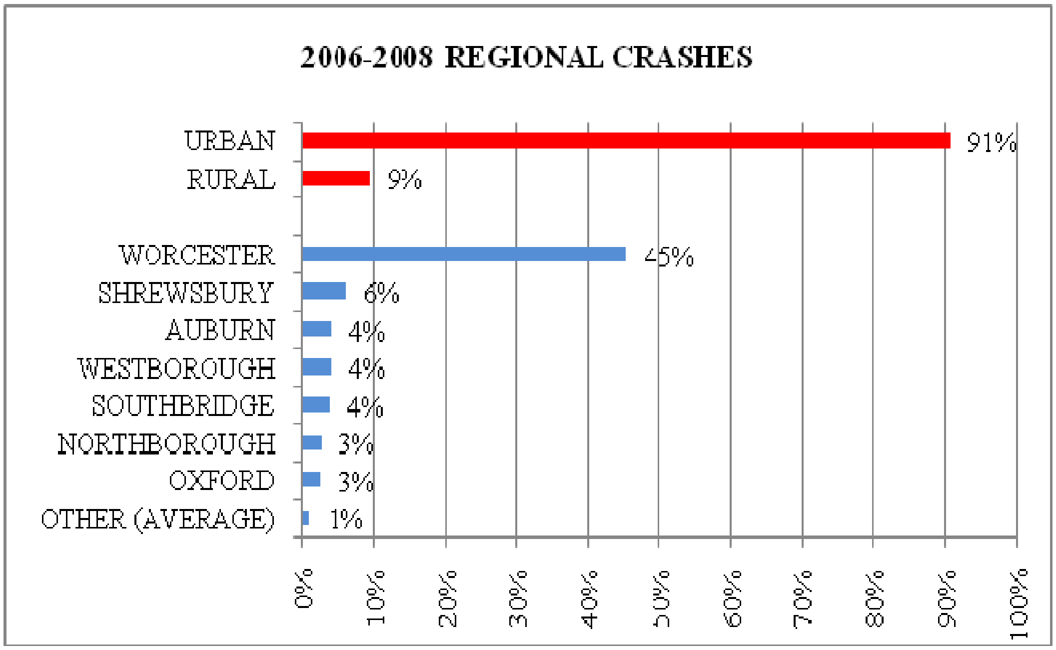
D.2.3.1 HSIP Selection Criteria

a) Projects using Federal HSIP funding are required to be selected by a data driven process. To satisfy this requirement MassDOT obtains crash data from local police reports collected by the RMV Crash Records Section. Then with the assistance of Geonetics, they developed an automated procedure for processing, standardizing, matching and aggregating the crash data by geographical location using Geographic Information System (GIS) tools and procedures resulting in crash clusters, bike clusters and pedestrian clusters. The data used in this report is based on automobiles crashes from 2006 -2008 and pedestrian/bicycle crashes from 2002-2008.
b) The top 5 % of automobile crash clusters are listed in Table V-1. They are derived from all crash clusters identified by MassDOT on local roads (excluding interstate highways).
c) The top 5% of pedestrian and bicycle crash clusters are listed in Table V-2. They are derived from all pedestrian / bicycle crash clusters identified by MassDOT.
d) The top crash corridors are listed in Table V-3. They were identified on road segments where the top 5% of combined automobile pedestrian and bicycle crash clusters occurred.
e) The location of top crash clusters are shown in Figure III-7.

D.2.3.2 The CMRPC Region

The Central Massachusetts Regional Planning Commission consists of 39 towns surrounding the City of Worcester. Major transportation routes include east/west bound traffic served by interstates 90 and 290, while interstates 290,190, 84, 395 and

495 serve north/south bound traffic. From 2006-2008 there were over 30,000 crashes in the region. 45% of all crashes were in the City of Worcester and 91% of all crashes were in the urbanized area.



HSIP FUNDED PROJECTS IN THE REGION:

a) City of Worcester - The FY2011 Transportation Improvement Program (TIP) included $5.1M in HSIP funds for the Belmont Street East resurfacing project[2].

b) City of Worcester – The FY2012 State Transportation Improvement Program (STIP) approved $1.0 M HSIP funds for intersection & signal design improvements at Lincoln Street, Highland Street, Pleasant Street corridor[3].

[2] CMMPO Minutes of December 2, 2009 Meeting

[3] http://www.eot.state.ma.us/downloads/stip/2009/2012_highway_0210.pdf

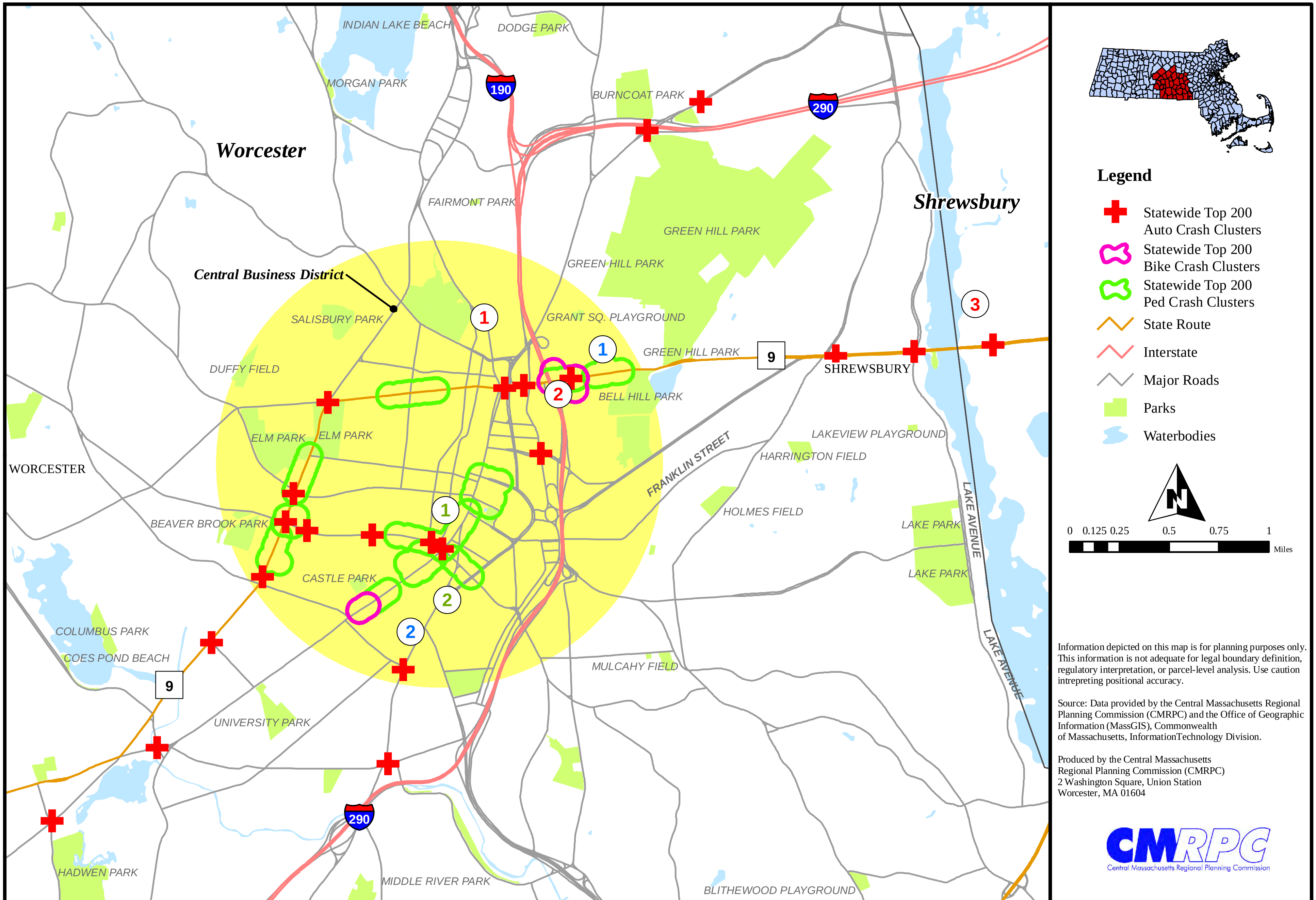


Figure III-7 CMRPC Highest Ranked Crash Clusters

D.2.4 Public Transit Safety

The CMMPO and the Worcester Regional Transit Authority (WRTA) recognize that a safe and efficient public transportation system is an integral component of the urban fabric. In addition to operational efficiency of the bus routes, passenger safety, comfort, and convenience are all considerations in the planning activities that support the fixed-route bus service. The WRTA has established an extensive safety program that is intended to provide a safe environment for its employees and customers and to protect its assets from the threat of loss, damage or abuse.

1. **Policy & Procedures**: Through its fixed route operations the transit authority has instituted a variety of policies and procedures to improve overall safety in the system. To ensure the comprehensiveness of the program, all policies and procedures are covered in the training of newly hired employees and through periodic retraining of all employees. They include:
   - Personnel Selection
   - Accidents and Incidents Procedures
   - Driver Training
   - Maintenance Plan
   - Drug & Alcohol Testing Program
   - Safety Data Acquisition/Analysis
   - Safety Committee

2. **Location of Bus Stops:** A collaborative effort was undertaken between the CMMPO and the WRTA to identify existing bus stops using Geographic Positioning Systems (GPS) technology. The information was then downloaded to a GIS platform to spatially locate the bus stops for improved management. Bus stop data collected in 2007 and 2008 was mapped using GIS software. The database containing WRTA ridership sample data by bus route was also mapped. Using the crash data from MassDOT, the bus-stop locations with highest Bike/Ped crash clusters were identified. This integrated effort identified the need to evaluate safety, security, and accessibility at City of Worcester bus stops as follows.

   a) **Signage at Bus Stops**: The safest location of bus stops for pick-up or discharge of passengers is decided in a collaborative effort between the Worcester City Council, Worcester Department of Public Works (DPW), and the WRTA. Due to periodic changes to the fixed route service, bus stop signage also requires frequent updates. An active list of these locations must be maintained by both the Worcester DPW which is responsible for the signs, and the WRTA which monitors bus service. CMRPC's GIS database provides assistance with this effort.

   b) **Safety at Bus Stops**: In order to assist the WRTA meet its mission to provide convenient, comfortable, safe, reliable, cost-effective mobility services for the region it is necessary to evaluate the efficacy of designated bus stops. To advance this effort, the FHWA has advocated the use of Road Safety Audits (RSA). Such an audit will be performed by an independent interdisciplinary team of 3-5 persons consisting of community members and professionals to examine the design of designated high frequency bus stops in order to reduce both verified and potential hazards at these locations using the following methodology:

- Generate a checklist of criteria for evaluating safety and accessibility at bus stops
- Classify the designated bus stops consistent with the checklist
- Develop a bus stop rating system to evaluate safety and accessibility
- Utilize bus stop ratings to evaluate and improve safety on public transit routes

D.2.5 Rail Safety

Massachusetts had one of the best rail safety records in the nation from 2008- 2010. Worcester County suffered 40 injuries and 5 fatalities in the same period[4]. As, the U.S. Department of Transportation is advocating substantial increases in passenger, light-rail, and freight over the next three decades, the region is looking to participate in improving rail safety. All levels of government and private stakeholder, are expected to work together to meet these safety challenges. *Operation Lifesaver,* a rail safety education partner is helping to raise awareness to improve public safety at highway-rail grade crossings and tracks through public awareness using education, enforcement and engineering, making communities with tracks and railroad property safer, reducing collision incidents and decreasing the likelihood of injuries and fatalities. The region concurs with *Operation Lifesaver* and advocates the use of safe engineering practices for at-grade railroad crossings where two or more modes of transportation intersect to include the following devices to improve rail safety in the Central Massachusetts.

- *Traffic control devices* at highway-rail grade crossings such as signs, signals, pavement markings, or other warning devices designed to help manage traffic flow and reduce risk.
- *Apply established standards* for signage at highway-rail grade crossings.
- *Designate Quiet Zones* with flashing light signals with gates, constant warning time train detection circuitry and power-off indicators visible to the train crew.
- *Gates with channelization* or medians, four-quadrant gates, one-way streets, and crossing closures.
- *Wayside horn* mounted at the crossing and activated simultaneously with flashing lights
- *Emergency Notification Sign (ENS)* posted at highway-rail grade crossing, with telephone number to notify the railroad of device malfunction.
- *Warning signs* informing pedestrians and bicyclists that they are trespassing on private property and could be fined, seriously injured or killed.

D.2.6 Pedestrian and Bicyclists Safety

Within the CMMPO region, there are a total of 107 individual pedestrian crash locations with six (6) of those locations within the Top 5% of all pedestrian crash locations in the region. For bicycles, there were 36 individual bicycle crash locations with two (2) of those locations within the Top 5% of all bicycle crash locations (2002-2008) in the region. The Bicycle and Pedestrian plan recommends prioritizing locations with high bike and pedestrian crashes for future improvements, and this will become part of the future CMRPC efforts.

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[4] *Federal Railroad Administration, Office of Safety Analysis, Annual Casualties By State, Railroad or Type*

D.3 Security Planning

SAFETEA-LU calls for an increase in planning for the security of the transportation system and requires it to be a stand-alone planning factor. The CMMPO has come to regard security for all agencies and users of our transportation system – motorists, cyclists, pedestrians and transit users – as an important component of the Regional Transportation Plan.

Transportation security refers to both personal and homeland security, including attention to the vulnerability to intentional attack and natural disasters, and the associated evacuation procedures. Security is generally defined as freedom from intentional harm or tampering. A targeted terrorist attack is not the only threat to Central Massachusetts infrastructure, as natural disasters, accidents and safety issues may also present security risks. Traditional crimes, fires, system property damage, trespassing, failure of vehicles or equipment, infrastructure deterioration, and vehicular gridlock are constant security risks. Responding to emergencies is often complicated by vehicular congestion, inadequate first responder access, and other factors not directly related to the specific incident.

An overall goal is to increase the security of the transportation system for both motorized and non-motorized users.

The Central Region Homeland Security Advisory Council (CRHSAC) has taken a lead effort in planning for the region's security needs. The CRHSAC is taking a regional approach and is exploring ways to better integrate prevention, response, mitigation, and recovery efforts directed toward security incidents, regardless of whether they are natural or manmade. The Council's Transportation voting member is the Administrator of the Worcester Regional Transit Authority, and MassDOT's Highway Division is represented by a non-voting member. The Council has funded one transportation-related project to date; installation of security cameras at the North Leominster Commuter Rail Station, as the CRHSAC's region includes communities in all of Worcester County, not just those in the CMMPO region.

CMRPC assists the CRHSAC in its security planning and funding efforts. As part of that collaborative effort, CMRPC will prepare an Evacuation Plan beginning summer 2011.

As part of its current work program, the CMMPO explored its potential role in the field of security planning. The organization recognized the importance of transportation security planning to all agencies and users of the regional transportation system. Over a dozen agencies perform functions crucial to our transportation system. Some are implementing security measures, while others may not be. To ensure that security needs are met promptly and equitably, the CMMPO effort coordinates and cooperates with transportation agencies and stakeholders.

- Transportation stakeholders include the Worcester Regional Transit Authority; MassDOT Office of Transportation Planning and Highway Division; Massachusetts Bay Transportation Authority; Peter Pan, Greyhound and Bonanza bus lines; Amtrak; freight railroad operators; and city and community public works departments.

- Regulatory and advisory stakeholders include the Central Region Homeland Security Advisory Council, U.S. Department of Homeland Security, Federal Highway

- First responders include state and local police and fire departments and emergency medical technicians.

It was identified that security efforts may focus on the following three components and related planning:

Coordination with transportation agencies and stakeholders

- Meet regularly to develop working relationships for information and resource sharing
- Identify existing emergency command/operations facilities and assess role of transportation in emergency procedures
- Assist transportation stakeholders in planning and mitigation efforts, utilizing information available through our planning processes, including management systems

Identification and prioritization of security components of transportation infrastructure enhancements

- Develop an inventory of critical transportation infrastructure and at-risk locations
- Identify levels of prioritization of transportation security components
- Ensure timeliness and equity of projects and funding through the TIP process

Contingency planning for evacuations and other emergencies

- Utilize modeling software to predict effects of potential emergencies such as bridge closure, rail emergency between stations, bus service suspension, and other incidents
- Survey potential hazards and develop transportation emergency response and evacuation plans
- Ensure security drills and related exercises are coordinated with transportation stakeholders, and assist agencies and towns in identifying and coordinating such efforts
- Develop a process to identify and discuss transportation experiences and lessons learned, for prevention efforts and improved incident management

While most of these efforts overlap, the CMMPO recognized that its role as a coordinator was a natural one. The CMMPO can develop stronger relationships and communications through all transportation agencies and coordinate with agencies and stakeholders by meeting regularly for information and resource sharing.

The CMMPO prioritized its effort to "Identify existing emergency command/operations facilities and assess role of transportation in emergency procedures". As part of that effort, the CMMPO has produced the map of critical transportation infrastructure (dams, bridges, high volume roads, flood zones, and transit routes)(see Security Chapter for maps). From this planning exercise, the CMMPO hopes to better understand where flood prone areas exist, highlight the transportation infrastructure that could be most affected, monitor future flooding events, and provide an analysis of the transportation impacts of each event to feed into future planning efforts.

In addition, in conjunction with the CRHSAC, steps will be taken to begin the process to generate an Evacuation Plan in the Summer/Fall of 2011. Travel Demand Modeling software will be used to project travel effects of potential emergencies, including bridge closure, WRTA service/system shut down, roadway spill, or commuter/freight rail incident.

The CMMPO is also involving its congestion management planning process to identify existing bottlenecks that can potentially become security issues, particularly in evacuation and incident management situations. As part of a past effort to survey Emergency Medical Technicians to determine roadway locations where first responders' response time is inhibited, as well as the cause of the delay, the CMMPO seeks to plan transportation projects to facilitate first response travel. In part, the region's security relies on the ease and accessibility of first responders throughout the Central Massachusetts region.

Consistent with the goals of the CRHSAC, the CMMPO will be able to identify and prioritize security components of transportation infrastructure enhancements. The CMMPO will involve itself to the extent permissible in future post-incident planning to identify and discuss transportation experiences and lessons learned for prevention efforts and improved incident management.

D.4 Infrastructure Condition

D.4.1 Statewide Bridge Management System (BMS)

According to the MassDOT bridge listing, there are 659 bridges in the region. Virtually every bridge in the regional listing is maintained by MassDOT or the local municipality. As the list does not include railroad overpasses, it does not include any of the bridges that are maintained by the five railroads operating within the region. MassDOT regularly collects bridge condition data using consistent federal standards in various structural categories including bridge deck, superstructures (the physical condition of the bridge), substructures (condition of the piers, abutments, piles, girders, footings, or other components), retaining walls, deck geometry, and roadway approach alignment. The resulting inventory is used to calculate a condition rating, which is used to classify the bridges as either structurally deficient or functionally obsolete. Bridges that do not fall into one of those categories are ineligible for the Highway Bridge Replacement and Rehabilitation Program funded by the Federal Highway Administration (FHWA).

A structurally deficient bridge is defined as a bridge whose condition has been rated no better than poor in any of these five areas: bridge deck, superstructures, substructures, culverts, and retaining walls. Utilizing information provided by MassDOT in 2010, the region's 53 structurally deficient bridges are depicted in Figure III-8 and listed in Table III-1. Notably, improvement projects on five (5) of these bridges were advertised for replacement in FY 2010. An additional bridge is listed on the CMMPO 2011-2014 TIP to be advertised during FY 2011.

The most notable structurally deficient bridge listed is the Route 9 bridge over Lake Quinsigamond between Worcester and Shrewsbury. Built in 1916 and reconstructed in 1983, the nearly 100-year-old bridge has a fairly low AASHTO rating (34.0) and is key to efficient and secure transportation in the area. This bridge is currently listed on the Central Massachusetts Metropolitan Planning Organization (CMMPO) 2011-2014 Transportation Improvement Plan (TIP) listing as well as being part of the state Accelerated Bridge repair plan. It is in pre-design phase at time of writing, with the overall bridge style and structure type having been selected and presented to the public and design review and oversight groups. Public information meetings on the progress of this effort were held in March of 2009, 2010 and 2011.

Table III-1
Structurally Deficient Bridges in Central Massachusetts

Town	Roadway Name	Over/Under	Owner	AASHTO Rating
Barre	Route 32 (Main Street)	Ware Canal	Town	41.3
Barre	Route 32 (S Barre Road)	Ware River	MassDOT	2.0
Barre	Rte 32 (New Braintree Road)	Ware Canal	MassDOT	55.9
Barre	Worcester Road	Prince River	MassDOT	75.2
Charlton	Glenmere Road	Little River	Town	47.2
Douglas	Mechanic Street	Mumford River	Town	41.3
Dudley	Peter Street	French River	Town	36.0

Town	Roadway Name	Over/Under	Owner	AASHTO Rating
Dudley	Perryville Road	French River	Town	23.2
Dudley	West Dudley Road	Quinebaug River	Town	2.0
East Brookfield	Shore Road	East Brookfield River	Town	7.0
Grafton	Route 122A (Main Street)	Blackstone River	MassDOT	69.1
Hardwick	Access Gate 43	Quabbin Res S BAF DAM	Other State Agency	30.3
Hardwick	Bridge Street	Ware River	Town	14.6
Holden	River Street	Quinapoxet River	Town	28.4
Holden	Route 31 (Wachusett St)	Quinapoxet River	MassDOT	33.6
Hopedale	Mill Street	Mill Brook	Town	38.8
Leicester	McCarthy Avenue	Kettle Brook	Town	40.9
Leicester	Parker Street	Bartons Brook	Town	2.0
Millbury	Route 146	W Main Street	MassDOT	30.2
Millbury	Greenwood Street	Diversion Channel	Town	59.3
Millbury	I-90 Ramps	I-90	MassDOT	78.0
North Brookfield	Hines Bridge Road	Five Mile River	Town	46.5
Northborough	Allen Street	Assabet River	Town	67.6
Northbridge	Douglas Road	Mumford River	Town	31.0
Northbridge	Rte 122 (Providence Rd)	Blackstone River	MassDOT	59.1
Northbridge	Linwood Avenue	Linwood Pond	Town	45.0
Oxford	Comins Road	French River	Town	70.7
Rutland	Intervale Road	Ware River	Town	58.2
Shrewsbury	Route 9 (Belmont Street)	Lake Quinsigamond	MassDOT	34.0
Southbridge	Alpine Drive	Lebanon Brook	Town	24.5
Southbridge	Route 131 (Sandersdale Rd)	Sandersdale Canal	Town	47.2
Southbridge	Route 169 (N Woodstock Rd)	P&W Railroad (Abandoned)	MassDOT	28.8
Spencer	Brooks Pond Road	Five Mile River	Town	24.3
Sturbridge	Haynes Street	Quinebaug River	MassDOT	49.6
Sutton	Blackstone Street	Blackstone River	Town	48.7
Sutton	Main Street	Mumford River	MassDOT	20.9
Sutton	Depot Street	Blackstone River	Town	60.5
Uxbridge	River Road	Ironstone Brook	Town	24.0
Uxbridge	Route 122 (Main Street)	Blackstone River	MassDOT	40.2
Uxbridge	Route 16 (Mendon Street)	Blackstone River	MassDOT	38.0
Warren	Old Boston Post Road	Naultaug Brook	MassDOT	41.0
West Brookfield	Long Hill Road	CSX Railroad	MassDOT	32.8
West Brookfield	Wickaboag Valley Road	Sucker Brook	Town	48.9

Town	Roadway Name	Over/Under	Owner	AASHTO Rating
Westborough	I-90 EB	CSX Railroad	MassDOT	39.0
Westborough	I-90 WB	CSX Railroad	MassDOT	39.0
Westborough	I-495 SB	Route 9	MassDOT	38.2
Westborough	I-90 EB	Flanders Road	MassDOT	48.0
Worcester	I-290 EB	McKeon Road	MassDOT	56.8
Worcester	I-190 NB	Route 12	MassDOT	65.0
Worcester	I-190 SB	Route 12	MassDOT	47.0
Worcester	Route 12 (Webster Street)	Middle River	MassDOT	64.9
Worcester	Route 122 (Grafton St)	US Route 20 (Southwest Cutoff)	MassDOT	46.7
Worcester	Route 9 (Belmont Street)	I-290	MassDOT	34.0

Source: MassDOT, September 2010

A functionally obsolete bridge is defined as a bridge that is considered in serious condition in any of these three categories: deck geometry, underclearances, or approach roadway alignment. Additionally, if the structural condition or waterway adequacy is in serious condition (but better than that for a structurally deficient bridge), the bridge would be identified as being functionally obsolete. Essentially, a functionally obsolete bridge is one that is not built in accordance with currently accepted design standards. The region's 174 functionally obsolete bridges are also depicted in Figure III-8. A tabular listing of these bridges has been provided in the Technical Appendix.

Posted bridges are bridges that have weight restrictions. There are 71 such bridges within the region, 21 of which are also structurally deficient and 25 of which are functionally obsolete. The region's posted bridges are depicted in Figure III-8 and listed in Table III-2.

Table III-2
Posted Bridges in Central Massachusetts

Town	Over	Under	Owner	AASHTO Rating	Deficiency
Auburn	Oxford Street	Kettle Brook	Town	72.7	FO
Barre	Route 32 (Main Street)	Ware Canal	Town	41.3	SD
Barre	Rte 32 (New Braintree Road)	Ware Canal	MassDOT	55.9	SD
Berlin	Bridge Road	Assabet River	Town	48.8	FO
Berlin	Linden Street	North Brook	Town	65.5	
Berlin	Pleasant Street	North Brook	Town	66.8	
Berlin	South Street	North Brook	Town	61.0	FO
Blackstone	Route 122 (Main Street)	Blackstone River	MassDOT	32.8	FO

Town	Over	Under	Owner	AASHTO Rating	Deficiency
Blackstone	St. Paul Street	Blackstone River	Town	37.9	FO
Brookfield	Fiskdale Road	Quaboag River	Town	42.1	FO
Douglas	Hemlock St	Tinkerville Brook	Town		
Douglas	NW Main Street	Whitin Reservoir	Town		
Douglas	Mechanic Street	Mumford River	Town	58.4	FO
Douglas	Potter Road	Mumford River	Town	63.6	
Dudley	Brandon Road	Mill Race (Dry)	Town	60.0	FO
Dudley	Carpenter Road	P&W Railroad	MassDOT	27.6	FO
Dudley	Tracy Court	French River	Town	58.5	FO
East Brookfield	Shore Road	East Brookfield River	Town	7.0	SD
East Brookfield	South Pond Road	South Pond Inlet	Town	79.3	
East Brookfield	Main Street	E Brookfield River	Town		
East Brookfield	Podunk Street	Great Brook	Town		
Grafton	Millbury Street	Quinsigamond River	Town	55.4	FO
Grafton	Route 140 (Shrewsbury St)	CSX Railroad	MassDOT	55.7	FO
Hardwick	Barre Road	Moose Brook	Town	91.5	
Hardwick	Creamery Road	Ware River	Town	38.1	FO
Hardwick	Taylor Hill Road	Moose Brook	Town	64.4	FO
New Braintree	Barr Road	Meadow Brook	Town	57.4	
New Braintree	Hardwick Road	Winimussett Brook	Town	74.4	
N.Brookfield	Hines Bridge Road	Five Mile River	Town	46.5	SD
Northbridge	Douglas Road	Mumford River	Town	31.0	SD
Northbridge	Linwood Avenue	Linwood Pond	Town	45.0	SD
Oxford	Comins Road	French River	Town	70.7	SD
Oxford	Dudley Road	French River	Town	67.3	FO
Oxford	Harwood Street	French River	Town	50.4	FO
Princeton	Old Colony Road	Ware River	Town	70.6	
Princeton	Main Street	Keyes Brook	Town		
Princeton	Clement Hill Road	S Wachusett Brook	Town		
Princeton	E Princeton Road	E Wachusett Brook	Town		
Rutland	Whitehall Road	Long Meadow Brook	MassDOT	92.4	
Shrewsbury	Boylston Street	I-290	MassDOT	77.6	SD
Southbridge	Main Street	Quinebaug River	MassDOT	50.9	SD
Southbridge	Mill Street	Quinebaug River	Town	70.5	FO
Southbridge	Ashland Avenue	Lebanon Brook	Town		

Town	Over	Under	Owner	AASHTO Rating	Deficiency
Southbridge	Central Street	Quinebaug River	Town	74.9	FO
Southbridge	Rte 169 (N Woodstock Rd)	P&W Railroad (Abandoned)	MassDOT	28.8	SD
Spencer	Brooks Pond Road	Five Mile River	Town	24.3	SD
Spencer	North Spencer Road	Seven Mile River	MassDOT	53.2	
Sturbridge	Champeaux Road	Water Long Pond	Town	59.0	
Sturbridge	Holland Road	Quinebaug River	Town	50.9	FO
Sturbridge	Stallion Hill	Quinebaug River	Town	59.5	
Sutton	Depot Street	Blackstone River	Town	60.5	SD
Sutton	Blackstone Street	Blackstone River	Town	48.7	SD
Upton	Glen Avenue	West River	Town	75.6	
Upton	Pleasant Street	West River	Town	39.4	FO
Uxbridge	Main Street	Blackstone River	MassDOT	40.2	SD
Uxbridge	Hartford Avenue	Mumford River	Town	50.1	FO
Uxbridge	River Road	Ironstone Brook	Town	24.0	SD
Uxbridge	Route 122 (N. Main Street)	Mumford River	MassDOT	53.4	FO
Warren	Old Boston Post Road	Naultaug Brook	MassDOT	41.0	SD
Warren	Main Street	Quaboag River	MassDOT	53.0	
Warren	Gilbert Road	Quaboag River	Town	75.7	
Warren	Old West Brookfield Road	Quaboag River	Town	71.3	
W.Brookfield	Shea Road	Mill Brook	Town		
W.Brookfield	Foster Hill Road	Coys Brook	Town	45.4	
W.Brookfield	Long Hill Road	CSX Railroad	MassDOT	32.8	SD
W.Brookfield	Wickaboag Valley Road	Sucker Brook	Town	48.9	SD
Worcester	Webster Street	Middle River	MassDOT	64.9	SD
Worcester	James Street	CSX	MassDOT	67.4	SD
Worcester	Laurel Street	I-290	MassDOT	51.7	FO
Worcester	May Street	Beaver Brook/Sewer	City	62.9	FO
Worcester	Route 9 (Belmont Street)	I-290	MassDOT	34.0	SD

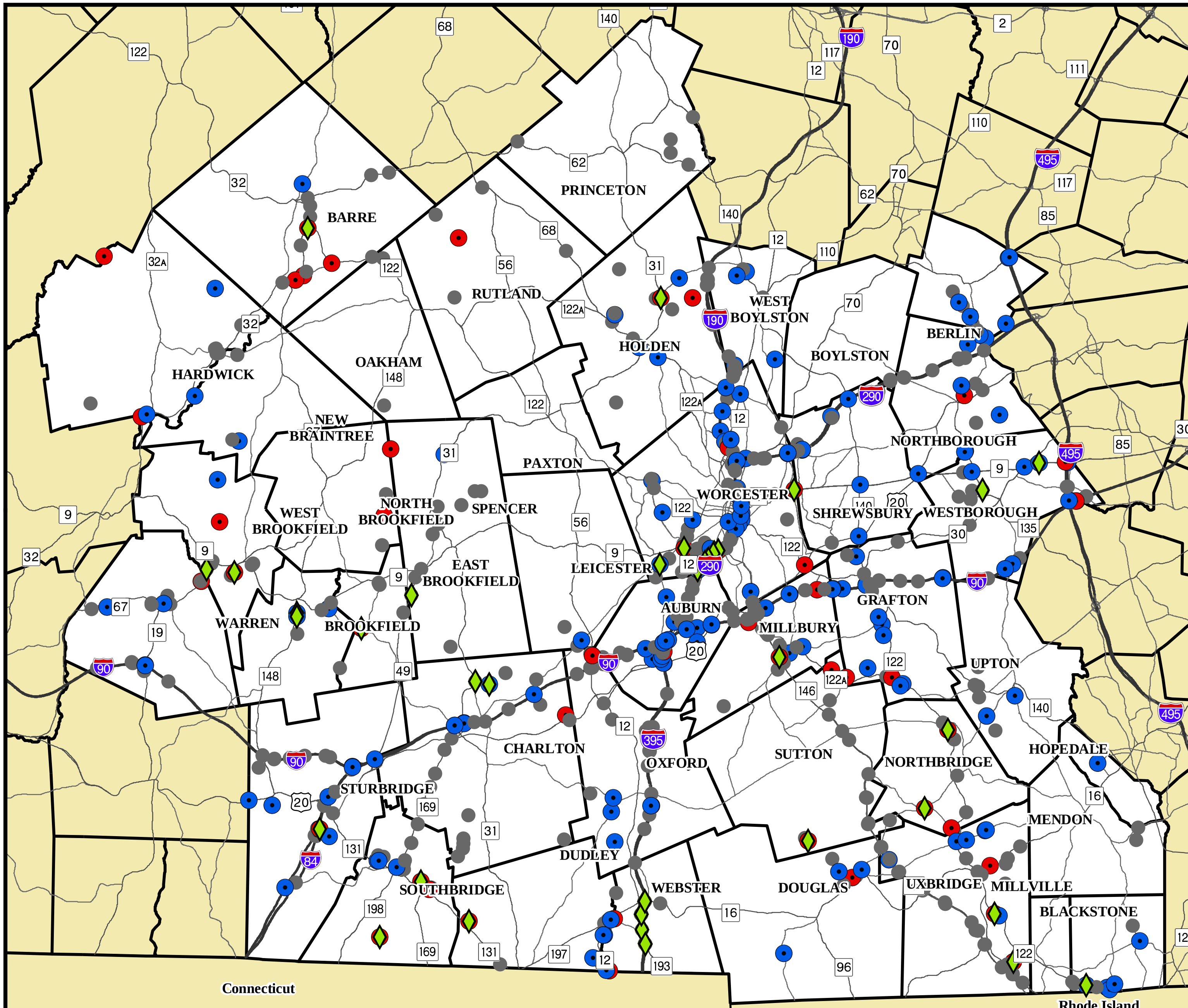
Source: MassDOT, May 2011

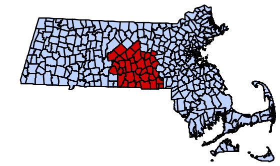
The Accelerated Bridge Program (ABP) was developed primarily to address the state’s structurally deficient bridge inventory. With investments made to date and the continued support of MassDOT’s statewide Road and Bridge Program, the number of former MassHighway and DCR structurally deficient bridges has declined at a steady pace. Regional ABP bridge projects that are completed, under construction or in their design phase are listed in Table III-3 and show as green diamonds in Figure III-8.

Table III-3
Accelerated Bridge Program Bridges in Central Massachusetts

Town	Over	Under	Owner	AASHTO Rating	Status
Westborough	Lyons Street	Route 9	MassDOT	49.8	Complete
Grafton	Pleasant Street	Blackstone River	Town	28.3	Complete
Sturbridge	Haynes Street	Quinebaug River	MassDOT	49.6	Construction
Southbridge	Alpine Drive	Lebanon Brook	Town	24.5	Construction
Sutton	Main Street	Mumford River	MassDOT	20.9	Construction
Brookfield	Fiskdale Road	CSX	MassDOT	72.7	Construction
Charlton	Jones Road	CSX	MassDOT	74.7	Construction
Charlton	New Spencer Road	CSX	MassDOT	86.0	Construction
Spencer	Podunk Boulevard	CSX	MassDOT	91.4	Construction
WBrookfield	Routes 19 & 67	CSX	MassDOT	83.2	Construction
Westborough	Milk Street	CSX	MassDOT	84.9	Construction
Worcester	James Street	CSX	MassDOT	67.4	Construction
W Brookfield	Long Hill Road	CSX	MassDOT	32.8	Construction
Northbridge	Providence road	Blackstone River	MassDOT	59.1	Construction
Uxbridge	Main Street	Blackstone River	MassDOT	40.2	Construction
Uxbridge	River Road	Ironstone Brook	Town	24.0	Construction
Webster	I-395	Thompson Road	MassDOT	94.8	Construction
Webster	Birch Island Road	I-395	MassDOT	82.8	Construction
Webster	I-395	Memorial Beach Road	MassDOT	92.2	Construction
Webster	I-395	Memorial Beach Road	MassDOT	92.2	Construction
WBrookfield	Shore Road	E Brookfield River	Town	7.0	Design
Holden	Wachusett Street	Quinapoxet River	MassDOT	33.6	Design
Dudley	W Dudley Road	Quinebaug River	Town	2.0	Design
Northbridge	Douglas Road	Mumford River	Town	31.0	Design
Worcester	Webster Street	Middle River	MassDOT	64.9	Design
Shrewsbury	Route 9	Lake Quinsigamond	MassDOT	34.0	Design
Barre	Worcester Road	Prince River	MassDOT	75.2	Design
Southbridge	N Woodstock Road	PW	MassDOT	28.8	Design
Millbury	Route 146	West Main Street	MassDOT	30.2	Design
Brookfield	Fiskdale Road	Quaboag River	Town	42.1	Pending
Blackstone	Main Street	Blackstone River	MassDOT	32.8	Pending

Source: MassDOT, November 2010





Legend

Bridge Condition

- Meeting Standards
- Functionally Obsolete
- Structurally Deficient
- Accelerated Bridge Program (ABP)

0 1 2 4 6 Miles

Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), massDOT/Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

Produced by the Central Massachusetts Regional Planning Commission (CMRPC)
2 Washington Square, Union Station
Worcester, MA 01604

Central Massachusetts Regional Planning Commission

Figure III-8 Central Massachusetts Region Bridge Conditions and ABP Inclusion Status

D.4.2 Pavement Management System

Central Massachusetts Regional Planning Commission (CMRPC) transportation staff implemented a pavement management program to assist decision makers in determining the most cost effective strategies to address the regions deteriorating roadway conditions. In general, a successful program defines a roadway network, identifies the condition of each segment within the network, develops a list of needed improvements, and balances those needs with the available resources of the party responsible for maintaining the defined roadway network.

Using the calculated pavement rating, the Average Daily Traffic (ADT) volume, and the unit cost and estimated life of the repair option chosen, recommended improvement projects can be organized in a prioritized order. The key to an efficient pavement management program lies in the project prioritization process. All roadways are in a constant state of deterioration because of time, weather, and traffic load. Since the ultimate goal of the state and town highway departments is to maintain a roadway network at an acceptable level of performance, roadways needing preventive or routine maintenance should receive sufficiently high priority. A “maintenance first” strategy is far more efficient than the typical “worst first” approach. In a limited funding environment with the poorest performing roadways receiving highest priority, many maintenance projects are postponed, and, as that trend continues, a roadway once needing routine, inexpensive maintenance now needs a far more expensive improvement option. The “worst-first” roadway network typically remains at the same poor level of overall condition, while properly prioritized maintenance and repair can improve the overall condition of a network in time using the same level of resources.

D.4.2.1 Data Collection Process

Staff collected pavement distress information on the federal-aid eligible roadways within the Central Massachusetts region, including the city of Worcester and the 39 surrounding communities, excluding the interstate highways (I-84, I-90, I-190, I-290, I-395, & I-495). A team of two technicians collected the information in the field by conducting a “windshield survey.” This team drove along each predetermined segment of the defined roadway network and took note of the severity and extent of the following pavement distresses:

- potholes
- distortions
- alligator cracking
- transverse and longitudinal cracking
- corrugations, shoving and slippage
- block cracking
- rutting
- bleeding/polished aggregate
- surface wear and raveling

Staff completed the region-wide pavement condition data inventory over the course of four summers from 2006 until 2009. Technicians began this cycle again in the summer of 2010 in order to maintain a current database.

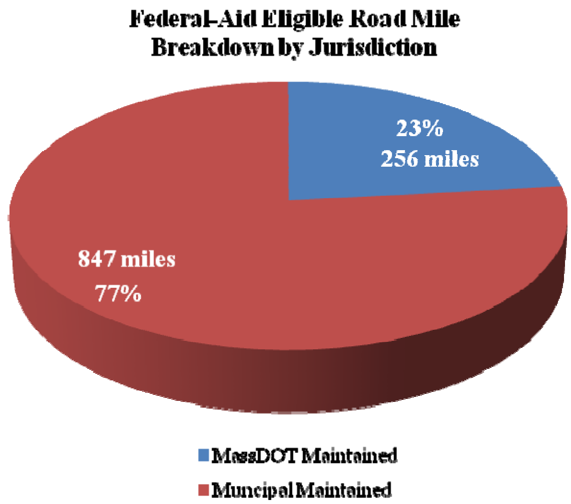
Staff entered the data collected in the field into *Cartegraph*, an asset management software package developed and supported by Cartegraph Systems Incorporated, used to inventory, quantifiably rate and analyze pavement distress information. Using *Cartegraph*, staff determined an Overall Condition Index (OCI) for each segment based upon the pavement ratings and nature of the distresses. The OCI is a score used to rate each segment inspected on a scale from 100 to 0. An OCI of 100 indicates optimal pavement conditions, while an OCI of 0 indicates that a road is in very poor condition and in need of extreme repair measures. The score is calculated by subtracting a series of deduct values associated with the severity and extent of the various pavement distresses described above. *Cartegraph's* deduct values are determined through a series of deduct curves, which were developed by pavement engineers using years of research on pavement performance. The resulting OCI is a quantified rating of pavement condition.

Table III-4 below shows that the OCI scores are separated into five categories ranging from "excellent" to "very poor." Each category is associated with a general maintenance or repair strategy recommended for pavement segments scored in that range. These recommended actions are used in budget scenarios to create maintenance and rehabilitation plans.

Table III-4
Overall Condition Index Rating Ranges & Recommended Action

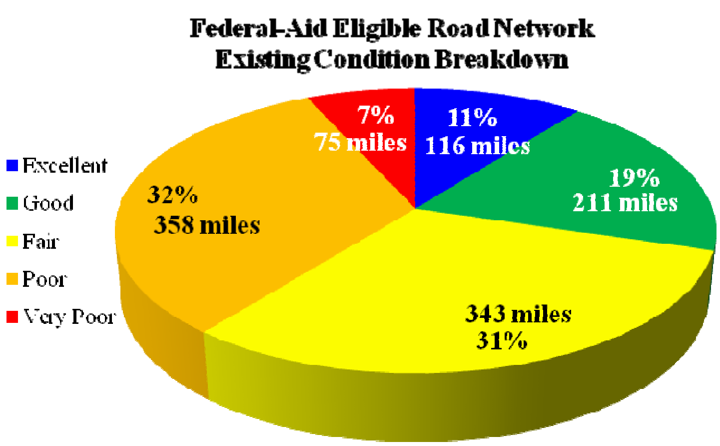
OCI Range	Pavement Condition	Recommended Action
0 - 24	**Very Poor**	**Base Rehabilitation –** represents roads that exhibit weakened pavement foundation base layers. Complete reconstruction and full depth reclamation fall in this category
25 - 47	**Poor**	**Structural Improvement –** when the pavement deteriorates beyond the need for surface maintenance applications, but the road base appears to be sound. These include structural overlays, shim and overlay, cold planeing and overlay, and hot in-place recycling.
48 - 67	**Fair**	**Preventive Maintenance -** slightly greater response to more pronounced signs of age and wear. This includes crack sealing, full-depth patching, and minor leveling, as well as surface treatments such as chip seals, micro-surfacing, and thin overlays.
68 - 87	**Good**	**Routine Maintenance -** used on roads in reasonably good condition to prevent deterioration from the normal effects of traffic and pavement age. This treatment category would include either crack sealing or local repair (pot hole, depression, poorly constructed utility patch, etc.), or minor localized leveling.
88 - 100	**Excellent**	**Do Nothing -** used when a road is in relatively perfect condition and prescribes no maintenance.

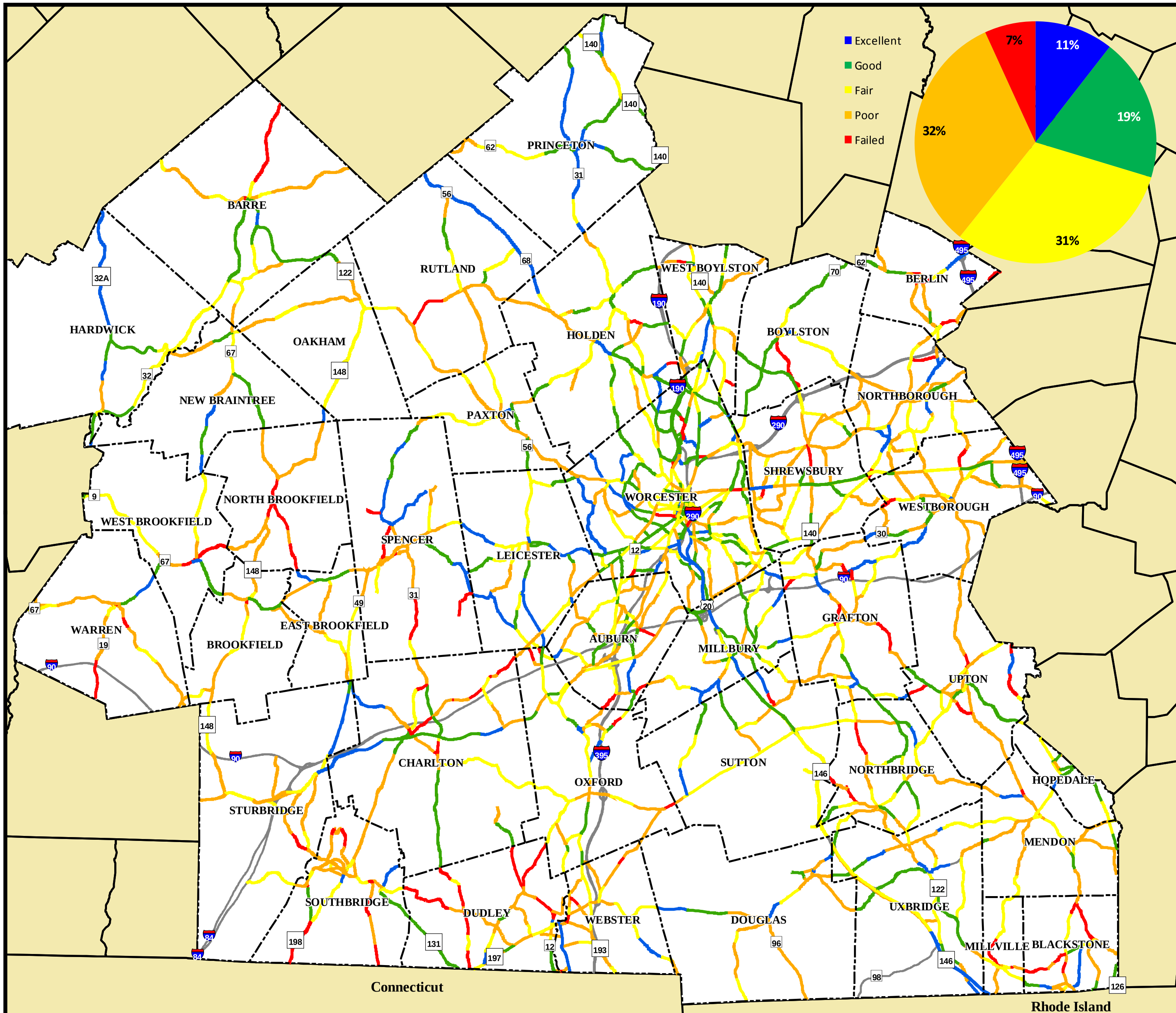
D.4.2.2 Existing Condition



According to CMRPC records, there are approximately 1,100 federal-aid eligible road miles in the CMRPC region. The Massachusetts Department of Transportation (MassDOT) maintains roughly ¼ of these roadways, while the 40 municipalities within the region maintain the remaining total. The mileage is comprised of 182 miles of arterials and 74 miles of collector under MassDOT jurisdiction, and 74 miles of arterials and 773 miles of collectors under town jurisdiction.

CMRPC staff determined that about 116 miles of the region's 1,103 mile federal-aid eligible road network are in "excellent" condition, 211 miles are in "good" condition, 343 miles are in "fair" condition, 358 miles are in "poor" condition, and 75 miles are in "very poor" condition. The map in Figure III-9, Table III-5, and the graph below each provide a visual depiction of this breakdown. If categories "excellent" and "good" are combined and categories "fair" and "poor" are combined, than we can see that the network is currently split in thirds: 1/3 is in "good" condition, 1/3 is in "fair" condition, and 1/3 is in "poor" condition. The network OCI (a weighted average of all the OCIs in the regional network) is approximately 60.1, placing it in the middle of the Preventive Maintenance treatment band (OCI ranging from 48 – 67). As shown above, this OCI average generally represents a roadway in "fair" condition. By definition, a road network condition in this treatment band means that considerable resources are needed to sustain network wide road conditions. It is likely that while any proposed pavement management spending plan will strive to maximize the benefit of each dollar invested. However, without an aggressive investment in the federal-aid eligible road network, the system will undoubtedly continue to lose roads from the routine and preventive maintenance treatment bands into the structural improvement and base rehabilitation bands because of time, weather, and traffic load. This very costly loss will present a challenge for the region to retain its roads in "fair" condition.





Legend

Fed-Aid Eligible

OCI Recommended Action

- Excellent (Do Nothing)
- Good (Routine Maintenance)
- Fair (Preventive Maintenance)
- Poor (Structural Improvement)
- Failed (Base Rehabilitation)

0 2 4 6 Miles

Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the US Bureau of Census, Central Massachusetts Regional Planning Commission (CMRPC), MassDOT/Office of Transportation Planning Geospatial Resources Section and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division.

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Figure III-9 CMRPC Regional Pavment Condition - 2010

Table III-5
Central Massachusetts Region's Existing Pavement Condition by Jurisdiction & Functional Class

Condition	MassDOT Maint. Arterials		Municipal Maint. Arterials		MassDOT Maint. Collectors		Municipal Maint. Collectors	
Excellent	29	16%	6	8%	7	9%	74	10%
Good	39	21%	18	24%	27	37%	127	16%
Fair	51	28%	26	35%	20	27%	246	32%
Poor	61	34%	16	22%	18	24%	262	34%
Very Poor	2	1%	8	9%	2	3%	64	8%
Total Miles	182		74		74		773	

D.4.2.3 Subregional Analysis

As mentioned above, the Central Massachusetts planning region network OCI is 60.1. The Central Subregion network OCI is 68.1. The Northeast Subregion network OCI is 50.2. The Southeast Subregion network OCI is 62.2. The Southwest Subregion network OCI is 56.8. The West Subregion network OCI is 58.8. The North Subregion network OCI is 60.8. While most subregional network OCIs linger around the regional OCI of 60.1, the Central Subregion is 8 points higher and the Northeast Subregion is almost 10 points lower. Table III-6 summarizes the subregional analysis.

Table III-6
Pavement Condition Miles & Percentage by Subregion

Condition	Central Subregion Net. OCI 68.1		Northeast Subregion Net. OCI 50.2		Southeast Subregion Net. OCI 62.2		Southwest Subregion Net. OCI 56.8		West Subregion Net. OCI 58.8		North Subregion Net. OCI 60.8	
Excellent	20.8	11%	9.4	7%	29.4	11%	18.7	9%	25.6	17%	13.4	9%
Good	49	27%	22.9	16%	50.5	19%	29.9	14%	24.4	16%	34.5	22%
Fair	80.7	44%	37.5	26%	84.1	32%	56.5	27%	38.2	26%	46.2	30%
Poor	29.9	16%	64	45%	84.1	32%	79.7	38%	48.2	32%	49	32%
Very Poor	3.7	2%	8.3	6%	15.3	6%	25	12%	13.9	9%	10.2	7%
Total Miles	184.1		142.1		263.4		209.8		150.3		153.3	

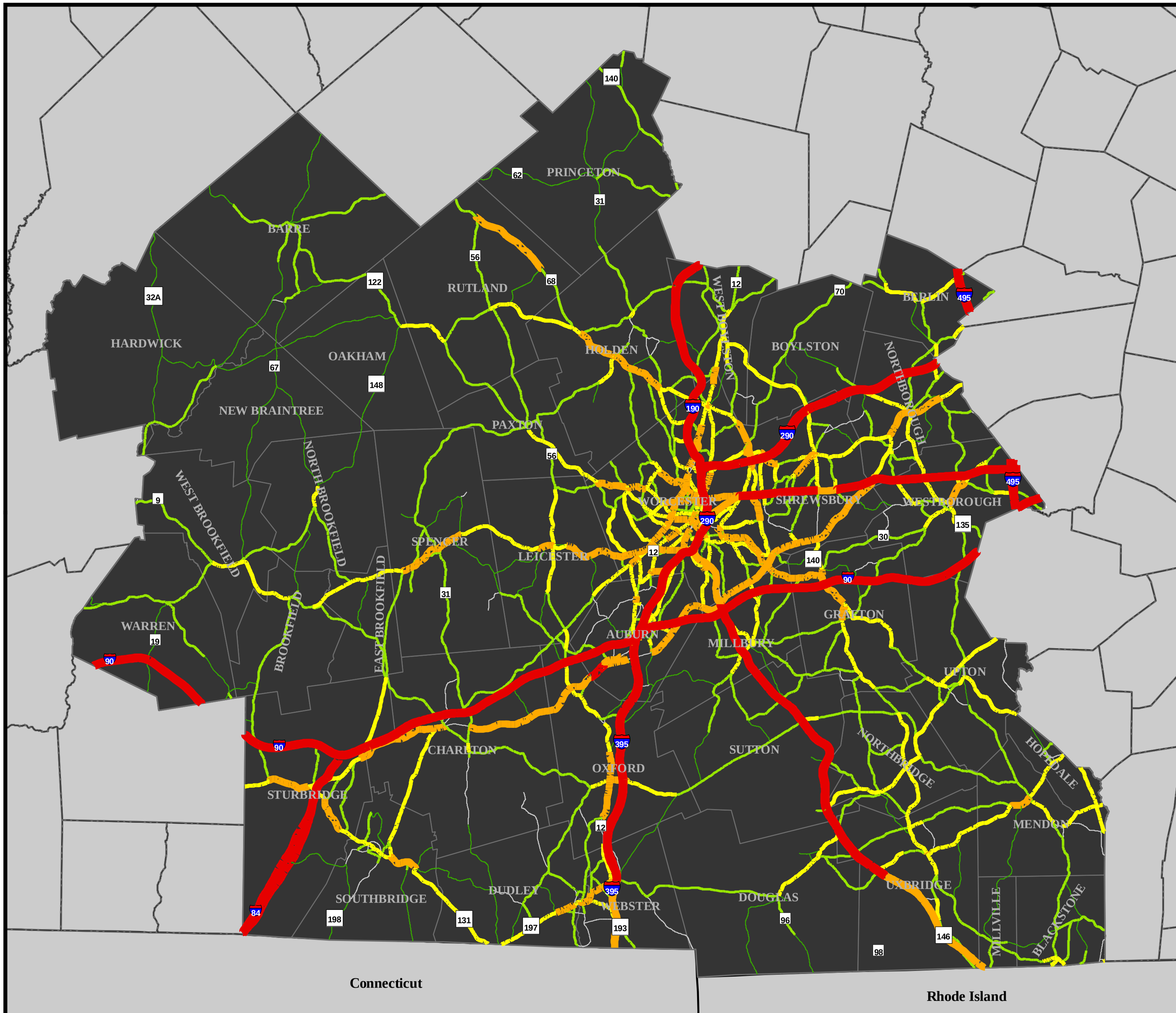
D.5 Mobility

D.5.1 Traffic Monitoring

CMRPC began conducting traffic volume counts in 1982 and has been developing a comprehensive Traffic Counting Program since 1984. Traffic volume counts are most common, but also included in the comprehensive program are a limited number of axle classification counts. The data is used by staff in its ongoing transportation planning program, including the regional travel demand forecast model, the various Management Systems and Freight Planning. Figure III-10 shows traffic volume for the federal aid eligible roadways in the region. This map was compiled using CMRPC's extensive database of traffic volumes. Also, MassDOT's data was used for roadways that CMRPC could not count.

The highest traffic volumes are on the interstate highways, especially Interstate 90, 290, and 495. Currently, approximately 90,000 vehicles per day use the Massachusetts Turnpike between Sturbridge (Interchange 9) and region's east boundary in Westborough, the heaviest being between Sturbridge (Interchange 9) and Auburn (Interchange 10). Lower volumes are observed on other segments west of Sturbridge. Daily volume surpasses 110,000 vehicles a day on sections of Interstate 290 in Worcester. Volumes on Interstate 495 in Berlin and Westborough approach 90,000 vehicles per day. In contrast, volumes on other interstate highways in the region are much lower. Interstate 84 near the Connecticut state line carries only approximately 40,000 vehicles. Interstate 190 carries over 70,000 vehicles per day north of Interstate 290, but by the time it leaves the region in West Boylston at the Sterling town line, a volume of only about 32,000 is observed. Interstate 395 also carries a relatively low volume by the time it leaves the region. Though over 45,000 vehicles use this highway in Auburn, fewer than 22,000 vehicles per day currently utilize the highway as it enters the State of Connecticut in the town of Webster. MassDOT is the agency that collected the data on the interstate highways.

The diverse nature of the development in the region has resulted in widely varying traffic volume patterns. Route 9 between Lake Avenue in Worcester and I-495 in Westborough carries a volume of little over 50,000 vehicles per day. There are several locations along Route 20, throughout the region, where volumes approach or exceed 20,000. Over 20,000 vehicles per day use a section of Route 122A in Holden. Worcester, the center of the region, is also the center of traffic in the region. Several roadways, including Belmont Street (Route 9), Cambridge Street, Grafton Street (Route 122), Highland Street (Route 9), Main Street (Route 9), and Park Avenue (Route 9, 12, and 122A), carry volumes in the 15,000 – 25,000 range. In contrast, several municipalities, especially in the northwest, have no roadways with over 10,000 vehicles per day.



Legend

Traffic Volume

- Not Counted
- < 2500
- 2500 - 7499
- 7500 - 14999
- 15000 - 30000
- > 30000

0 1 2 4 6 Miles

Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC) and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

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Figure III-10 Regional Traffic Flows

D.5.2 Congestion Management Process (CMP)

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) required urban areas across the country to assess traffic congestion using a management system approach. On behalf of the CMMPO, staff at CMRPC began developing the region's Congestion Management System in 1994.

The first step was to identify "focus segments," roadways where the traffic volume on the roadway was exceeding the operational capacity. A roadway's capacity is defined as "the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under prevailing roadway, traffic and control conditions."[5] Utilizing the TransCAD travel demand model for base year 2010 and 2035, a number of road segments across the region were identified as "congested" or "projected" to be congested by 2035. Once identified, CMRPC staff proceeded to verify and monitor the congested conditions in the field by conducting a series of travel-time-and-delay studies along roadways and turning movement counts at intersections. Figures III-11 and III-12 depict the findings of the travel-time-and-delay studies for A.M. and P.M peak hours.

Utilizing the analysis of this data in conjunction with information provided by communities and MassDOT, strategies to mitigate observed congestion can then be developed. Recommendations have included signal timing optimization and coordination; signal equipment upgrades; geometric modifications, such as installation of intersection turn lanes; and deployment of ITS solutions, such as advanced warning systems, traffic control preemptive device technology for emergency responders and recommendations on potential impact on alternate modes.

Occasionally, following the implementation of improvement projects, the same surveys described above are used for monitoring purposes and to assist in determining project effectiveness. It should be noted that the region's CMP data collection schedule has the flexibility to accommodate roadways added to the focus network either through refinements to the regional model, ongoing public participation activities, or requests from the MassDOT District offices.

Progress Reports for the region were compiled in 1995, 1997, and annually since 2000. Since 1998, Level-of-Service (LOS) analyses have been conducted at critical intersection locations and improvement options have been suggested for consideration. Beginning in 2000, signal warrants analyses have also been conducted under the region's CMS program. Also notable, the Progress Reports have been utilized by the MassDOT District #3 office for project development purposes since 1996.

[5] Highway Capacity Manual

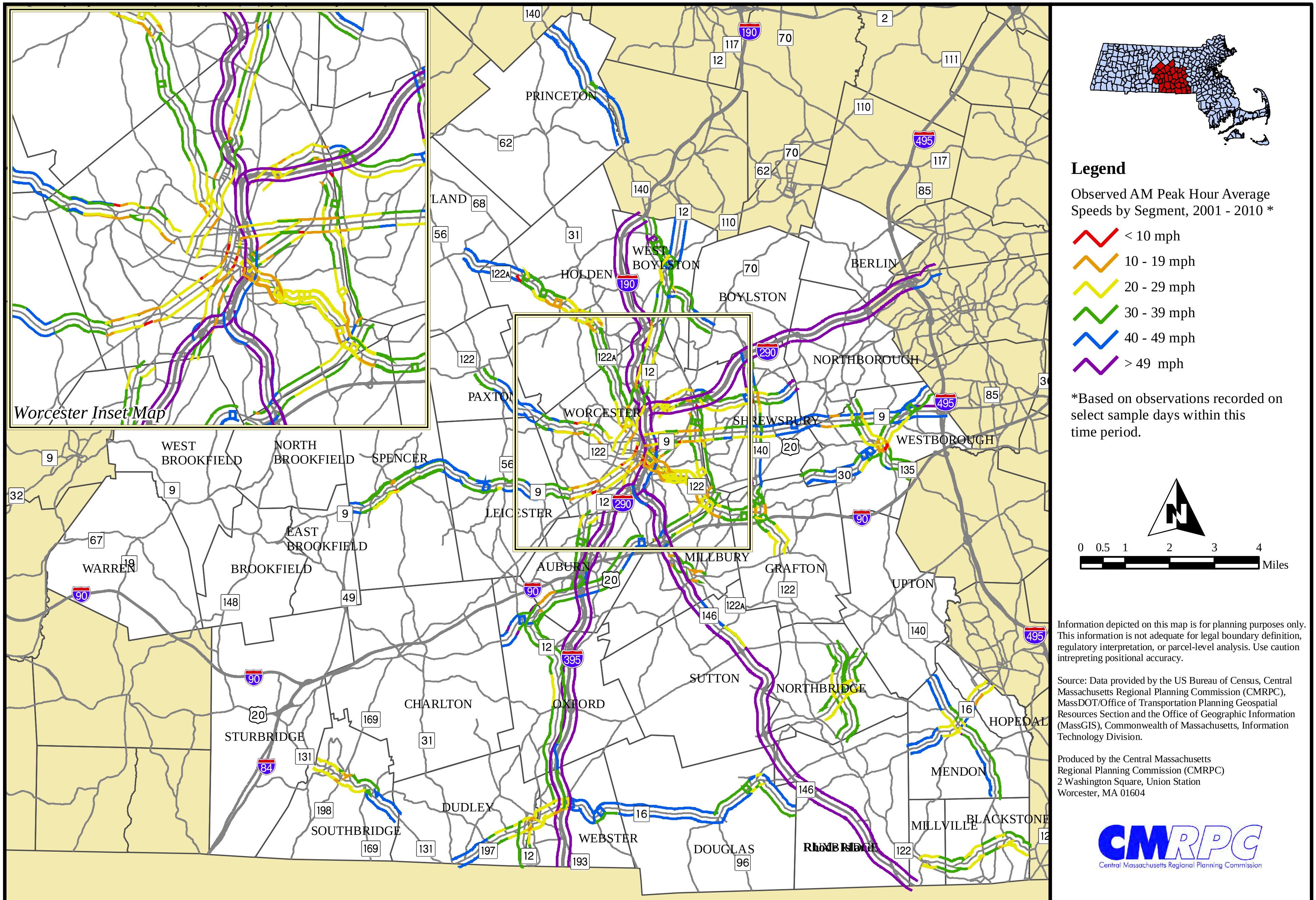
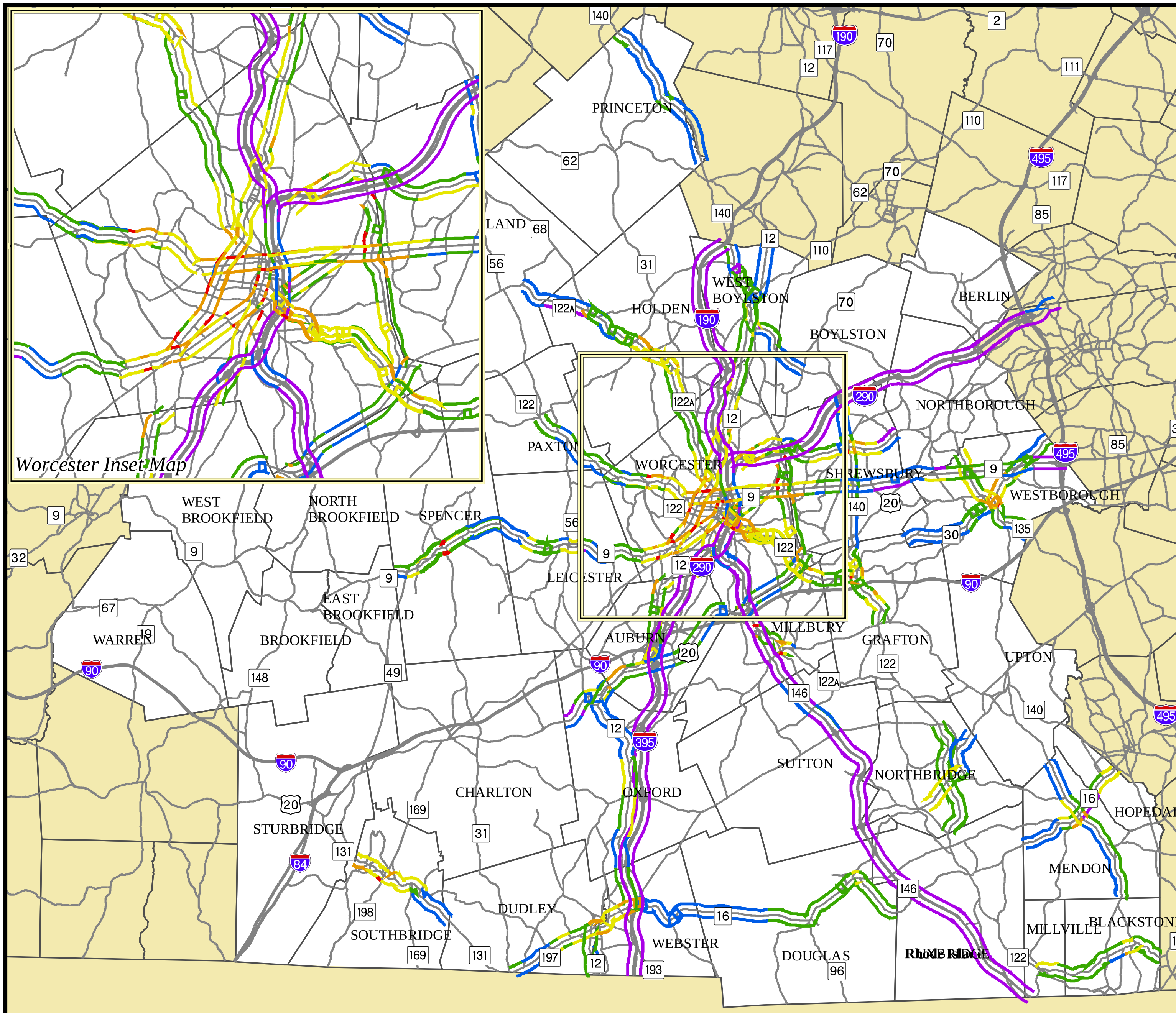


Figure III-11 Observed AM Peak Hour Travel Speeds



Legend

Observed PM Peak Hour Average Speeds by Segment, 2001 - 2010 *

- < 10 mph
- 10 - 19 mph
- 20 - 29 mph
- 30 - 39 mph
- 40 - 49 mph
- > 49 mph

*Based on observations recorded on select sample days within this time period.

0 0.5 1 2 3 4 Miles

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Source: Data provided by the US Bureau of Census, Central Massachusetts Regional Planning Commission (CMRPC), MassDOT/Office of Transportation Planning Geospatial Resources Section and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, Information Technology Division.

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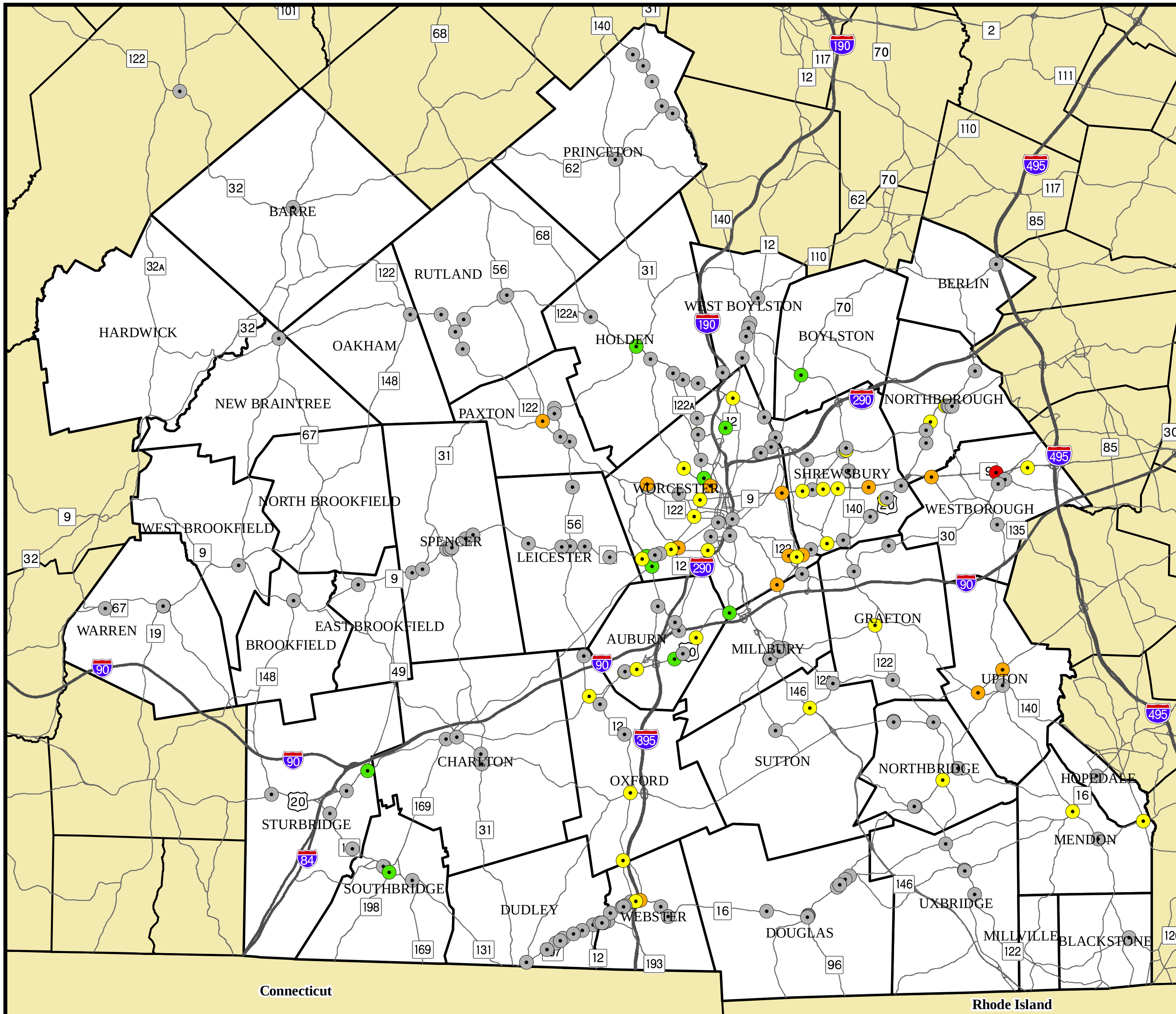
Figure III-12 Observed PM Peak Hour Travel Speeds

D.5.2.1 Trends in Delay Encountered

For all intersections where turning movement counts are obtained, it is possible to analyze the total delay encountered during the examined peak hour periods. A byproduct of the process that results in intersection LOS ratings is the "average delay encountered for entering vehicles." When multiplied by the number of vehicles to which the particular delay pertains, we can arrive at a total amount of waiting time in "car-minutes." A car-minute is one car waiting for one minute, presumably idling and producing emissions as well as adding to total social and economic costs. Five cars waiting for a minute each, or one car waiting for a total of five minutes, results in the same theoretical total waiting time cost and would be measured and quantified by a total net delay of five car-minutes.

Signalized intersections have delays of varying levels in all directions, and this is accounted for. Stop sign controlled intersections have delay counted only for those vehicles arriving on the minor approaches that are required to stop as well as those vehicles on the major approaches that often times need to wait in order to make a left turn. Generally speaking, signalized intersections have more total delay, but a busy stop-controlled location that may not presently meet the warrants for signalization can have substantial delays if volumes on the minor approaches seek to cross the major approaches. Signals establish orderly traffic flows and increase safety by providing the opportunity for traffic to proceed on both the major and minor intersection approaches, thus balancing encountered vehicle delay. When two heavily traveled streets cross at a major signalized intersection, significant delays are often generated due to the high traffic volumes that need to be accommodated. Only after signal operations are optimized are geometric improvements considered, such as the construction of additional travel lanes.

Encountered peak hour delay at critical intersections studied is depicted in Figure III-13.



Legend

Intersection Delay*

- 4 -1,786
- 1,786 - 2,500
- 2,500 - 7,500
- 7,500 - 13,000
- > 13,000

* In car-minutes per hour: The total number of minutes that drivers as a group wait at the intersection during the AM+PM hours. 1,786 minutes is the average peak hour delay of the intersections studied.

Data collected by CMRPC transportation staff as part of the 1996-2010 Congestion Management Program (CMP) program.

0 1 2 4 6 Miles

Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), massDOT/Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

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Figure III-13 Encountered Peak Hour Delay at Critical Intersections Studied (1996 - 2010)

D.5.2.2 Park-and-Ride Facilities within the Region

MassDOT supports the development of Park-and-Ride facilities as an integral part of the multimodal transportation system throughout the Commonwealth. These facilities enhance the mobility of the traveling public by providing transfer points for automobiles, bicycles, pedestrians, and other feeder transportation services needing access to and from car and vanpools, rapid transit, bus, passenger rail, ferry boat, and other transportation services. As this system is further developed, it will lead to improved transportation while reducing congestion and improving air quality.

Within the CMRPC region, the study surveyed the MassDOT lot in Berlin as well as the Massachusetts Turnpike lots in Auburn, Grafton, Millbury, Sturbridge, Westborough, and Worcester. These lots and their utilizations are illustrated in Figure III-14. Table III-7 below shows the utilization of the parking lots in the region. Four of the nine lots in the region are currently closed due to low utilization.

Table III-7
MassDOT and MBTA Maintained Park-and-Ride Lots in the CMRPC Region

#	Community	Location/Address	Capacity	Status*	Comment
1	Berlin	Rte 62 at I-495, Exit #26	45	Open	
2	Auburn	Mid State Drive Adjacent to I-90, Exit #10	135	Open	
3	Grafton	Rte 122 (Worcester Street) at Wyman Gordon Co.	500	Closed	Low Utilization
4	Grafton	MBTA Commuter Rail Station (Pine Street and Route 30)	364	Open	50% utilization
5	Millbury/Worcester	Rte 20 at I-90, Exit #10A	446	Open	
6	Millbury	Rte 122 at I-90, Exit #11	140	Open	
7	Sturbridge	Rte 131 at I-84, Exit #3 (Bethlehem Lutheran Church Lot)	50	Open	
8	Westborough (1)	222 Turnpike Road	42	Closed	Low Utilization
9	Westborough (2)	Rte 9	58	Closed	Low Utilization
10	Westborough	MBTA Commuter Rail Station (Smith Parkway)	448	Open	80% utilization
11	Worcester	Rte 122 (725 Grafton St) at Douglas Drug	90	Closed	Low Utilization
12	Worcester	MBTA-owned Parking Lot (Shrewsbury Street)	115	Open	90% utilization
13	Worcester	Union Station Parking Garage (Franklin Street)	208	Open	65% utilization

**MassDOT-owned lot status as of February 2011. MBTA-owned lot status as of August 2010.*

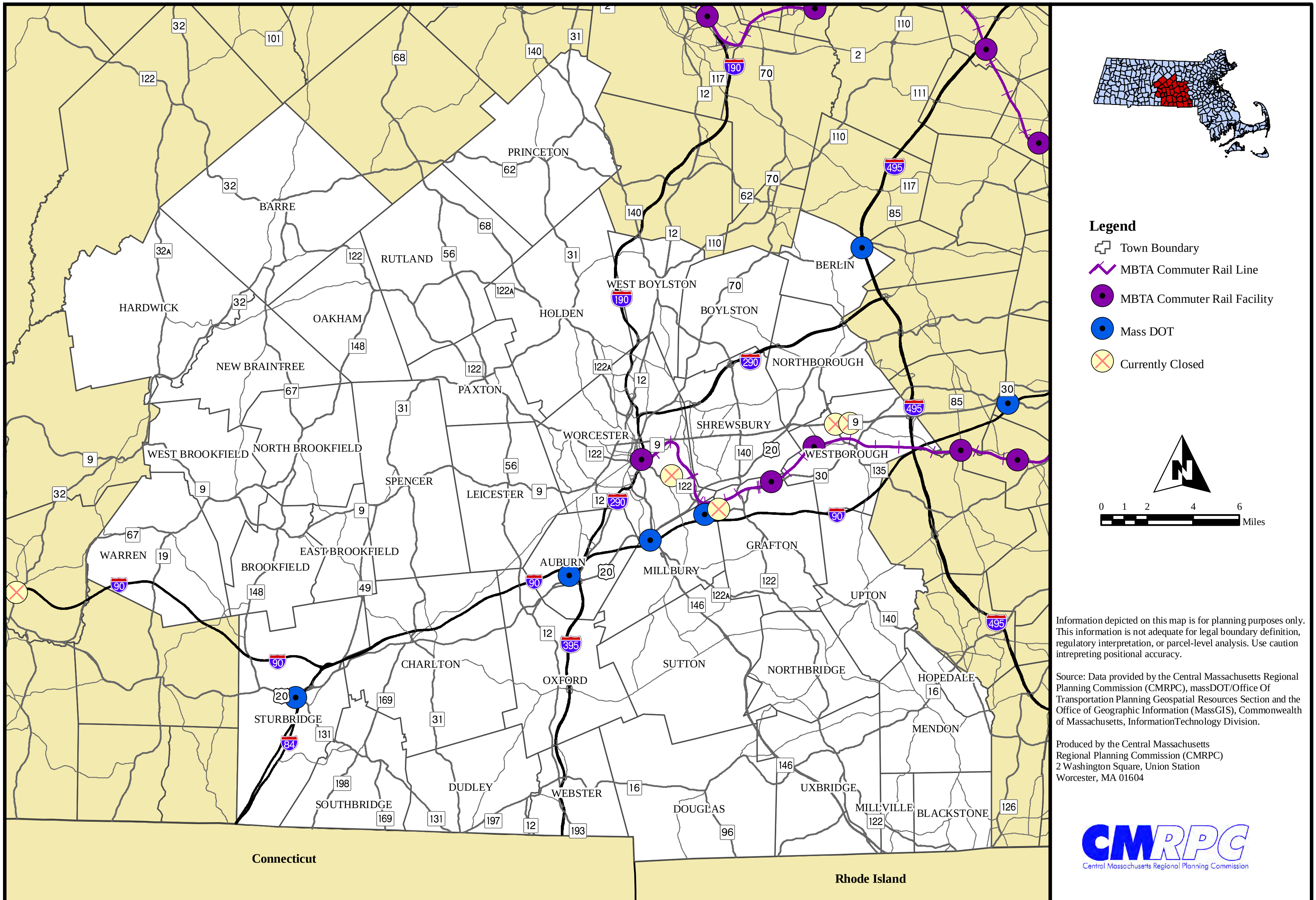

Figure III-14 Regional Park-and-Ride Facilities

D.6 Intelligent Transportation Systems (ITS) & Operations

Technology has found its way into nearly every aspect of our lives, and so it should come as no surprise that it is now being used extensively in ways that improve everyday mobility. From traffic signals to toll collectors to transit fare payment systems, technology is spreading quickly in ways that increase the efficiency of the transportation system. Intelligent Transportation Systems, or ITS, is the use of electronics, communications, or information processing to improve the efficiency or safety of transportation systems.

Because ITS transportation solutions are real-time solutions, they are a natural fit for improving the management and operations of transportation systems. Management and operations encompass daily roadway actions, such as reconstruction and maintenance, snow plowing and salting, providing real time traveler information, and traffic signalization. It also encompasses special circumstances like preparing and responding to accident-related congestion, planned special events, and unplanned security concerns.

By focusing on the evolving technology of ITS and the day-to-day activities of management and operations, transportation planners have a greater opportunity of providing more efficient and effective solutions to the region's transportation problems.

While computer-based technology improvements are happening daily within the sphere of the Central Massachusetts transportation system, most are not yet real-time, nor are they multi-agency. One of the fastest growing technology improvements is computer-actuated signalization using sensors in the pavement or cameras on the signal equipment, such as those used within the City of Worcester. While it is not typically responsive to changing levels of congestion, it can help to keep traffic at optimum levels under most predictable circumstances. Cameras that are used to monitor traffic congestion levels have been installed at intersections in other regions. When congestion becomes an issue, the signals at these intersections are adjusted remotely to improve traffic flows.

Pre-emptive devices on traffic signals that allow for emergency vehicles to proceed quickly through intersections are very common, especially within the urban core. In the past, there were issues with technology incompatibility between different products, but the 2006 Emergency Medical Technician (EMT) Survey showed that most mobile devices are currently adaptive to the various fixed devices used on traffic signals poles.

With the unification of MassDOT in 2009, came the opportunity to merge the former MassPike Operations Center with the MassHighway Traffic Control Center. Previously they were unable to share data or work as a seamless integrated system due to the use of multiple protocols , incompatible software and the lack of transparency among these agencies. Unification allowed the incident management team to share data, promote compatible software, improve response time, reduce delay and operate seamlessly to increase safety and ultimately benefit the public. The new single facility is known as the
Highway Operations Center - HOC.

While the HOC is primarily a roadway maintenance agency, its mission is to:

- increase safety through better incident management,
- improve detection and emergency response,
- gather and share real-time traveler information,

- manage traffic congestion,
- improve traffic operations and highway maintenance, and
- respond to event specific congestion.

For incident management at special event venues such as sporting events and concerts, portable video cameras with wireless capabilities are used to monitor transportation links. Typically, when an incident is detected on video or other source the control center transmits information using XXML; a protocol which converts data to a common format, to instantly relay it to state and local agencies and private-public partners such as the media and 511 which provide real-time transportation information. MassDOT does not disseminate directly to the public but distributes it through private-public partnerships to groups like Sendza which operates the 511 system in Massachusetts. Conversely, local police inform the HOC about incidents on state roads so that information about the incident can be quickly disseminated to emergency response teams in the area. Incident managers are expected to clear tunnel incidents within 200 minutes and above ground incidents within 2 hours. Variable message signs are activated by the HOC to keep motorists informed and offer alternate routing to reduce delay.

The HOC facility in South Boston is staffed 24 hours a day. It detects incidents using video cameras with pan, tilt and zoom (PTZ) capabilities and communicates with local incident management teams such as police, fire, hazmat and ambulance services to clear incidents in a timely manner. Video data is continuously transmitted using high speed broadband fiber optic cable to instantly transmit video, voice and digital data. Access to high speed communications systems is a critical part of the infrastructure required to transmit video data. From this single location at the HOC, operators of the state's bridges, tunnels and surface roadway systems share video, data and information to communicate directly with emergency first responders regarding incidents occurring on all state owned facilities.

Although the facility is expected to be a hub for statewide operations and safety related communications, the HOC primarily serves metro Boston at the present time. The facility operates over 600 hundred video cameras located primarily along tunnels, interstate highways and state routes in metro Boston with only two cameras located on I-90 in Central Massachusetts, and no cameras on I-290, even though peak period congestion is a daily occurrence, and incident-related congestion along I-90 is becoming more regular. Video detection has begun to expand greatly to western Massachusetts. A shared resource conduit with high speed fiber optic link is being installed on 55 miles of I-91 from Connecticut to Vermont to transmit data from more than 300 additional video cameras and more than a dozen variable message signs in the region. A new facility for highway operations for MassDOT-District 2 will be located in the Town of Northampton to be linked to the HOC in Boston through the I-90 high speed fiber optic link.

In addition to the two video cameras in the region, there are two variable message signs (VMS) on I-290 controlled by the HOC. These VMS were installed in the mid-2000s, but have only operated on occasion. The location of the signs is insufficient to provide advance driver warning of congestion, since congestion is typically already occurring at those location.

A state owned fiber optic communications backbone is located on I-90 & I-495, consisting of conduit laid on the right-of-way with fiber optic cable used for statewide transmission of video and data. This communications backbone can be described as analogous to traffic on an interstate highway. Communities adjoining I-90 & I-495 can transmit local video and data using the state communications backbone by connecting the last mile using routers to Wide Area Networks (WAN)) which are like arterial roads. Similarly, Local Area Networks (LAN) are like collector streets and can be connected to the WAN, facilitating rapid data transmission useful for local traffic management. Secondary benefits to the local communities include access to high speed internet and cable which can be a significant factor for expanding economic development opportunities.

Although there is no indication that the state is planning to expand the communications backbone to I-290, it would clearly benefit the City of Worcester and surrounding communities. The HOC uses central radio command, GPS tracking of snowplows, tracking and management of the roving motorist assistance and Cares Van patrols managed through private--public partnerships. The HOC currently relies on local police to relay information to them before alerting incident response teams in the area to clear the incident then activate variable message signs to inform motorists, illustrating how the current protocol slows down response time and increases delay. Installing video detection at key ramps and intersections on I-290, Route 146, I-395, I-190, Route 9 and Route 20 could significantly reduce response time while giving the region more responsibility in incident management. Coordinating the decision-making with the Central Massachusetts region could improve safety and benefit the public. Improving the communications backbone could also allow for consideration of technology-aided methods of managing demand on I-290, since the recently completed Worcester Regional Mobility Study noted that the ability to expand capacity is not presently feasible.

While using electronics to improve efficiency or safety is not a totally new idea, what is new is the level of planning and coordination to ensure that different ITS projects can “talk” to each other and “work” together. Section 5206(e) of the 1997 Transportation Equity Act for the 21st Century (TEA-21) required all ITS projects funded through the Highway Trust Fund to be in conformance with the National ITS Architecture and applicable standards. The National ITS Architecture is a common, established framework for developing integrated transportation systems and is maintained by the United States Department of Transportation (USDOT). The US Department of Transportation required a compliant Regional ITS Architecture to be in place by April 8, 2005 in regions that are deploying ITS projects.

In 2004, the Executive Office of Transportation-Office of Transportation Planning (now MassDOT) led the effort to develop a Central Massachusetts Regional ITS Architecture. This effort was updated in 2010. CMRPC coordinated by building local involvement and support for the effort. During the needs analysis step of the Regional Architecture development process, the Guidance Committee identified key regional needs and major themes for the Regional ITS Architecture. These findings helped shape the architecture to the unique circumstances of Central Massachusetts. The four regional needs, unchanged since 2004, were: **congestion management; transit efficiency; efficient use of existing infrastructure; and economic development**. The three major themes expressed by participants in 2004 were: **transit demand and revenue; traffic congestion and traveler information**. In 2010 the **use of ITS data** was added as a major theme. From these expressed regional needs and major themes came four statewide Near-Term Multi-Agency Initiatives that were recommended by the Guidance Committee for Central Massachusetts. They are:

- **Event Reporting System:** Internet-based tool that serves as a centralized repository for information on events affecting the transportation network.

- **Expansion of the Massachusetts Interagency Video Integration System (MIVIS):** Expansion of video sharing and distribution system to allow sharing of real-time video feeds among a larger group of agencies.
- **511 Travel Information System:** Public travel information system, covering the roadways and transit services in the region.
- **Planning Data Archive:** System for coordinating the planning data archives for the transportation agencies in the region.

These statewide initiatives are largely dependent on MassDOT implementation, and when eventually implemented, will require an expansive effort to involve regional agencies beyond MassDOT to become effective and have a significant effect on regional conditions.

D.7 Access Management

SAFETEA-LU, the federal authorizing legislation for transportation, calls for an increase in planning for accessibility, mobility, safety, and security of people, across modes, for both motorized and non-motorized users. Since FY 2008, CMRPC has begun to develop access management and land use planning strategies that would assist communities in managing land adjacent to roadways in order to provide for safe and efficient internal and external access for motorists, transit users, bicycle riders, and pedestrians.

The Federal Highway Administration defines access management as “the process that provides access to land development while simultaneously preserving the flow of traffic on the surrounding system in terms of safety, capacity, and speed.” In practical terms, it means managing the number of driveways that a vehicle may encounter without hampering reasonable access to a property and removing slower, turning vehicles from the arterial as efficiently as possible.

The Commonwealth of Massachusetts has been heavily promoting Sustainable Development, Smart Growth and Transit Oriented Development (TOD) design principles in an effort to reduce vehicle travel, improve quality of life, and improve air quality. CMRPC believes that developments have an opportunity to utilize these alternative principles in their design. The traditional “suburban sprawl” style of major commercial development is not conducive to transit service. The walking distances between the buildings are often considerable and do not invite pedestrian activity, thereby not accommodating to bus riders who may want to visit or work at more than one business on site. Also, some general design principles that promote the use of transit and deserve consideration include enhanced pedestrian connectivity between buildings and a more clustered layout with vehicle parking (potentially reduced) located behind the buildings.

Three corridor development scenarios were identified in the 2007 Regional Transportation Plan along “vital links” within the region:

a) near build-out conditions of primarily commercial/retail development (Rte 9 Westborough)
b) rural low-to-medium-density development with primarily residential land uses, (Rte 122A Holden) and
c) under-utilized developable land identified as a future growth area (Rte 140 Boylston)

Beginning in 2009, for each of three scenarios, working with community officials to verify the future land use along each the corridors and reviewed the following existing conditions along the corridor:

- Existing and newly approved driveway locations
- Historic crash data analysis along each corridor
- Peak hour traffic volumes along each corridor
- Land uses of lots of record along and in the immediate vicinity of each corridor
- Zoning boundaries – existing and future changes, if known
- Any existing site design guidelines for managing access

A Toolkit will be compiled using the recommendations for the three studies and will be hosted on CMRPC's website for communities to use as access issues arise on specific corridors. Refer to Chapter 7 for sample recommendations.

III-B. PUBLIC TRANSPORTATION SYSTEM

A. FRAMEWORK OF PUBLIC TRANSPORTATION IN THE REGION

Public transportation plays a smaller role than personal automobile in terms of mobility, but the availability of alternative modes of travel is a significant factor in meeting the overall needs of the region. Public transportation includes both local and intercity options. Local options include fixed route bus service, public and client-based paratransit services, taxi and livery services. It is important to note that paratransit services are often partially or fully government subsidized. Intercity public transportation options include intercity bus, commuter rail, and intercity passenger rail.

Public transportation options serve the needs of both commuters and transit-dependent populations. While commuters in the CMMPO region had become less reliant on public transportation over the past 20 years, in recent years that trend appears to be reversing, first for those using improved commuter rail service, and now commuters returning to local public transit. Public transportation suffered from cutbacks in funding, which translated to cutbacks in available service, however, funding has become slightly more stable since the 2007 Regional Transportation Plan was written, and service has also stabilized as a result. In addition to riders who can choose transit or auto travel, for the transit-dependent populations (those who don't drive or can't afford a car), public transportation is the only option and it is vitally important to their quality of life. In addition, it is important to recognize the importance that transit can play in making communities more livable.

The demand for increased alternative travel options are being heard by the state and local officials. The state is in the process of completing transactions with CSX Corporation that will allow for more rail capacity to be available between Worcester and Boston, and plans for more passenger trains in the near future. In addition, state operating assistance for local transit service has begun to stabilize, and local transit officials have made strides in upgrading infrastructure and service features.

B. GOALS FOR THE FUTURE

B.1 SAFETEA-LU

SAFETEA-LU, the current authorization for federal transit and highway programs, recognized the importance of available and affordable public transit by increasing overall capital funding levels and by providing new dedicated operating assistance for programs that go above and beyond Americans with Disabilities (ADA) compliance criteria (New Freedom) and that provide additional options for individuals with low incomes who commute to work (Job Access Reverse Commute-JARC).

B.2 State Emphasis

The State of Massachusetts is the primary operations funder of statewide public transportation, funding approximately 72% of the fixed route and paratransit net costs within the region. While adequate funding has been an issue over the past decade (as will be discussed in more detail below), there has been recognition at the state level that the needs far outweigh the available service.

B.3 CMMPO Goals

The CMMPO recognized the importance of a viable public transportation system to the quality of life in the region. The goals and objectives that the CMMPO developed for the 2012 Regional Transportation Plan addressed the need to define and maintain acceptable conditions and optimal functionality of the public transit system. The CMMPO also recognized the need to improve and encourage the use of public transit (including both local transit and MBTA Commuter Rail), ridesharing services, and pedestrian and bicycle facilities so as to achieve a reduction in the percentage of commuter trips utilizing single-occupant vehicles (SOVs), as measured by US Census Journey-to-Work data. Lastly, the CMMPO acknowledged the need to develop an alternative, creative transportation system that integrates multiple travel modes and includes the use of technology.

B.4 Needs Identified Through Public Input

Public input provided an assortment of recommendations for public transportation, but overall the consensus was that more investment in existing services, especially commuter rail and fixed route service, is urgently needed.

Along with that, there is a perceived need for community-based transit service and more personalized/flexible paratransit services. The "Baby Boomer" generation has begun to reach early retirement age and by the year 2020 will begin to turn 75. In general, these individuals will not disassociate from society as was the norm in previous generations. The baby boomer generation will bring expectations for lifestyles and services that accommodate individual choice. This generation will expect a public transportation that meets their needs for remaining economically and socially active. The challenge will be for public transportation to change its perception as the mode of last resort to lure these individuals out of their cars. Their overall life focus will be on preventative health care, healthy lifestyles, nutrition and adequate and flexible community based activities and services. An increasing majority of older people are likely to be well, healthy, mobile and financially stable. Based on this pattern, it is more than likely that in succeeding groups of older people, the number of individuals who will wish to remain integrated as active, participating, productive members of their communities will grow.

While this picture is one possible scenario for the future, it is important to note that the possibility for more individuals with declining health needing public transportation services, as has been the trend over the past fifteen years, is also likely to continue concurrently. A third group is the 25-60 year olds who are looking for alternatives that are green and can save on gasoline costs, particularly since those costs are escalating at a far greater rate than inflation.

Lastly, there was a specific request to see “crosstown” routes implemented on the WRTA system to provide more direct connections to destinations in the region.

C. WRTA FIXED ROUTE SERVICES

C.1 Introduction

Fixed route transit operations continue to play an increasing and critical role in the 40 municipality Central Massachusetts Regional Planning District. Overall, transit serves approximately 0.5% of all person trips in the region[1]. Within the City of Worcester itself, approximately 1.3% of all person trips are served by transit. However, transit serves a critical role because of its impact on downtown Worcester traffic flow and because of the market segment transit serves.

Transit's impact on traffic is greater than its small 0.5% share of total travel would indicate due to the fact that the fixed route system is radially oriented concentrated along the traffic corridors leading into the Worcester Central Business District (CBD). Given the eastern Massachusetts area's non-attainment status with regard to air quality, the City of Worcester’s maintenance status for carbon monoxide, and the recent development activities in downtown Worcester (including the City Square project and MBTA service expansion), transit is a viable alternative to auto travel for trips destined to this potentially congested area. The nature of the market segment served by transit is the second reason for transit's important role in the regional transportation system. Traditionally in this area, transit has served persons who would find it difficult or impossible to make their trip by any other mode. Among the groups affected are: (1) elders, (2) people with disabilities, (3) young people and (4) people living on limited incomes. Over the past few years, the transit has begun to attract new riders who are becoming more environmentally aware and riders who are more concerned with higher gas prices. Overall, transit serves nearly three and a half million trips each year.

C.2 Characteristics/Trends

C.2.1 Providers

The single most important provider of fixed-route and paratransit services in Central Massachusetts is the Worcester Regional Transit Authority (WRTA). Its 35 member municipalities are depicted in Figure III-15. Under the provisions of the state enabling legislation, Chapter 161B of the General Laws of Massachusetts, the WRTA is prohibited from operating any services itself. All of its services are provided by transit operators who are under contract to the Authority.

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[1] The Worcester Regional Transit Authority carried about 11,800 riders per day according to the FY ’10 National Transit Database (NTD) Report. It is estimated that there are about 1,251,000 person trips per day made in the 13 WRTA fixed route communities by all modes. This estimate is based on the National Household Travel Survey (NHTS) conducted in 2001 where the daily person trips per household was determined to be 9.66. 129,491 households in 13 fixed route communities X 9.66 = 1,250,883.

The fixed route provider under contract to the WRTA is RTA Transit Services, Inc. RTA Transit Services currently operates 47 full size (30', 35' and 40') buses along with an additional 50 vans which are used for paratransit purposes. These vehicles along with the garage/maintenance facility at 287 Grove Street are owned by the WRTA.

C.2.2 Fixed Route Service Area and Population

RTA Transit Services provides service on 23 weekday routes. These routes serve the City of Worcester and eleven (11) surrounding communities. All routes are oriented to Downtown Worcester as this is the most cost-effective way to provide service coverage given limited operating resources. The need is recognized for more direct cross-town service, but that will require more operating resources than currently available to the WRTA. Eleven (11) of the 23 routes serve outlying communities. Service extends as far out as Brookfield (18 miles from Downtown Worcester) and Webster (20 miles). Route coverage is depicted in Figure III-16. The fixed route system basically serves the population within or going to the Worcester Urbanized Area. The 2010 Federal Census population for the entire 35 community WRTA service area is 509,764.

C.2.3 Ridership, Route Characteristics, Service Days/Hours

The WRTA has embarked on an aggressive campaign over the past three years to increase ridership, resulting in 2-3% increases in each year. In addition, they are on par to increase ridership by at least 3% in the current fiscal year. Overall, ridership has increased by 13% over the past four years.

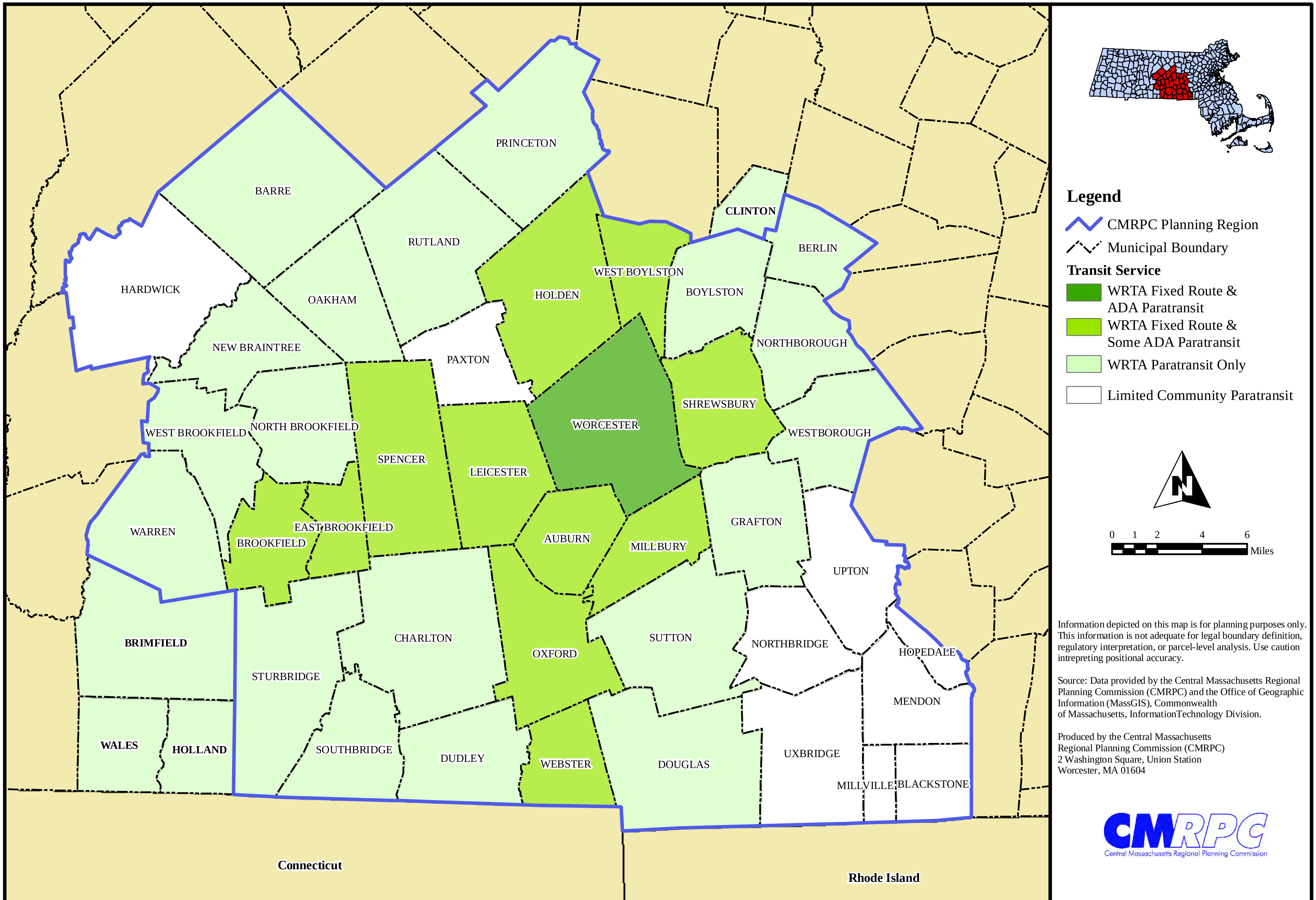


Figure III-15 CMRPC Regional Transit Service Condition, 2011

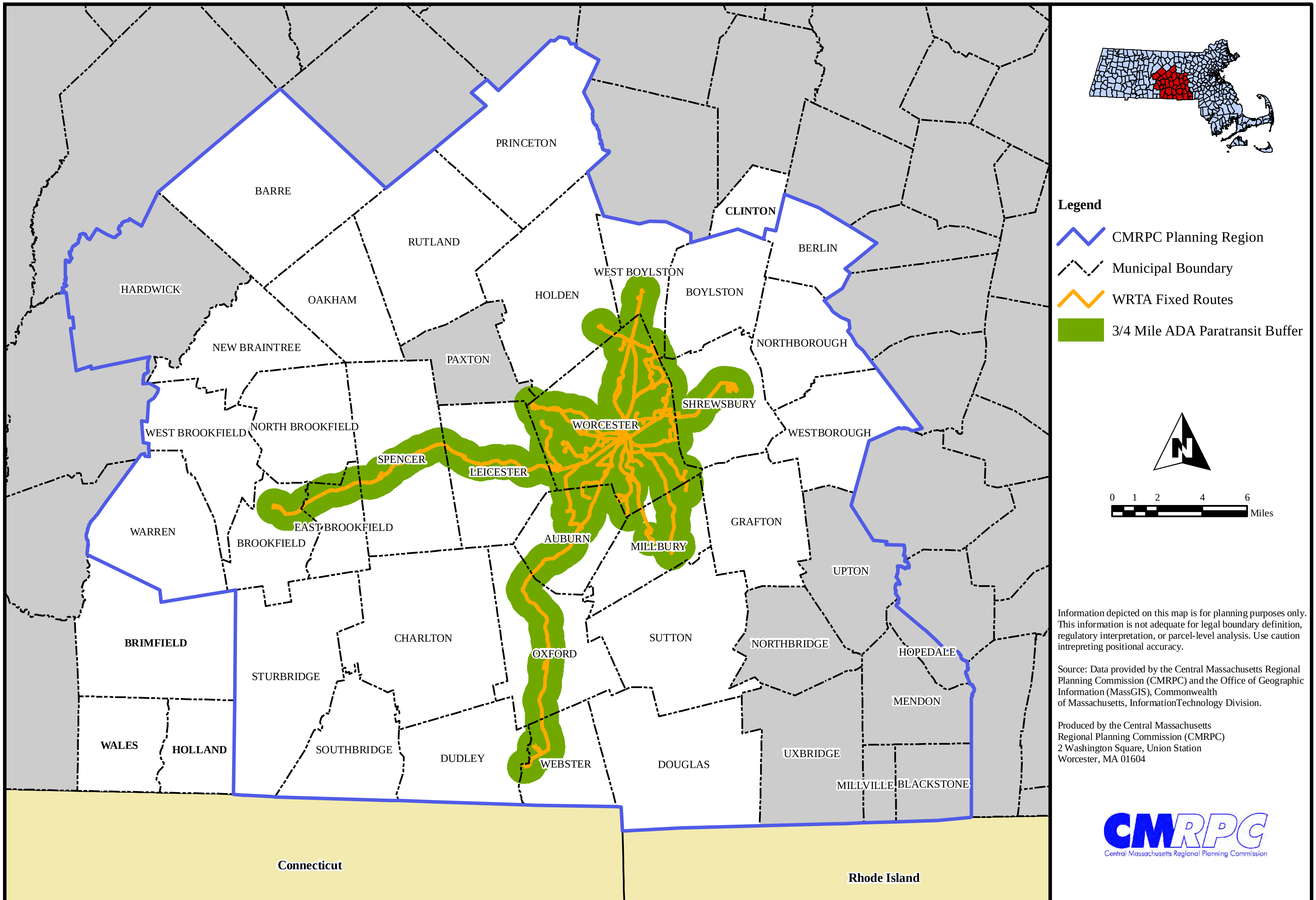


Figure III-16 WRTA Weekday Fixed Bus Route System & 3/4 Mile ADA Paratransit Buffer, 2011

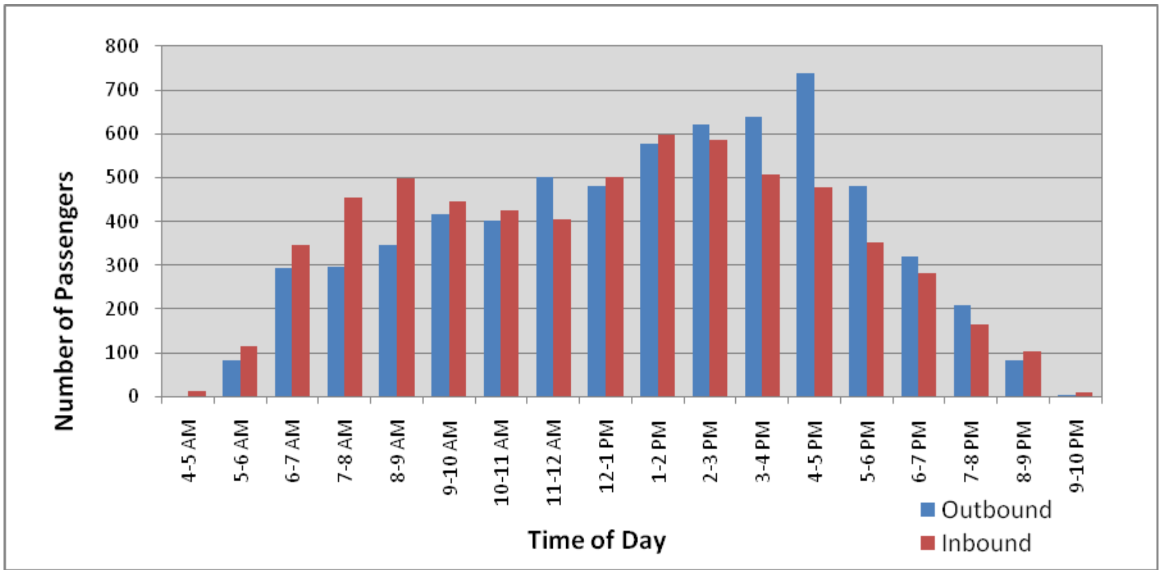
Seven day a week service is provided by the WRTA albeit to a lesser degree during the weekend time period, particularly on Sunday. The result of the most recent weekday driver surveys and ridership makeup is presented in Tables III-8. It should be noted that (in FY '11) Saturday service approximated 37% (in terms of passenger trips) of that provided during weekdays. Sunday service is approximately 12% of that provided on weekdays.

Table III-8
Weekday Passenger Ridership Makeup
(Driver Count – November 2010)

Route	Fare Category		Total	Ridership Makeup %	
	Full Fare	E&D		Full Fare	E&D
1	190	75	265	71.7	28.3
2	293	163	455	64.3	35.7
3	118	82	200	59.0	41.0
4	127	60	187	68.1	31.9
5	592	213	805	73.6	26.4
6	179	71	250	71.5	28.5
7	408	205	613	66.6	33.4
11	790	318	1,108	71.3	28.7
14	157	58	215	73.1	26.9
15	211	78	289	73.0	27.0
16	232	91	323	71.9	28.1
19	832	310	1,142	72.8	27.2
22	124	4	128	96.8	3.2
23	647	245	892	72.5	27.5
24	581	305	886	65.5	34.5
25	217	51	268	81.0	19.0
26	954	263	1,217	78.4	21.6
27	952	358	1,310	72.7	27.3
30	768	192	960	80.0	20.0
31	486	116	602	80.7	19.3
33	387	83	470	82.4	17.6
42	148	43	191	77.2	22.8
System	**9,392**	**3,384**	**12,776**	**73.5**	**26.5**

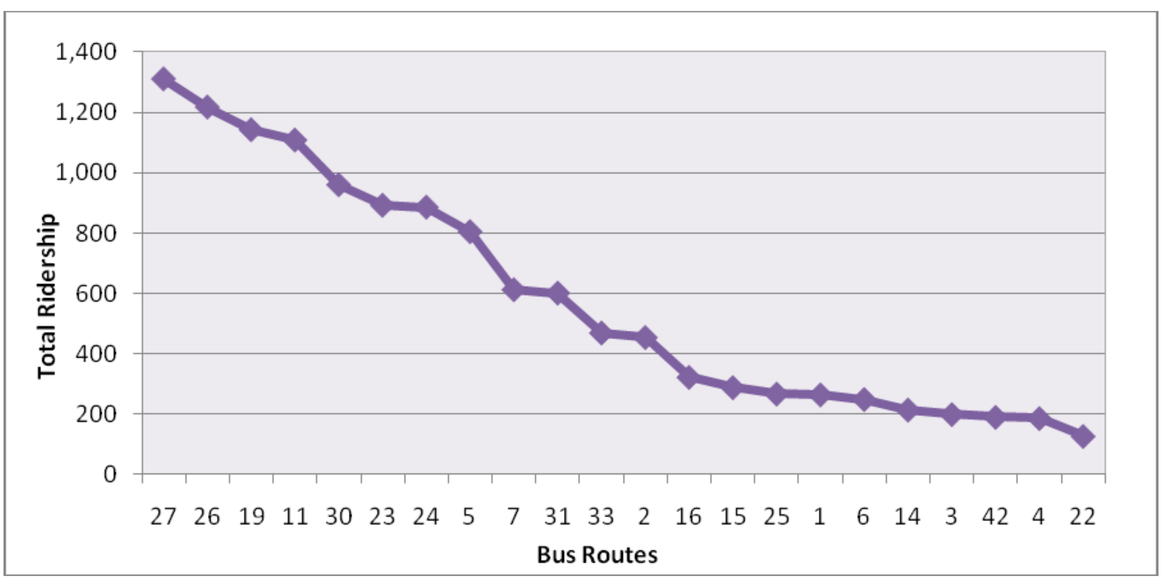
Weekday directional hourly ridership profiles are depicted in Figure III-17. As expected, ridership is highest inbound in the morning and outbound in the evening. What is perhaps more unusual is that ridership is generally at its highest from 1PM to 5PM, and that ridership remains high throughout the middle of the day.

Figure III-17
Weekday Directional Hourly Ridership Profiles
(Driver Count November 1, 2010)



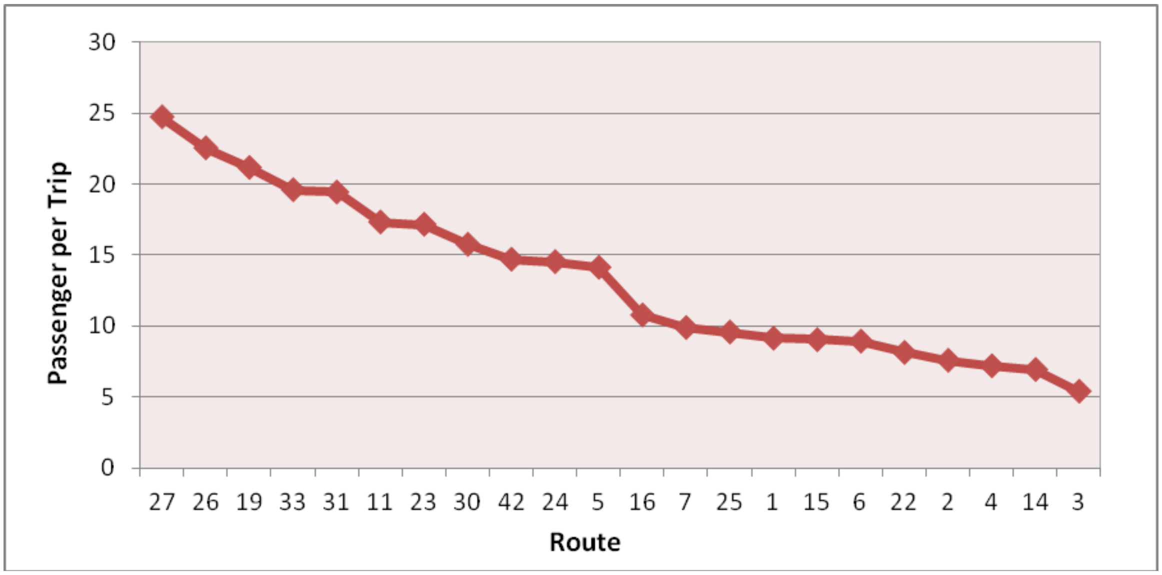
Weekday ridership by route is shown graphically in Figure III-18. It's important to note that most of the lower performing routes also have lower frequency of service and therefore less actual inbound/outbound trips. For this reason, it is also necessary to show the number of weekday passengers per trip by bus route which are depicted in Figure III-19.

Figure III-18
Weekday Ridership Makeup by Bus Route
(Driver Counts - November 1, 2010)



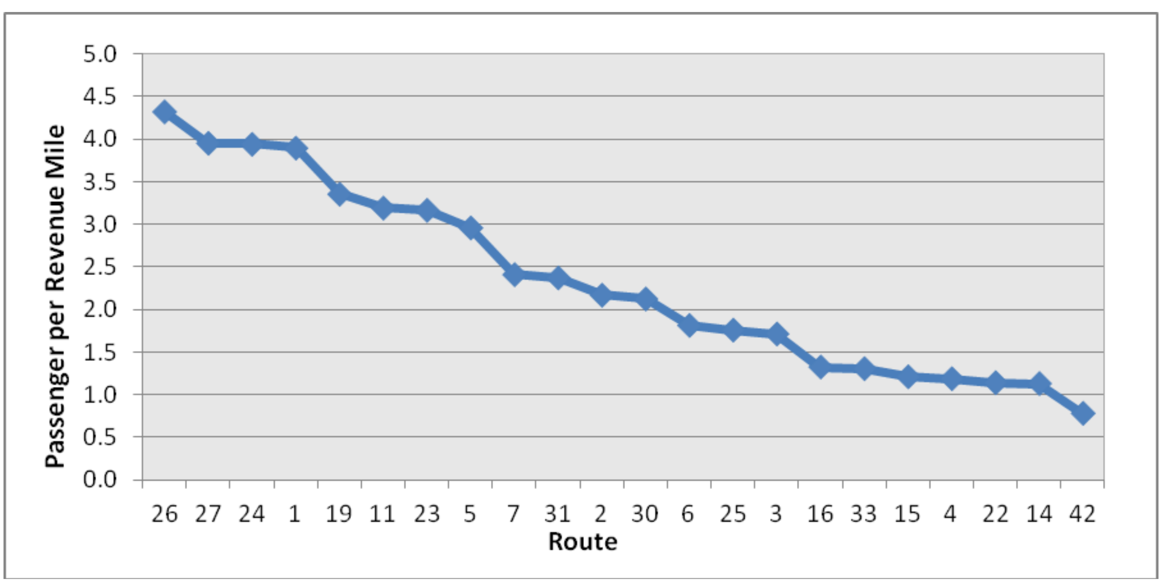
One of the lowest performing routes in terms of overall ridership is Route 42, however as can be seen below, Route 42 performs much better when you factor in that it also has lower frequency of service.

Figure III-19
Weekday Passengers per Trip by Bus Route
(Driver Count - November 1, 2010)



Since cost of service is related not only to hours on the road, but also to miles of service, it is helpful to also consider the weekday passengers per mile by bus route, which are depicted in Figure III-20.

Figure III-20
Weekday Passengers per Revenue Mile by Bus Route
(Driver Count - November 1, 2010)



Service hours range from 4:55 A.M. to 9:50 P.M. on weekdays, from 5:50 A.M. to 9:47 P.M. on Saturdays and from 9:35 A.M. to 8:25 P.M. on Sundays. The hours of operation by route and day of week from the first A.M. trip (whether from inbound/Downtown terminus or outbound terminus) to its last P.M. trip are depicted in Table III-9.

Table III-9
Hours of Operation by Route and Day of Week
(Effective September 4, 2010)

Route	Description	Weekday	Saturday	Sunday
1	Mt. St. Ann via Providence St.	6:00 AM -- 8:20 PM	8:15 AM -- 4:45 PM	10:30 AM -- 5:10 PM
2	Tatnuck Square via Pleasant St.	5:45 AM -- 8:55 PM	11:25 AM -- 6:00 PM	11:30 AM -- 6:30 PM
3	Worcester State University via Highland Street	5:15 AM -- 9:25 PM	10:45 AM -- 6:25 PM	
4	Shoppes at Blackstone Valley via Millbury Street	8:15 AM -- 9:15 PM	10:00 AM -- 6:00 PM	10:00 AM -- 6:00 PM
5	SWCommons/Wheelock Avenue via Grafton Street	5:20 AM -- 8:15 PM	10:30 AM -- 5:20 PM	10:45 AM -- 5:55 PM
6	West Tatnuck via Chandler St.	6:10 AM -- 8:00 PM	7:00 AM -- 8:50 PM	
7	Washington Heights Apts.	5:15 AM -- 9:05 PM	6:15 AM -- 9:20 PM	9:35 AM -- 8:25 PM
11	Fair Plaza via Vernon Hill and Greenwood Street	5:00 AM -- 9:10 PM	6:05 AM -- 9:30 PM	12:00 AM -- 7:30 PM
14	Showcase Cinemas/Holden via Burncoat Street	5:20 AM -- 8:40 PM	10:45 AM -- 6:10 PM	
15	Shrewsbury Center via Shrewsbury St. and Route 9	5:20 AM -- 8:50 PM	11:35 AM -- 5:25 PM	
16	Lincoln Plaza via Hamilton St. and Lake Avenue	6:00 AM -- 9:30 PM	9:30 AM -- 7:00 PM	
19	Worcester Airport/Leicester Wal-Mart via Main Street	4:55 AM -- 8:30 PM	6:35 AM -- 9:40 PM	11:00 AM -- 7:00 PM
22	Millbury Center via Massasoit Road and Route 122A	Weekday Only Commuter Service (5:55 AM--8:45 AM; 1:10 PM--5:37 PM)		
23	Mountain Village via Lincoln St	5:25 AM -- 9:00 PM	6:35 AM -- 9:00 PM	12:00 AM -- 7:30 PM
24	UMASS Medical Center via Belmont Street	5:45 AM -- 9:50 PM	6:40 AM -- 9:10 PM	
25	Auburn Industrial Park via Canterbury & Southbridge Sts.	6:30 AM -- 8:20 PM	10:00 AM -- 6:45 PM	
26	Great Brook Valley via Lincoln Street	5:35 AM -- 9:05 PM	6:10 AM -- 9:25 PM	10:08 AM -- 8:25 PM
27	Auburn Mall via Main Street	5:35 AM -- 9:20 PM	6:10 AM -- 8:49 PM	10:30 AM -- 6:30 PM
30	West Boylston Wal-Mart via Grove and West Boylston Sts.	5:35 AM -- 9:05 PM	5:50 AM -- 9:47 PM	11:00 AM -- 6:25 PM
31	Lincoln Plaza via Grove and West Boylston Streets	5:00 AM -- 8:55 PM	10:20 AM -- 5:55 PM	
33	Worcester-Spencer-Brookfield via Main St./Rte. 9	5:10 AM -- 9:06 PM		
34	George Booth Apts. via Belmont and Plantation Sts			10:00 AM -- 8:00 PM
42	Worcester-Oxford-Webster via Southbridge St. & Rte 12	6:00 AM -- 7:35 PM		

C.2.4 Route Combinations, Service Frequencies, Vehicle Requirements

Most routes are interlined in combination with one another for purposes of efficiency (it takes approximately 3-4 minutes to loop around the City Hall/Worcester Common area due to traffic signalization), passenger convenience (consideration is given to trip origin and destination patterns within the City of Worcester), and in recognition of air quality concerns and the commitment to mitigation measures.

Route combinations are determined/influenced by the demand for service on each route, the run time required by each route, and the desire to maintain clock headways. The size of the vehicles assigned to route combinations are primarily based on peak hour loadings (influenced heavily by school-related trip making) and roadway geometrics. The combinations for weekdays is presented in Tables III-10, along with the associated service frequencies and vehicle requirement. Combinations for Saturdays and Sundays vary.

Table III-10
Weekday Route Combinations/Service Frequencies/Vehicle Requirements
(Effective September 4, 2010)

Route Combination	Peak Period Frequency (minutes)	Vehicle Requirement	
		#	Size
1 / 16	60	2	35'
2 / 5	30	3	35'
30 / 3 / 6	20-40/60/60	4	40'
4	60	1	30'
7	30	2	30'
11 / 24	30	2	35'
14	60	1	40'
15	60	1	30'
19 / 23	35	4	40'
22	60	1	30'
26 / 27	35	4	40'
31 / 25	60	2	35'
33	>90	2	40'
42	120	1	40'
22 Routes Total		**30**	

Vehicle requirements, by category, by day of the week, are summarized in Table III-11. The fleet is 100% accessible with approximately 20 lift trips realized during a typical weekday.

Table III-11
[*]Peak Period Vehicle Requirement by Category by Day of Week
Effective September 4, 2010

Day of Week	30'	35'	40'	Total
Weekday	5	11	17	**33****
Saturday	1	10	9	**20**
Sunday	2	3	7	**12**

* Peak Period Service operates between 8-10 A.M. and 4-6 P.M.
** Not including work and school related extras.

C.2.5 Fare Structure

A flat fare structure exists within the WRTA fixed route service area with adult fares costing $1.50. The WRTA adopted this new flat fare structure in January 2009 when it increased fares from $1.25 to $1.50 and eliminated the four zones within the service area. Only two of the WRTA's routes operated over more than two zone changes and the administrative costs were more than the return.

Approximately 9% of all passenger trips involve a transfer (from one bus to another) for which there is a requirement of paying an additional $1.50 fare. However, given the significant interlining of the route structure, approximately 17% of passengers travel from one bus route to another (essentially using the same bus) who escape this charge. In addition, passengers who will be making a return trip can purchase a one-day pass for $3.50, thereby avoiding the charge for transferring to a different route.

Passenger fares have risen approximately 200% within the 1980-2010 time period – see Table III-12. However, while the base passenger fare has gone from $.50 to $1.50, passenger revenue as a percentage of total operating costs has decreased significantly over the same time frame, due to a more dramatic increase in operating costs.

Table III-12
Fare Changes FY '80 - FY '11

Year	Adult Fares* ($)	Base Student Fare	# of Fare Zones	Transfer Fee ($)
'80-'81	0.50-1.15	0.10	5	0
'82	0.60-1.25	0.30	5	0
'83	0.60-1.25	0.30	4	0.10
'84-'89	0.60-1.25	0.45	4	0.10
'90	0.75-1.75	0.45	5	0.25
'92-'96	0.75-1.75	0.75	5	0.25
'97-'01	1.00-1.75	0.75	4	0.25
'02-'09	1.25-2.00	N/A	4	0.25
'09-'11	1.50	N/A	1	N/A

* Elderly and Disabled (E&D) fares are 50% of the zonal adult fare throughout the day

As can be determined from Table III-13 passenger revenue made up 46% of the total operating cost in FY ’84 but had decreased to 17% by FY’08. Over the past two years, the ratio of passenger revenue to operating costs has begun to increase again to 22%, partly due to the increase in fares, but also due to containment of costs and increasing ridership. It should be noted that a much lower revenue to cost ratio of 16.5% occurred in FY ’05, but that year was abnormal given that there was a 67 day strike.

Table III-13
Operating Costs per Revenue Mile

Fiscal Year	Actual Revenue Miles	Operating Costs ($)	Cost per Mile ($)	Passenger Revenue ($)	Passenger Revenue per Mile ($)	Ratio of Revenue to Operating Costs
1980	1,963,279	4,918,116	2.51	2,014,221	1.03	40.96%
1990	2,032,367	7,788,300	3.83	2,676,639	1.32	34.37%
2000	2,160,419	11,463,970	4.93	3,047,684	1.41	28.60%
2001	2,232,221	12,137,140	5.17	3,455,628	1.56	30.22%
2002	2,109,332	12,063,441	5.56	3,160,108	1.52	27.34%
2003	1,918,455	12,779,151	6.41	3,062,027	1.60	24.98%
2004	1,616,082	12,243,796	7.24	2,559,374	1.60	22.06%
2005	1,290,845	11,423,516	8.51	1,811,904	1.40	16.49%
2006	1,546,451	12,957,085	8.04	2,502,893	1.68	20.13%
2007	1,557,080	13,352,596	8.25	2,373,636	1.52	18.48%
2008	1,568,224	14,089,605	9.20	2,461,007	1.57	17.07%
2009	1,562,176	14,173,204	9.39	2,718,538	1.74	18.53%
2010	1,522,274	14,262,021	9.06	2,966,352	1.95	21.51%

Actual revenue miles per NTD/Section 15 reports
Operating costs and revenue from Financial Statements

C.2.5.1 Net Operating Costs

The WRTA, similar to transit authorities throughout the country, operates at a substantial deficit. An issue facing the WRTA on a yearly basis is how to limit net operating costs such that the WRTA doesn’t end the year with an unfunded net cost of service. This is problematic given that federal operating subsidies have been eliminated, local subsidies are constrained by Proposition 2 ½ and state contract assistance is capped and the amount is determined by the legislature in arrears.

Fixed costs (labor, health insurance, etc.) are the primary cause of the fixed route cost increases experienced by the Authority. In the past, inflation, along with the addition of paratransit services for new municipalities, were the primary causes of cost increases. Over the past four years, the WRTA has been somewhat successful in containing costs, in spite of significant increases in health care costs.

Net operating costs for both paratransit and fixed route services are depicted in Table III-14 and Figure III-21. Several measures have been taken by the Authority to limit fixed route costs since the 1980s including cutbacks in service, going out to bid on new fixed route service and the provision of existing suburban route service (#s 22, 32, 33, 42 and 110) by the Community

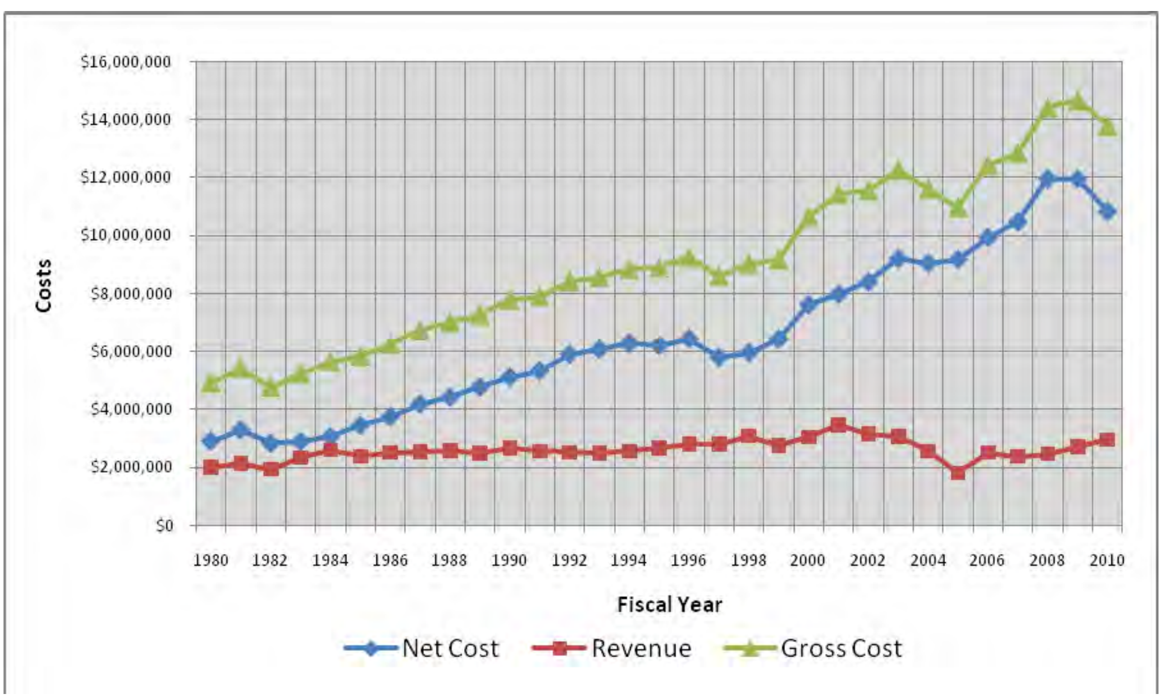
Division of RTA Transit Services, Inc. The Community Division has a separate collective bargaining agreement with a significantly lower associated wage rate than the City Division fixed route operators. Even with the above measures, fixed route operating costs have risen approximately 180% over the FY '80-FY '10 period. During the same 30-year timeframe, the corresponding increase in passenger revenue has been approximately 47%.

Table III-14
Comparison of WRTA Fixed Route and Paratransit Costs

Fiscal Year	Net Cost Fixed Route ($)	% Fixed Route	Net Cost Paratransit ($)	% Paratransit	Total Net Cost ($)
1980	2,903,895	91.2	280,782	8.8	3,184,677
1990	5,111,661	77.0	1,525,404	23.0	6,637,065
2000	7,609,810	68.7	3,467,194	31.3	11,077,004
2001	7,977,514	66.5	4,026,096	33.5	12,003,610
2002	8,399,488	66.9	4,158,466	33.1	12,557,954
2003	9,198,152	67.2	4,483,205	32.8	13,681,357
2004	9,044,929	67.6	4,328,108	32.4	13,373,037
2005	9,176,467	68.1	4,300,599	31.9	13,477,066
2006	9,931,316	68.5	4,568,500	31.5	14,499,816
2007	10,471,109	70.0	4,484,748	30.0	14,955,857
2008	11,959,371	72.2	4,601,196	27.8	16,560,567
2009	11,953,055	74.2	4,145,361	25.8	16,098,416
2010	10,826,293	73.7	3,872,535	26.3	14,698,828

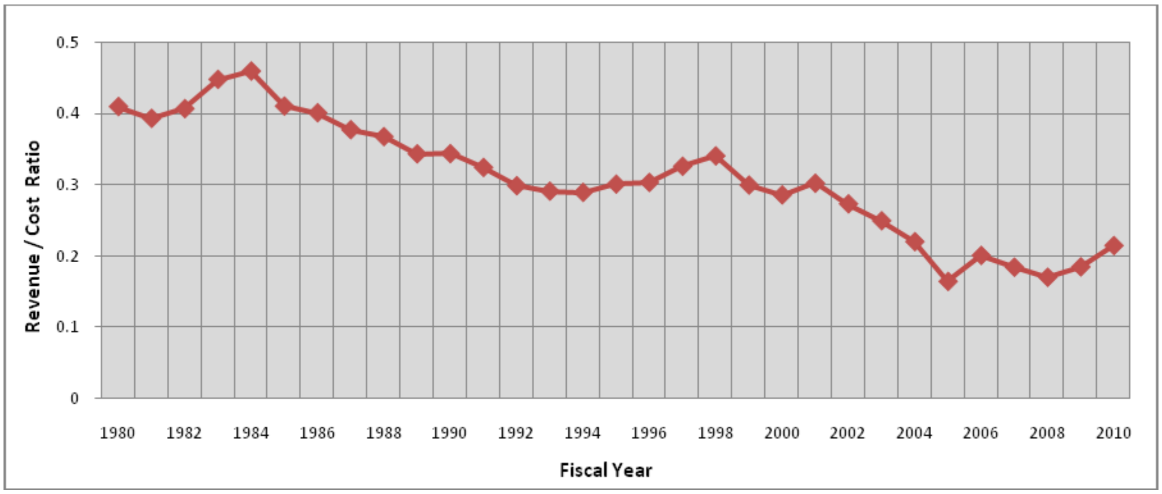
Source: McCarthy-Hargrave Certified Public Accountants
WRTA Annual Auditors Reports Fiscal Years 1980-2010

Figure III-21
Revenues and Costs of Fixed Route Service



As shown in Figure III-22 and in Table III-13 the revenue/cost ratio for fixed route service has decreased 49% over the time frame - from approximately 0.41 in FY '80 to approximately 0.21 in FY '10. Until two years ago, passenger revenues, even with fare increases, could not keep pace with operating costs. The WRTA has begun to contain operating cost increases over the past two years, and has experienced passenger growth in spite of a fare increase in January 2009- see Figure III-23.

Figure III-22
Revenue/Cost Ratio - Fixed Route Service for Fiscal Years 1980 thru 2010



Source: McCarthy-Hargrave Certified Public Accountants
WRTA Annual Auditors Reports Fiscal Years 1980-2010

Figure III-23
Net Operating Costs for Fiscal Years 1980 thru 2010
WRTA Fixed Route and Paratransit Services

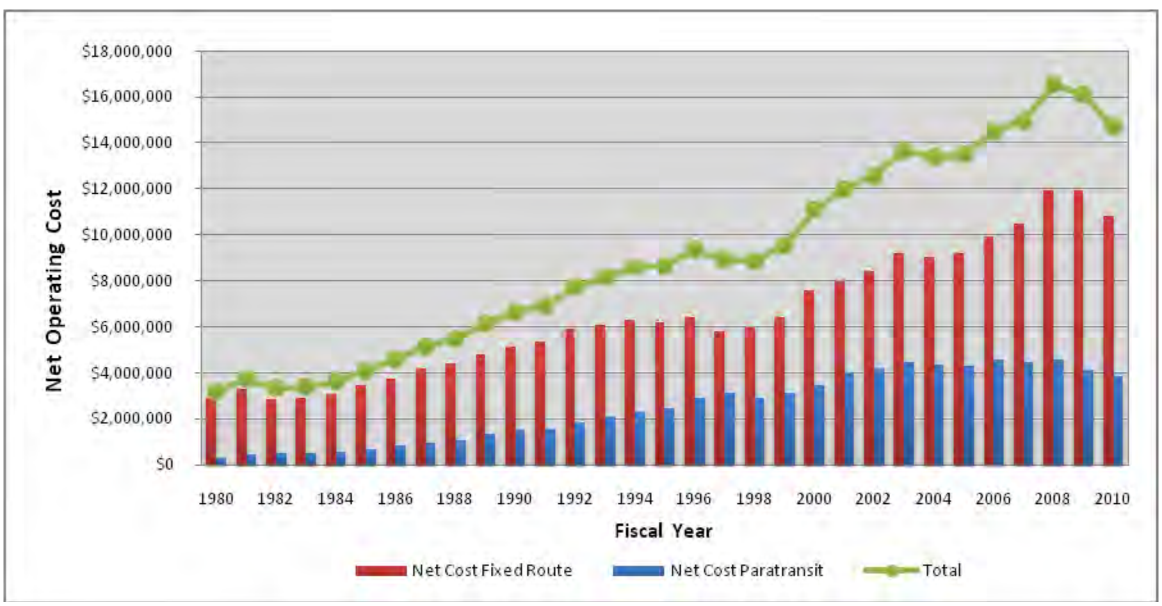
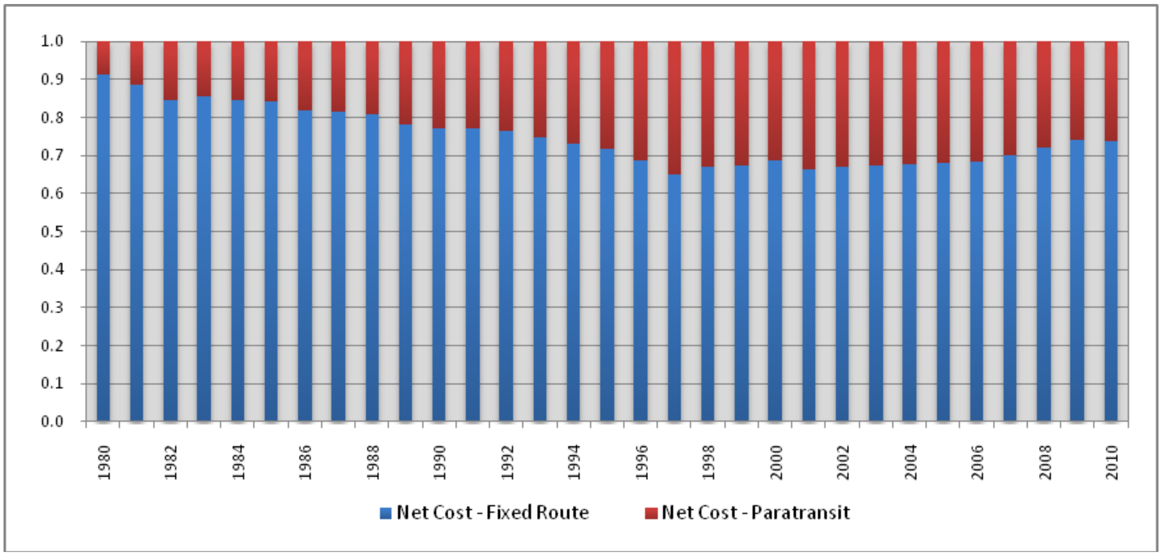


Figure III-24 depicts the fact that the fixed route/paratransit ratio of total operating costs have begun to drop back to a 75/25 split after rising for years to a 66/34 split. The paratransit component grew dramatically from 1980 when it only made up approximately 10% of total operating costs. The increase in paratransit costs primarily reflects the number of communities which joined the WRTA after 1980 for paratransit purposes, and then the rising cost of providing ADA services.

Figure III-24
Service Components of Total Operating Costs by Year



C.2.5.2 Subsidies

Given that federal operating monies were eliminated in the 1980s and the fact that local monies are constrained by Proposition 2½, there has been increasing reliance on the State to fund WRTA operations.

Table III-15 indicates the State's share of the net cost of service over time. One can observe that the State's share has increased from 50% in the early 80's to nearly 84% in the early 90s, back to 72% in 2010. The rising cost of providing service, combined with the limitations of Proposition 2½ capping local assessments and State fiscal constraints on operating assistance result in the difficulty of even maintaining current levels of service.

Table III-15
State Share of Net Cost of Service

Year	Net Operating Deficit ($)	State Share of Net Operating Deficit ($)	%
2010	12,123,378	8,698,546	71.74
2009	12,128,761	8,814,942	72.68
2008	11,579,082	8,539,809	73.75
2007	10,977,851	8,022,400	73.08
2006	10,999,827	8,169,461	74.27
2005	10,663,763	7,937,139	74.43
2004	10,149,863	7,489,742	73.79
2003	9,931,449	7,336,209	73.87
2002	10,107,948	7,580,954	75.00
2001	9,798,782	7,336,209	74.87
2000	8,857,082	6,516,096	73.57
1993	7,541,535	6,301,860	83.56
1990	5,877,298	4,187,739	71.25
1980	1,656,480	828,240	50.00

Source: WRTA Year End Financial Statements prepared by McCarthy, Hargrave & Co.

C.2.6 Fleet Composition and Replacement

The composition of the fixed route fleet as of June 30, 2010 is presented in Table III-16.

Table III-16
WRTA Fixed Route Fleet Composition

Category	#	Year of Manufacture	Fuel Type	Seating Capacity	Standing Capacity	FY 2010 Mileage	Avg. Lifetime Mileage Per Vehicle
29', 35' and 40' Full Size Buses	5	1996	Diesel	43	10	137,225	494,257
	1	1996	Diesel	39	18	18,667	486,289
	4	1996	Diesel	35	8	94,945	508,750
	8	1997	Diesel	33	12	290,987	496,794
	3	1997	Diesel	39	18	65,541	480,780
	6	1998	Diesel	35	8	196,031	410,284
	3	1998	Diesel	43	10	68,148	397,496
	3	1998	Diesel	39	18	85,830	432,120
	2	2000	Diesel	35	8	60,287	357,084
	2	2008	Diesel	26	15	67,928	69,710
	6	2008	Diesel	38	20	253,017	84,589
	3	2009	Diesel	26	14	32,959	10,986
	8	2009	Diesel	38	18	109,658	13,707
	2	**2009**	**Hybrid**	**26**	**14**	**21,644**	**10,822**
	2	**2009**	**Hybrid**	**38**	**18**	**28,515**	**14,258**
Mini bus (24')	1	2003	Diesel	18	0	2,401	103,231
	3	2005	Diesel	18	0	20,345	82,622

Source: FY 2010 NTD/Section 15 Report

As can be determined, the average age of the above 29’, 35’ and 40’ full-size bus fleet as of September 2011 was approximately 7.66 years and the average cumulative mileage per bus was approximately 278,500 miles. The average number of miles accumulated per year by vehicle for the above bus fleet was approximately 25,000 per year. All buses are wheelchair accessible.

A major concern in past years (as reflected in the ’00, ’03, and ’07 Regional Transportation Plans) has been the adequacy of Federal Section 5307 monies to meet WRTA capital needs requirements. However, in contrast with both ISTEA and TEA 21, SAFETEA-LU Apportionment levels are significantly higher than either of the former and have allowed the WRTA to proceed with a very much needed fixed route replacement program. As noted above, the average age of the WRTA’s full-size bus fleet as of September 2011 was 7.66 years, down from 9.1 years in 2007 and approximately 10 years in 2009. This is still above the generally accepted standard of 6.0 years which assumes that replacement buses are purchased on a regularly occurring one to four year basis, however the WRTA’s fleet replacement program will continue for the next several years, and this will bring the age of the fleet into good condition.

C.2.7 Fixed Route Service Modifications

A number of revisions to the WRTA fixed route system have been considered/implemented over time as a result of reductions in operating assistance. The early and mid 2000s included reductions in service frequency, route consolidations, elimination of least productive routes, reductions in school trip extra service, the short-turning of certain routes, and a reduction in route deviations so as to decrease run times. The State’s fiscal crisis precipitated two service reduction plans during the ’02 and ’03 fiscal years in addition to a general fare increase in the ’03 fiscal year where the base adult fare rose from $1.00 to $1.25. The fiscal situation also led to a further service reduction plan (in the order of 15%) which took place in the ’04 fiscal year. In addition, recommendations from a Comprehensive Service Redesign Study by the consultant Urbitran Associates were implemented in 2 phases over the ’06-‘07 time period. The changes basically reflect a reallocation of existing resources, particularly to shore up core services and eliminate several long-distance low performing routes.

Since 2007, the focus has been on re-structuring services to provide greater service efficiencies, while also providing new or increased service to major generators. The WRTA was able to take advantage of Job Access Reverse Commute (JARC) funding to implement greater service to the WalMart in Leicester and the Shoppes at Blackstone Valley. In addition, services were re-structured to detour to the new Worcester WalMart when that opened in 2010. Geographically, routes have been combined where possible, while still maintaining some coverage to most areas of Worcester and the denser suburban areas. Notably, the northwest area of Worcester is no longer serviced by fixed route. When several low-performing routes were eliminated in this area, a flexible fixed route was instituted, but that also was cut due to low ridership.

In addition to the re-structuring noted above, over the past three years the WRTA has sought to more actively engage the community, including riders, community groups, colleges, and major employers. The WRTA, and its subcontractors, have met with many groups to re-introduce them to transit service and to better understand what is needed by each group. Where possible, routes have been manipulated, in terms of timing or routing, to better service key destinations. In addition, informational materials have been tailored to each group, such as:

- Routing information for college students to get to key destinations, such as commuter rail;
- Combination schedules showing multiple routes for major employers;
- Employee address matching to provide personalized routing information;
- Improved opportunities for riders to obtain schedules and passes;
- Mapping of social service agency services in relation to the fixed route system;
- Training of personnel, particularly human resource and resident advisor staff, in using the bus; and
- Rider demonstrations on using the bus.

As noted earlier, these efforts have resulted in a significant increase in ridership in each year since 2007.

C.2.8 Fixed Facilities

While capital monies available to the WRTA are approximately 50% higher than in past years ($8.5M in FFY ’11 vs. $5.3M in FFY ’05), it also needs to be recognized that the WRTA has had to program capital funds as much as possible to preventive maintenance and ADA paratransit service ($3.4M and $0.9M respectively in FFY ’10) in order to make up for limited state and local operating assistance.

Still, the higher federal capital funds have allowed the WRTA to tackle some important transit improvement efforts. One of the WRTA’s recent capital expenditures is a “common branding” endeavor. Prior to this effort, the WRTA lacked a consistent branding that included a uniform color scheme for vehicles, haphazard bus stop signage, and literature that didn’t follow a consistent template for easier reading. Under this new effort, the WRTA worked with Penta Communications to establish the following:

- A uniform coloring scheme for all buses, not just new buses that were purchased
- New and uniform replacement bus stop signage
- Literature (notices, schedules and maps) following a consistent format and color scheme
- A new WRTA logo and associated letterhead
- A revamped website to include the WRTA colors and logo, as well as non-English language interpretation

The WRTA has since seen a number of benefits with this common branding effort including passengers who find schedules easier to read, a more easy to navigate website and uniformly painted vehicles for easy identification.

In addition to branding efforts, the WRTA has also worked to improve environmental efforts. In addition to purchasing new diesel-hybrid buses to lower vehicle emissions and improve miles per gallon, the WRTA has worked to remediate as much as possible the environmental damages at its existing maintenance facility. WRTA and subcontractor staff participated in an FTA grant that allowed for extensive training in Environmental Management Systems techniques. This training not only has resulted in improved environmental conditions and reduced costs at the current facility, but is also being factored into the design of new facilities. Further, the WRTA has participated in "Dump the Pump" programs to increase ridership, as well as the last three Earth Days at local, large employers promoting the environmental effects of transit use and their new vehicles.

In terms of fixed facilities, the WRTA's largest effort is the design and construction of a new Maintenance and Operations facility to replace the existing garage and maintenance facility at 287 Grove Street. In FY 2010, the WRTA received a federal State of Good Repair grant of $39 million, the second largest in the nation, to build the new facility. This new facility will be designed to LEED standards and will replace the functionally obsolete existing 77 year old facility and, more importantly, allow for the increased environmental mitigation at the Grove Street site once they have moved to the new location. The new site will be located closer to Union Station thereby decreasing deadhead travel time for more efficient operations.

In addition to the Maintenance and Operations facility, the WRTA is also in the process of designing a new bus "hub" at Union Station in Worcester. This new hub will be located on Foster Street next to the existing Peter Pan/Greyhound bus depot and, once complete, will provide easier intermodal connections to intercity bus (Peter Pan/Greyhound), intercity rail (Amtrak) and commuter rail (MBTA). The new hub will also include new administrative offices for the WRTA, customer service space, waiting areas, ticket/pass machines and restrooms. The facility will be able to hold eight full-size buses at a time and will also allow improved connections between fixed-route and paratransit service.

C.2.9 Technology

The WRTA is in the process of implementing a state-of-the-art technology system as the result of funding received from the American Recovery & Reinvestment Act. The new system, to be installed for both fixed route and paratransit systems, will include tools for improving the management of the system and tools for riders to obtain real-time information for trip planning and riding. Included in the implementation are:

- Automatic Vehicle Locator system
- Data Communications System
- Automatic Vehicle Announcements
- Automatic Passenger Counter System
- Dynamic Message Signs
- Traffic Signal Priority
- Maintenance Management System
- Web Interface for Real-Time Information

The system will begin to be deployed in Fall 2011 and will be completed in Summer 2012. Taken as a whole, the technology implementation will help the WRTA improve schedule reliability, reduce federal reporting costs, provide detailed information to assist in route planning, and assist the riding public in obtaining real-time information about their trip. Also, since the 2007 RTP, the WRTA has implemented a scheduling software program (HASTUS) to improve efficiency and has upgraded its telephone system to take advantage of new computer technology.

D. COORDINATED PARATRANSIT SERVICES

D.1 Introduction

The provision of public paratransit service in the Worcester area began in the 1970s primarily to meet the needs of elders. At that time, principal destinations included senior centers, grocery stores and local medical offices. Service was typically provided by the local Councils on Aging. Many communities joined the Worcester Regional Transit Authority (WRTA) specifically to obtain funding for these services, although some communities, particularly in the Blackstone Valley, continued to fund them through local government sources.

With the passage of the Americans with Disabilities Act in 1990, the provision of paratransit service became a civil right offered to all people with disabilities whose disabilities prevented them from using the fixed route (bus) service offered in their areas. By the time ADA was passed, most of the communities in the region offered some type of paratransit service, typically through a WRTA contract with the Councils on Aging, and still some others as a town service. In the WRTA fixed route service area, ADA formalized and expanded the level of paratransit service available. Though not federally required, the WRTA decided to continue the existing weekday service in communities outside of Worcester, where ADA service availability was limited to ¾ mile from fixed routes.

Trends in healthcare, technology, diversity, housing and community services during the last decade have improved overall mobility and life expectancy and created a shift in the provision of service to those individuals in their 70’s and 80’s and beyond. Changing demographics are creating a more diverse regional population. Housing trends and trends toward more community-based services have resulted in more people who are living independently in sprawling individual housing settings rather than in denser group facilities. Advances in medical technology, particularly in the early diagnosis and treatment of serious health issues, have created a larger demand for public transit for regimented medical treatments such as dialysis and chemotherapy. Compound regimented medical treatments with individuals who are increasingly older and frailer because of the extended period of decline that advances in medical technology have created, and the result is a widening gap in service between what public transit can provide due to funding versus what services individuals need. The challenge of reducing the gap will need to be addressed to meet current and future needs of more personalized service.

D.2 Impact of Federal Legislation and Coordination Efforts

D.2.1 ADA Law

The emphasis in paratransit planning shifted dramatically when the Americans with Disabilities Act passed in 1990. This powerful act has had far reaching implications for the WRTA and its services, particularly paratransit, and that trend is expected to continue into the foreseeable future. Before ADA, paratransit planning took a broader approach that emphasized “special efforts” in providing service not only for individuals with varying levels of limited functional mobility but also populations (particularly elders) whose circumstances could make them transit dependent even if their functional mobility allowed them to get around on their own. Often, elders (even those without mobility limitations) need paratransit service because their other transportation options are either limited or non-existent.

In rural areas, there is little or no fixed route bus service because population densities are too low to support it. Often elders don't drive, nor do they have access to anyone else who can take them places on a regular basis. Even if they do drive, economic reasons may prevent them from owning a car or they may not feel confident driving in winter weather, in high traffic areas, or under the stress of traveling to or from medical appointments. Although taxi service may be available, limited incomes often make that option cost-prohibitive. In order to serve the transit dependent populations within both the disability (regardless of age) and the elderly ambulatory community throughout its service area, the WRTA paratransit system evolved to address the travel needs of both.

To understand the impact of ADA on this service model, it is helpful to understand the intent of ADA as civil rights legislation that narrowly mandates equal access for persons with disabilities. The amount of service required is based on a minimum standard of fixed route comparability for those persons whose disabilities prevent them from using fixed route systems. Although ADA service is available only to eligible individuals within the ADA service area, it is a costly service to provide and doesn't meet the full complement of transportation needs for either people with disabilities or elders. While the Federal government encourages planning for non-ADA needs, financial constraints on regional transit authorities generally limit the amount of general paratransit service that can be provided.

During its 30 years of funding mass transit service, the WRTA has been very responsive to regulatory changes and the growing demand for accessible service. In accordance with ADA, the WRTA equipped its entire fixed route bus fleet with ADA accessible lifts and implemented ADA compliant Complementary Paratransit Service for individuals whose disabilities prevent them from using the fixed route system. Although service requirements for ambulatory elders and non-ADA eligible individuals without disabilities are weaker and much less specific than those required for ADA eligible individuals, the WRTA has continually supported a level of non-ADA paratransit service for these populations - especially in WRTA communities where fixed route bus service and the accompanying ADA paratransit service is limited or non-existent.

D.2.2 Statewide Coordination Efforts

The second and concurrent driving force behind the region's paratransit evolution was a major effort by the MassDOT (formerly the Executive Office of Transportation and Construction) to make statewide coordination a reality. Throughout the 80's, MassDOT took the lead, and was assisted by regional planning agencies, in compiling what was then a patchwork of non-profit Council on Aging providers to coordinate with either RTAs or one another in areas where an RTA didn't exist. RTAs were the designated 'lead agencies' for their communities, statewide. Outside RTA service areas, MassDOT encouraged and supported effective non-profit agencies through the award of accessible vehicles and by providing technical assistance. These agencies were then designated "lead agencies" for non- RTA communities. Applicants seeking vehicles through the state Mobility Assistance Program were given priority if they coordinated with an RTA or MassDOT-designated lead agency. It should be noted that very few non-profit transportation agencies are still in existence because although they were able to get vehicles through the Mobility Assistance Program, they were not able to generate funding to cover annual operating costs year after year.

Simultaneously, another effort was undertaken by MassDOT to encourage state human service agencies to coordinate their client transportation with RTAs. As a result, in 1988, under a Memorandum of Understanding between MassDOT and the Executive Office of Human Services (EOHS), the WRTA became a major provider of client transportation for the Department of Mental Retardation (DMR).

On and off since 1988, the WRTA has been under contract to provide client transportation for a variety of state human service agencies, including the Division of Medical Assistance, Department of Mental Retardation, and Department of Public Health. Issues associated with agency rates covering RTA costs or RTA costs exceeding what the state agencies were willing to pay for service has been an ongoing struggle and the WRTA has only provided limited human service transportation since 2002 because it is often not cost-effective.

D.3 Other Public Regional Providers

Traveling to other regions by public carriers is generally not possible except in the east direction. To the north, the Montachusett Regional Transit Authority (MART) provides limited trips through its Human Services Coordination program and through a contract to provide veteran's services. The WRTA does not currently provide any service into the MART area, but has been working with MART and the Town of Barre to offer reciprocal paratransit services to residents in that area.

Service to the Rhode Island in the south is limited to one round trip daily on Peter Pan. The WRTA has not been approached about providing service in that direction. Fixed route service is currently provided to Webster, on the Connecticut border. The Northeast Connecticut Council of Governments (NECOG) operates fixed route shuttles in the northeast corner of Connecticut, a portion of which is in the Worcester Urbanized Area. NECOG reports that they have demand to go into Massachusetts, particularly for health care, and that they would like to pursue creating a connector service.

Under contract to the WRTA, S.C.M. Elderbus provides paratransit service to Palmer, Brimfield, and Wales to the west of the region, and provides limited tripmaking into communities that border the WRTA service area. There have been requests for fixed route bus service to connect to the Pioneer Valley Transit Authority (PVTA), but neither public agency has the resources to expand at this time.

Public service to the east is slightly more available, and also receives the highest demand at this time. The northeast subregion is the second largest home to jobs in the region, with one town, Westborough, employing more people than it has residents. This subregion is expecting high job growth between 2000 and 2035. The northeast subregion is the only subregion where jobs are expected to grow at a faster rate than population. The MBTA Commuter Rail service provides service to numerous communities to the east, although complementary fixed route feeder service is often not available except in Framingham and Boston. The WRTA and the MetroWest

Regional Transit Authority have a reciprocal arrangement to provide paratransit service in border communities to take advantage of each other's cost-efficiencies, depending on the details of each trip. Both agencies have discussed the need for fixed route service linkages along Route 9, which traverses the two regions, but funding has not been identified for this service. Both agencies are committed to finding ways to link services more in the future.

D.4 Coordinated Public Transit-Human Services Transportation Plan

The Central Massachusetts Metropolitan Planning Organization has prepared a Coordinated Public Transit-Human Services Transportation Plan. The Plan is a guiding document that focuses on the coordination of transportation services provided by public providers, human service agencies and private providers to eliminate duplication of services and identify where gaps in service exist to low-income individuals and people with disabilities.

Common problems recognized by commentors include:

- Limited service hours in the evening,
- Limited locations of service
- Limited or no access to employment in suburban locations
- Limited or no intermodal connections among various service providers
- Limited or no service to new shopping and/or recreational locations
- Limited ability for riders to obtain information about the full spectrum of services

Interestingly, duplication of service was limited among providers. This is likely because each of the providers transports a specific population who are typically separated by geographic distances.

D.5 WRTA Paratransit Services

The WRTA contracts with 10 Councils on Aging to provide paratransit service to 13 communities and one private non-profit agency to provide paratransit service to an additional 21 communities. While Council on Aging services have the distinct financial advantage of low overhead (administrative costs are often assumed by the Council on Aging/town), over time redundancies and inefficiencies in service were recognized. Often several WRTA vehicles were dropping off passengers to the same place, such as hospitals, and returning to their respective towns with little coordination among providers. In 2008, the WRTA Mobility Management Model was launched in an attempt to take advantage of the best of the Council on Aging model, but also to better coordinate services, particularly for out-of-town trips. The Model was designed to maximize efficiencies by utilizing the existing community infrastructure, including employees and vehicles, and pairing it with the WRTA's central paratransit brokerage office, PBSI, who would coordinate the services by providing call taking, scheduling, call backs and dispatching.

At the time, two communities offered to pilot the program. Now, two years later, the PBSI office coordinates service for seven communities including Worcester. The program's goal is to reduce operating costs by reducing the number of trips that PBSI must outsource to a local taxi company who is paid by the trip, while still providing at least the same level of service to communities.

When discussing paratransit service provided by the WRTA, it is necessary to separate service inside and outside Worcester. Due to the dominance of fixed route service offered in Worcester, the entire city has been blanketed with ADA level paratransit service. Outside Worcester, ADA level service is offered within a ¾ mile buffer within the hours and days of fixed route service but additional non-ADA level paratransit service is offered by the local Council on Aging. This additional service operates weekdays, typically 8:00am-4:00pm and provides an important local service to elders and people with disabilities in the towns who are typically more transit-dependent.

PBSI also continues to coordinate service for Eldershopper, a Worcester transportation service for grocery shopping. Over the years, as demographic changes in the elder population have occurred (including a higher rate of elders who remain independent and drive), the ridership on the Eldershopper has steadily decreased. In 2010, a decision was made to provide the service to a limited number of high-rise buildings in Worcester and serve a limited number of supermarkets. This difficult decision to reduce service has, in fact, resulted in cost and passenger efficiencies.

The WRTA has also been able to leverage the availability of paratransit service by receiving funding from New Freedom program to encourage more people to switch some of their trips to the more cost-effective fixed route system. WRTA has offered a Travel Training program free to all members of the public. The hope is that more people will be motivated to try using the fixed route service for some or all of their trips. Fixed route service is less expensive to use and offers the convenience of not needing to pre-schedule trips.

The WRTA has been successful in coordinating paratransit services with the neighboring MetroWest Regional Transit Authority. In a reciprocal arrangement, paratransit trips can be provided by MWRTA to WRTA paratransit customers who live in the WRTA service area but wish to enter the MWRTA service area. By entering a short distance into the neighboring transit authority’s service area, each transit authority can serve people who otherwise may not be served.

Recognizing a gap in service in the SCM Elderbus service area, especially for people traveling to Worcester, New Freedom funds were used to provide midday paratransit service from the western area to Worcester. This service would be available for people traveling to Worcester, regardless of their trip purpose. Previously with no midday service, people would have to spend extended hours in Worcester before they could return to their own community.

In Jan 2009, the fare increased for all services including paratransit. While this is often met with negativity by the general public, people with disabilities and elders are often more impacted due to limited incomes. Nevertheless, the fare increase was implemented and did not cause a drop in ridership. It should be noted that this was the first fare increase since 2003, and only the second since the early 1990s.

Table III-17
WRTA Paratransit Services

Provider / Service	Service Area
PBSI brokers to RTA Van Division, private for-profit taxi & livery, **SCM Elderbus**, & Councils on Aging services	Brokers on behalf of Worcester, Auburn, Leicester, Northborough, Westborough, Boylston and Oxford and brokers ADA backup to the remaining WRTA towns
RTA Transit Services Van Division, ADA-level service	 Worcester and backup to contiguous communities
SCM Elderbus, Inc. ADA-level service Non-ADA Service for elders and people with disabilities	 The ADA service area along WRTA Bus Routes 19, 33 and 42. Barre, Brimfield, Brookfield, Charlton, Douglas, Dudley, East Brookfield, Holland, New Braintree, North Brookfield, Oakham, Princeton, Rutland, Southbridge, Spencer, Sturbridge, Sutton, Wales, Warren, Webster, and West Brookfield
Councils on Aging: • Auburn CoA/Non-ADA &ADA • Clinton CoA/Non-ADA • Grafton CoA/Non-ADA • Holden CoA/Non-ADA &ADA • Leicester CoA/Non-ADA &ADA • Millbury CoA/Non-ADA &ADA • Northborough CoA/Non-ADA • Oxford CoA/Non-ADA &ADA • Shrewsbury CoA/Non-ADA &ADA • West Boylston CoA/Non-ADA &ADA	 Auburn Clinton, Berlin Grafton Holden Leicester Millbury Northborough, Westborough, Boylston Oxford Shrewsbury West Boylston

Table III-18
FY 2010 Operating Statistics for WRTA Paratransit Services

Name of Service	# of comm served	# of vehicles out at peak	Trips Ambulatory Elderly Passenger	Trips Disabled Passenger	Total Trips	Vehicle Mile	Vehicle Hour	Trip per Veh Hr	Net Cost per Trip
Auburn	1	2	4,345	1,661	6,006	26,156	2,431	2.47	$5.33
Clinton	2	2	6,924	405	7,329	28,906	2,288	3.20	$5.78
SCM Elderbus	21	17	18,752	10,636	29,388	351,905	20,415	1.44	$27.18
Grafton	1	1	1,193	1,869	3,062	13,910	1,508	2.03	$8.12
Holden	1	1	2,717	440	3,157	21,572	1,499	2.11	$11.14
Leicester	1	1	3,356	385	3,741	12,074	1,222	3.06	$6.33
Millbury	1	4	2,989	16,474	19,463	89,931	3,623	5.37	$2.40
Northborough	3	3	494	4,347	4,841	49,822	3,190	1.52	$12.64
Oxford	1	1	607	3,561	4,168	17,421	868	4.80	$7.26
Shrewsbury	1	2	6,120	1,705	7,825	51,496	3,975	1.97	$9.49
West Boylston	1	1	3,580	1,191	4,771	25,869	1,805	2.64	$5.92
RTA Van Div'n		6	0	59,901	59,901	211,599	14,834	4.04	
Private Vendor		7	0	27,794	27,794	422,597	29,635	0.94	
Eldershopper	1	1	7,706	0	7,706	5,606	799	9.64	
Total		49	58,783	130,369	189,152	1,328,864	88,092	2.15	

Trip numbers do not include PCAs or companions
Clinton serves Clinton and Berlin
SCM Elderbus provides regional transportation services to 21 communities
Northborough serves Northborough, Westborough and Boylston

While overall costs of providing paratransit continue to escalate, ridership trends show a decrease in trip making. It is unclear whether this is due to a reduction in the number of people using the service, a reduction in the number service hours, an improvement in the fixed route service, the expansion of WRTA's Travel Training program or any other factor. The answer may be different depending on the area served, the service hours offered, additional local resources, the size of the ADA paratransit service area or a host of other possibilities.

It should be mentioned that in FY10, 72% of paratransit trips were for people with disabilities. This is a notable increase from FY06 when 58% of paratransit trips were for people with disabilities.

D.6 Local Councils on Aging

While the WRTA service area covers much of Central Massachusetts, most communities in the Blackstone Valley and the town of Paxton are not members. Paxton's ambulatory elders are served by the Council on Aging. Paxton residents requiring a lift-equipped vehicle are served by SCM Elderbus through a contract agreement.

The seven contiguous Blackstone Valley communities that do not belong to the WRTA (Upton, Northbridge, Uxbridge, Mendon, Hopedale, Millville, & Blackstone) either operate their own van or receive paratransit service from non-WRTA operators, usually through the town's

Council on Aging. Councils vary in their service but generally operate two to five days a week between 9:00am and 4:00pm. The Mendon Council on Aging recently received a new van through the State's Mobility Assistance Program to replace a well used vehicle in poor condition. Council on Aging services are typically available only to serve their own client trip needs and often that service is inadequate. Currently, service does not exist for the general public, for people with disabilities (except if they are elderly) or for the transportation disadvantaged. An ongoing issue for towns in the Blackstone Valley is the need to provide long distance medical trips, especially to Worcester, Framingham and Boston.

D.7 Private Non-Profit Services

A few Blackstone Valley private non-profit agencies serve their own clients. Blackstone Valley Multi-Human Service Agency and Beaumont Adult Day Health Center operate small fleets to transport their own clients to and from programs during their limited program hours.

While many non-profit social service agencies have found the provision of transportation service cost prohibitive, two agencies, primarily serving City of Worcester residents, are still in existence. Most of their trips involve many individuals to one destination (like nutrition sites or social day care) and are agency funded for specific clients. With the exception of cab trips provided by Elder Services of the Worcester area, very few public demand response/dial-a-ride (one to one) trips are provided due to cost.

In FY'10 Elder Services of Worcester funded over 15,177 cab rides for low-income elder clients. They also provide Adult Day Health transportation to the New England Dream Center, Meals on Wheels services to shut-ins, and transportation to Worcester Senior Center programs for Worcester residents. In combination with the Jewish Community Center, they play an important role in the Worcester transportation picture.

The Jewish Community Center, another multi-elder service agency, also operates a transportation service open to Worcester elders. Trip purposes served include adult day health, nutrition and medical trips. Service is available Monday through Friday from 8:00 A.M. to 4:30 P.M. No fare is charged.

The Central Massachusetts Area Agency on Aging funds the following programs that extend additional paratransit transportation throughout Worcester County. As previously noted, a grant to the Blackstone Valley Transportation Consortium provided 386 one-way long distance medical trips to the Framingham/Natick area in Fiscal Year '10. In 2010, the Massachusetts Association for the Blind provided 782 one-way trips (primarily to Boston) for 42 of their clients. Tri-Valley Elder Services provided 212 one-way trips to 63 of their clients.

D.8 Human Services Contracting

Montachusett Regional Transit Authority (MART), the current Central Massachusetts human service transportation broker, provided approximately 415,000 trips for the region during FY'10. Statewide, the Departments of Mental Retardation, Public Health, and Medical Assistance coordinate human services transportation by contracting with a single entity for the brokering of the service. The broker uses numerous private entities, including those discussed in the next section, for that actual provision of service. For the past five years, MART has held that contract, but a new Request for Proposals (RFP) is expected to be issued in January.

D.9 Regional Private For-Profit Services

Central Massachusetts provides origin to destination service through the use of taxi, limousine, ambulance and charter service to the general population using both accessible and inaccessible vehicles. They range from highly specialized service like for people who need medical transportation or people who need assistance to upper floors of walkup buildings to curb-to-curb service offered by a charter bus. Only one of the taxi companies offers wheelchair accessible taxi service. They provided a total of 1,910 accessible trips during 2010.

Below is a listing of regional private for-profit taxi, limousine, ambulance and charter bus services in Central Massachusetts.

Taxi Services

Auburn Taxi
Blackstone Valley Taxi
Grafton Taxi
Millbury Taxi
Red Cab*
Sunshine Taxi
Town Taxi
Uxbridge Taxi
Westboro Taxi
Worcester Yellow Cab

*Accessible vehicles

Regional Private For-Profit Ambulance Services

Alert Ambulance Service, Inc.
Am-B-Care
Am-B-Chair Personal Transport
American Medical Response
Eascare
K Ambulance Service
Lifeline Ambulance
Medstar Ambulance
North Brookfield Emergency Squad, Inc.
Pathways Ambulance Service
Patriot Ambulance Service, Inc.
Quality Chairvan Service, Inc.
Spencer Rescue Squad, Inc.

Regional Private For-Profit Limousine Services

AA Transportation Co, Inc.
A Limo Affair
A Perfect Limo
Airport Connection
Airports Unlimited
All Rolls Royce Limousines
Blackstone Valley Limousine Service
Cadillac Limousine
Car-A-Long
Comfort Limousine
Delta Limousine
Early's Custom Limousine
Ecua Limo
Edwards Limousine Service
Ekeh Transportation and Limo Services
Elegant Touch Limousine Service
Eric's Limousine Service
Executive Center Limousine Service
First Choice Limousine
Flicks Limousine Service
Fuller VIP Coach
Gold Limo Service
High Class Limo Service
Joey's Limousine Service
Knight's Airport Limousine Service
Lewis and Lewis Limo

Max Silverman's Classic Limousines
Mirage Limousine
New Worcester Limousine Service
Pegasus Limousine Service, Inc.
Prescott Coach
Prestige Limousine
Princeton Limousine
Professional Limousine Service
Reliable Ride
Ritchie Bus Lines, Inc.
Smart Limousine Service
Sully's Limousine
Supreme Transportation
Traditions Limousine Service, Inc.
Transportation Unlimited
Wellesley Hills Limousine
Worcester Airport Limousine

Private For-Profit Bus Companies

AA Transportation Co, Inc
Atlantic Express Transportation
Bloom Bus Lines, Inc
Buckingham Bus Co
Conway Bus Service
County Cab
First Student
Fox Bus Lines
Fuller VIP Coach
Holiday Charter Services, Inc
Laidlaw Transit
Lizak Motor Coach Service
New York City Express
Peter Pan Bus Lines
Ritchie Bus Lines, Inc
US Coachways
Wilson Charter and Tours

E. INTERCITY TRANSPORTATION SERVICE

E.1 Introduction

Intercity transit travel between cities is of great importance to the region because of the density of not only the Central Massachusetts region, but also the New England and Northeast Corridor regions. The Central Massachusetts region is the second largest urbanized area in the state and the third largest area in the six-state New England region. The region is significant to intercity travel as a trip generator with the city of Worcester being the hub for trips to and from the region. Worcester has always had an important role in being an origin and destination point for intercity transit travel, however its prominence in that role has visibly increased with the re-construction and restoration of Union Station.

Constructed between 1909 and 1911, Union Station was designed to consolidate three major passenger railroads (the Boston and Albany, the New York, New Haven and Hartford, and the Boston and Maine) into one centralized location. The station was modeled after a Roman basilica and included other neo-classical elements in its architecture, including two towers that reached over 100 feet in height. In the 1920s, the towers were removed for safety reasons due their instability from frequently passing trains and being constructed of solid marble. During World War II, Union Station saw a dramatic increase in use between troop movements and the general public who were using public transportation due to gasoline rationing.

After World War II, the station played a less prominent role and by the late 1960s, was used very infrequently and in 1972 closed its doors to the general public. For over 20 years, the building sat vacant and continued to decline in appearance due to vandalism and the elements, but by the early 1990s, efforts to restore Union Station to its former grandeur were underway. Restoration began in 1998 after a two-year preparation period of debris removal and roof repairs. In 2000, Union Station once again opened fully to the public following a $39 million restoration effort. Since that time, Union Station has served as the regional intermodal center for passengers taking MBTA commuter rail, Amtrak, and Peter Pan Bus and Greyhound buses.

E.2 Intercity Bus

E.2.1 Existing Operations

The providers of intercity bus service compete for passengers directly against airlines, passenger rail and single occupancy vehicles (SOV's). In markets hit by disruptions in air and/or Amtrak service, bus carriers are responding by adding routes and schedules. According to industry officials, relatively short-haul intercity bus routes are gaining riders, largely on the strength of low fares. In many cases, by operating from centrally located terminals, like Union Station, and offering almost hourly service between major cities, regional carriers maintain that their passengers avoid both highway and airport congestion and make bus travel more convenient.

E.2.2 Peter Pan Bus Lines

Peter Pan Bus Lines, Inc., a private carrier based in Springfield, Massachusetts, is one of two major intercity carriers providing service in the CMMPO region. Established in 1933, Peter Pan Bus Lines began as a local bus carrier. By the late 1940s, Peter Pan was a regional bus carrier with service to Boston from Springfield. It also provided chartered service. The company continued to grow and diversify over the following decades, and by the mid-1980's, Peter Pan purchased Trailways New England which essentially doubled the size of the company and made it an interstate carrier to larger cities such as New York. Further acquisitions of American Coach Lines and Coach USA companies expanded operations and destinations to Philadelphia, Baltimore, and Washington, DC. In 1999, during the highly publicized "Fare Wars", Peter Pan entered into an alliance with Greyhound Lines to create "pool service", which allows the companies to coordinate frequent departures, provide more nonstop schedules, and set ticket prices in a more competitive manner.

Today, Peter Pan is among the most innovative of the nation's regional bus lines with express service and passenger amenities. Peter Pan was a pioneer in becoming one of the first bus lines to to offer e-ticketing and online schedules. Since moving to Union Station in August 2006, Peter Pan has seen anecdotal increases in passenger ridership and in 2007 began purchasing new coaches for its fleet that offer the latest in on-board, high-tech equipment that provides WiFi, electrical plug-ins and tray tables to keep up with customer needs and wants to stay connected when traveling, as well as on-board GPS and on-board ticket scanners for drivers.. The company is also continuing to expand its Intelligent Transportation Systems (ITS) capabilities implementation of on-board security cameras, real-time information updates using scrolling LED signs and monitors, and integrating its multiple communications systems into one platform. Service expansion is also being examined with possibilities including expanded commuter service, new destinations and intermodal ticket/pass compatibilities.

E.2.3 Greyhound Lines

The sole nationwide bus carrier, Greyhound Lines, Inc. is the second major intercity carrier providing service in the CMMPO region. Founded in 1914, Greyhound Lines, Inc. has become an American icon with the Greyhound running dog being one of the most-recognized brands in the world. While Greyhound is well known for its regularly scheduled passenger service, the company also provides a number of other services for its customers including package delivery and charter and tour packages.

Greyhound has four subsidiaries in the United States, which are a part of the nationwide Greyhound network. They subsidiaries include Carolina Trailways, which serves the Southeastern U.S.; Texas, New Mexico and Oklahoma Coaches ("TNM&O"), serving the Southwestern U.S.; Valley Transit Company, serving the Texas-Mexico border, and Vermont Transit, serving New England. In addition, Greyhound has interline partnerships with a number of independent bus lines across the United States. These bus companies provide complementary service to Greyhound Lines' existing schedules and link to many of the smaller towns in Greyhound Lines' national route system. Amtrak passengers can also use Greyhound to make connections to cities not served by rail on Amtrak Thruway service, by purchasing a ticket for the bus connection from Amtrak in conjunction with the purchase of their rail ticket or from Greyhound directly.

Locally, Greyhound has also seen anecdotal increases in its ridership since moving to Union Station, however it has no major service expansion plans at this time.

E.2.4 Bus Service Levels

Because of the successful alliance of "pooled service" between Peter Pan and Greyhound, service is provided to regional and national destinations at certain times of the day by certain carriers. For example, there are five one-way trips to Albany, New York from Worcester. Three of those trips are provided by Greyhound Lines, one is provided by Peter Pan, and one is provided by Bonanza (a Peter Pan company). Table III-19 shows a breakdown of the number of trips to regional and national destinations from Union Station by each of the various bus lines. Service is available to most major cities in the Northeast. Frequency of service varies from hourly service to Boston to only one trip per day to Providence. Intercity bus service is not available to Fitchburg and Leominster at this time.

Both Peter Pan and Greyhound share space at Union Station. The facility provides berthing areas for four buses, as well as passenger waiting areas, taxi stands, and parking. While both companies operate independently, Peter Pan manages and operates the facility for both companies with its own staff

Table III-19
Trips by Carrier to and from Worcester's Union Station per Day
(As of 2/25/11)

Destination	**Peter Pan Lines***		**Greyhound Lines**	
	To	*From*	*To*	*From*
Albany, NY	6	2	3	5
Amherst-UMASS, MA	10	7	0	0
Baltimore, MD	3	0	0	4
Boston, MA	75	50	15	3
Concord, NH	4	1	0	0
Danbury, CT	3	6	0	0
Fall River, MA	8	10	0	0
Framingham, MA	12	5	0	0
Hartford, CT	25	7	0	2
Hyannis, MA	2	2	0	0
Manchester, NH	2	1	0	0
New Haven, CT	6	5	0	2
New York City	20	20	0	4
Newton, MA	5	5	4	3
Philadelphia, PA	4	2	0	4
Providence, RI	4	2	0	0

Springfield, MA	12	5	0	0
Washington, DC	4	2	0	2
Waterbury, CT	3	6	0	0
White Plains, NY	1	0	0	6
Wilmington, DE	2	0	0	3

**Includes Bonanza and Vermont Transit trips*

E.3 MBTA Commuter Rail

E.3.1 Existing Service in the Region

Throughout the 1980's and 1990's, a Boston-centric passenger rail renaissance occurred. Service on a number of lines was revived and subsequently expanded. Commuter Rail service was reinstituted on the Worcester extension in September 1994 with a frequency of three round train trips per day. This required a number of communities in the region to join the Massachusetts Bay Transportation Authority (MBTA) expanding its service area to 175 communities. By 2001, service to the region had steadily increased to 10 round train trips per day and late 2009, service was expanded to the current 13 inbound and 12 outbound trips per day. Ridership on the Worcester line increased approximately 90% during the 1990's, however it has decreased slight

The existing MBTA commuter rail line between Worcester's Union Station and Boston's South Station is 44 miles in length. The MBTA now owns the tracks between Boston and Worcester after negotiating with CSX Transportation for their purchase from Framingham to Worcester and taking over dispatching of all commuter trains. As part of that agreement, CSX is also conducting a $100 million expansion of the freight yard in Worcester between Shrewsbury and Franklin Streets. Amtrak also operates over the line under agreements with the state and CSX.

Under contract with the MBTA, the Massachusetts Bay Commuter Railroad runs commuter trains throughout Eastern Massachusetts. Between Worcester and Framingham, the rail line is generally a 60 MPH double-track railroad with a sophisticated signal system that allows trains to operate on either track in either direction. There is a high frequency of usage along the line between Worcester and Boston, with service on the line dating back to 1835.

Union Station Intermodal Transportation Center (ITC) serves as the hub of passenger rail activity in the region. Presently, the City of Worcester is attempting to assemble a number of land parcels around Union Station for future reuse. The nearby CitySquare mixed-use redevelopment of the former Worcester Common Outlet Mall includes plans for new streets to reconnect the downtown with Union Station, as was historically the case. New employment and housing opportunities associated with CitySquare could increase the area's reverse commute potential. Further, new housing opportunities exist just south of Union Station in renovated mill buildings on Harding Street.

E.3.2 Identified Passenger Rail Issues

During the compilation of the 2012 RTP document, a number of issues concerning passenger rail service in the region were identified. They are summarized below in no particular order:

- Competing needs between the movement of freight and the accommodation of expanded commuter rail service on the Framingham/Worcester Line. Frequency of mid-day rail service is limited due to conflicts with freight staging movements at the CSX rail yards in Worcester and Framingham

- Between January and July 2011, commuter trains on the Worcester line were on time an average of 87 percent. This was not the lowest on-time performance rate of all the lines in the MBTA commuter rail system (Providence and Rockport Lines were both at 72%), however it is not the best performance rate of all the lines (the Fairmount Line was at 94%; Greenbush Line at 93%)

- While tenants have moved into Worcester's Union Station ITC and the parking garage and Washington Square roundabout were completed in 2008, Union Station is still seeking to advance a "sense of place." Perhaps the construction on the CitySquare project to link Downtown Worcester with Union Station will help to enhance Union Station's sense of place

- There is a need for intracity feeder bus service to Union Station to better connect to MBTA commuter rail and Greyhound/Peter Pan intercity bus service

- As cited by Worcester officials, the existing commuter rail service schedule allows limited opportunity for reverse commute. Perhaps service increases could start to address this situation and its potential for economic development in Worcester

- Ongoing system-wide equipment problems, particularly air-conditioning malfunctions, locomotive/train breakdowns, broken seats and scratched windows

- Commuter rail station and parking lot security

- While not as much of a problem as in the past, parking capacity should be monitored and evaluated for increased capacity as needed

E.3.3 Proposed Expansion of Service on the Worcester Line

Citing continually increasing ridership, economic development prospects, as well as the potential for reverse commute, Worcester officials have looked to MassDOT, and its predecessor agencies, to address the need for expanded service. Beginning in 2003, responding to the demand for increased Commuter Rail service on the Worcester line, EOT (now MassDOT) officials approached CSX Transportation to discuss the situation. Referencing the results of the dispatching model utilized by CSX that looks at the Boston line between Selkirk, NY and Beacon Park yard in Allston-Brighton, CSX officials indicated that any further expansion in service could not be accommodated without a number of specific and costly infrastructure improvements. These included the need for locomotive cab signaling, the need for a lengthy railroad track extension to the east of Worcester's Union Station and, to a much lesser extent, west of downtown Framingham, as well as the need to address the at-grade highway-rail crossing in downtown Framingham. Further, as a freight carrier, CSX was naturally attempting to preserve and utilize any free line capacity for freight movement. The accommodation of additional passenger rail service was viewed as a lesser priority at the time.

Since 2003, Commonwealth and CSX Transportation officials have been working together to address the needs of both the public and CSX and come to agreement. In 2010, an agreement between these parties was reached. CSX sold ownership of its tracks from Framingham to Worcester's Union Station and the MBTA has taken over dispatching of all Worcester Line trains. In addition, CSX is conducting a $100 million expansion of the freight yard in Worcester between Shrewsbury and Franklin Streets, as well as increased operations and upgrades to its freight yard in Westborough.

E.3.4 Potential Future Action

As of June 2011, definitive plans for expanded commuter rail service on the Worcester Line have not been completed. The MBTA is currently working to develop these plans and acquire the necessary rolling stock needed for the number of trains needed to operate the service. The MBTA is also examining the feasibility of using the Grand Junction branch to direct some trains through Cambridge to North Station instead of South Station due to capacity constraints at South Station and the acquisition of the U.S. Postal Service's property. Additional capacity constraints at the Route 126 grade crossing in Framingham are also being examined. Despite these constraints, service is expected to be operational in late 2012/early 2013.

In addition to the MBTA, passenger/commuter rail service between Worcester and Providence has been discussed by a number of elected officials and business groups. No plans to study the Massachusetts portion of this corridor in in place at this time, however studies have occurred in Rhode Island (see Rhode Island section below).

E.3.5 Other Major Passenger Rail Initiatives

E.3.5.1 Statewide

On a statewide basis, beyond the Central Massachusetts planning region, there are many proposals for the expansion of existing MBTA commuter rail service as well as for the implementation of new or reinstituted service. These proposals are in addition to the MBTA's ongoing focus on system preservation, improving accessibility and attempts to better maintain existing equipment, including its July 2010 purchase of 20 new locomotives to replace 18 locomotives built between 1978 and 1980 for existing commuter rail services. The MBTA has stated that additional service would require substantial capital investments in infrastructure and additional rolling stock (e.g. locomotives and passenger cars), as well as operating dollars to run the services.

In order to be aware of the number of passenger rail initiatives both statewide and in the greater New England region, the following cumulative listing has been compiled to show the extent of competing proposals:

- *Study of the "Inland Route" for intercity passenger rail service from Boston to Worcester, Springfield, Hartford and New Haven.* The study will examine potential improvements along the Inland Route that will facilitate a second passenger rail service from Boston to New York at speeds comparable to existing Amtrak regional trains that travel along the Northeast Corridor. The study will likely include recommendations for upgrades to the existing route for higher-speed standards and be integrated with the New Haven-Hartford-Springfield Intercity Rail Corridor Development Project being led by the State of Connecticut (see Connecticut sub-section).

- *Infrastructure improvements to increase train speeds from Fitchburg-Leominster to Boston.* An estimated $200 million would be necessary to reduce travel times along the Fitchburg/South Acton line, and cut 10 minutes off the trip between Fitchburg and Boston's North Station. The project also includes construction of a new 4.5 mile spur to a new Wachusett Station as well as numerous upgrades to the railroad tracks, signals, bridges and switches. The majority of the $255 million project funding has been awarded through ARRA, TIGER and FTA federal funds ($180 million) with the remainder of the project using state funds. Design for the project was completed in December 2009 and construction began in 2010. Construction is expected to be complete in late 2012.

- *The reinstitution of passenger rail service between Boston and Southeastern Massachusetts through the extension of the existing Stoughton line southward to Fall River and New Bedford, a project that is anticipated to cost over $1.2 billion.* The proposed "South Coast" rail line is one of the largest permitting projects in the state and is being undertaken as a joint venture between MassDOT and the Executive Office of Housing and Economic Development (EOHED). In June 2009, the *South Coast Rail Economic Development and Land Use Corridor Plan* was completed. Since then, the state has provided technical assistance funding to encourage appropriate development in Priority Development Areas (PDA) and protection of Priority Protection Areas (PPA) to implement the South Coast rail corridor plan through the Old Colony Planning Council (OCPC) the and Southeastern Regional Planning & Economic Development District (SRPEDD). The U.S. Army Corps of Engineers has also expressed concern regarding routing through the Hockomock Swamp, which is located in portions of the towns of Bridgewater, Easton, Norton, Raynham, Taunton and West Bridgewater. The Southeastern Massachusetts Commuter Rail Task Force, a collective of cities, towns and organizations in the corridor, is also actively guiding the project.

E.3.5.2 Greater New England Region

Connecticut

The Connecticut DOT (ConnDOT) identified in their draft *2010 State Rail Plan* the "New Haven-Hartford-Springfield Intercity Rail Corridor Development Project" (also known as the "Knowledge Corridor") as one of the top passenger rail projects in the state. The project proposes to provide track upgrades to the 62-mile long corridor, including adding track capacity, signals and switches and also considers impacts of high-speed rail along the corridor. An additional bus link to Bradley International Airport from the corridor is also being examined. The project is also supported and being furthered along by the Pioneer Valley Planning Commission (PVPC), which has also included the cities of Northampton, Greenfield and Brattleboro, VT as part of the "Knowledge Corridor." In 2010, a HUD funded Sustainable Communities Regional Planning Grant was award to both the PVPC and Capitol Region COG in Hartford to roll out an ambitious work plan over the next three years to examine sustainable community development and create more livable communities along the corridor. The grant will be used to create a foundation of opportunity in housing, education, transportation, employment, nutrition, and community resources.

Another initiative under consideration is improved freight rail service between Worcester and New London on tracks owned by the Providence and Worcester Railroad. The existing corridor has a 40 MPH speed limit the existing track, signaling and grade crossing safety devices can safely handle now.

In order to enable faster passenger train speeds along Amtrak's Northeast Corridor, significant and costly infrastructure upgrades have been identified. Improvements to NEC track, switches, overhead catenary wires and bridge structures and tunnels are necessary. Costs are estimated in the *billions* of dollars.

Maine

Amtrak's "Downeaster" service between Boston and Portland carried over 500,000 passengers during fiscal year 2011 and ridership continues to grow. The Northern New England Passenger Rail Authority, which oversees the service along with the State of Maine, is also forging ahead with the service extension project from Portland to Brunswick. The project is funded with ARRA dollars and has completed construction of 27 miles of track, double tracking at Brunswick Station and drainage improvements. Brunswick Station is expected to be completed in October 2011 and Freeport Station completed in December. In May 2011, the Commonwealth of Massachusetts secured $21 million to improve speed along 10 miles of track shared by Amtrak's Downeaster and the MBTA's Haverhill commuter rail line. Funds to reconstruct the railroad bridge over the Merrimack River in Haverhill have yet to be found. Currently, the Downeaster runs 5 daily round trips between Boston and Portland, with a total trip time of 2½ hours.

New Hampshire

In late 2007, Governor John Lynch signed legislation creating the New Hampshire Rail Transit Authority. Since then, this agency has been working to develop a new *State Rail Plan* and was awarded a High Speed Intercity Passenger Rail Program (HSIPR) grant to develop a Boston-Concord Corridor Plan as part of the Boston-Montreal high-speed rail project. In previous years, the State was working with the MBTA to examine the feasibility of extending commuter rail service from Lowell to Nashua.

Rhode Island

Future potential for Worcester to Providence rail passenger service through the Blackstone River Valley on tracks owned by the Providence & Worcester Railroad. To date, Rhode Island has

completed its Intrastate Commuter Rail Study which examined commuter rail feasibility on the portion of the corridor from the City of Woonsocket to Providence. A possible extension to T.F. Green Airport, which is now served by MBTA commuter rail service from Providence, was also examined. Any service provided on the route would require cooperation with the Providence and Worcester Railroad (P&W) and the study anticipated that a contract between P&W and RIDOT or RIPTA could be established.
It should be noted that Providence & Worcester Railroad officials are aware of the various efforts concerning the reinstitution of passenger rail service along its lines between its namesake cities of Worcester and Providence, RI and between Worcester and New London on the Connecticut shore. With sufficient subsidy, the P&W would consider initial passenger demonstration service along its lines limited to 40 MPH-a freight train speed that the existing track, signaling and grade crossing safety devices can safely accommodate. In order to provide for passenger train scheduling and higher speeds, track improvements would be necessary. The P&W mainlines would likely need to be double tracked with continuous welded rail. Further, increased routine track maintenance would be expected with the advent of higher speed passenger operations. Positive Block Control (PBS) signaling would also be considered necessary for passenger service. In addition, system-wide, the P&W averages about one at-grade highway-rail crossing per mile.

Vermont
The State of Vermont is seeking the return of through high-speed rail passenger service to Montreal, Quebec from its current day terminus at St. Albans. This would potentially extend Amtrak's state-subsidized "Vermonter" service that provides passenger service between St. Albans, Burlington, and Springfield, MA, through to New York and Washington, DC. The service would likely replace existing regional rail service, but would be redirected in Massachusetts to pass through Northampton and Greenfield as part of the "Knowledge Corridor" project (see Connecticut section). In addition, Amtrak's existing "Ethan Allen Express" is being studied for extension to the communities of North Bennington, Manchester, Middlebury and Burlington. The first phase of that project is to complete improvements to the rail infrastructure that would allow the extension of the present Ethan Allen Express service up to Burlington. The second phase will include service to those communities south of Rutland.

E.4 Amtrak

E.4.1 Current National Perspective/Overview

Amtrak was created by Congress in 1970 to take over the passenger rail services that private freight railroad companies were previously required to operate. The freight railroads reported they had operated the services without profit – at a substantial loss, in fact – for a decade. More than half of the unprofitable rail passenger routes operated by the freight railroad companies were eliminated when Amtrak began service on May 1, 1971. With limited government subsidy, it has struggled financially for over 30 years.

Amtrak operates a nationwide rail network, serving more than 500 destinations in 46 states on 21,000 miles of routes, with approximately 19,000 employees. In FY 2009, Amtrak earned approximately $2.35 billion in revenue and incurred approximately $3.51 billion in expenses, covering 67% of its operating costs. No passenger railroad system in the world operates without some form of public support for capital costs and operating expenses. An average of approximately 925,000 people each day depend on commuter rail services operated under contract by Amtrak or that use Amtrak-owned infrastructure, shared operations and dispatching. Amtrak's Northeast Corridor is the busiest railroad in North America, with more than 2,600 trains operating over some portion of the Washington-Boston route each day. If included among U.S. airlines in 2008, Amtrak would rank eighth in the number of passengers served. On average, there are nearly twice as many passengers on an Amtrak train than there are on a domestic airline flight.

Unlike most of the national intercity rail system, Amtrak has owned most of the infrastructure on the Northeast Corridor since its 1976 conveyance by the federal government. Consequently, the renewal of the Corridor's infrastructure has had a unique history of public funding and quasi-private management by Amtrak. The Northeast Corridor is also unique in terms of its multiple users and heavy usage: by Amtrak for both higher-speed corridor and longer-distance intercity services, by seven state-supported agencies for extensive commuter railroad services with statutory access rights, and by several freight railroads for local and through freight services.

In June 2002, Amtrak faced one of its worst fiscal crises to date, coming within days of shutting down. David Gunn was hired as President of Amtrak, and Amtrak was able to obtain funding from the Department of Transportation and Congress that it needed to keep running. Gunn began a march towards fiscal responsibility and financial planning. He overhauled various components of the Northeast Corridor infrastructure and utilized equipment more efficiently system-wide. In spite of these improvements, Amtrak had operating losses of nearly $500 million by the mid-2000s.

In fiscal year 2007, Amtrak's chairman asked Congress for twice the funding amount allocated by the Bush Administration for that year. The request included $273 million for extraordinary capital needs, such as reducing the Northeast Corridor's infrastructure project backlog and investing in mandatory environmental and security projects, and totaled $1.6 billion dollars. The Administration had offered $500 million for capital projects and $400 million for measures meant to "reform" Amtrak service. A last-minute realistic appropriation seemed inevitable, and attempts to put Amtrak on a predictable financial footing are as elusive as ever.

In 2009, Amtrak's new President, Joe Boardman, established new goals and new criteria for progress using nine "Key Performance Indicators" which will be used to measure the effectiveness of reaching Amtrak's goals:

<u>Efficiency Measures</u>:
1. Cost per Available Seat Mile (CASM) - cost to move a seat one mile
2. Cost Recovery Ratio (CRR) - proportion of our expenses that are met with revenues
3. Passenger Miles per Core Employee - Total passenger miles divided by employees in core business lines
4. Revenue per Available Seat Mile (RASM) - income produced by moving a seat one mile

Effectiveness Measures:

1. Safety Ratio - number of reportable injuries per 200,000 man-hours of work
2. Customer Service Index (CSI) - survey-generated measure of performance
3. Host Railroad Performance - minutes of delay per ten thousand train miles
4. On-Time Performance (OTP) - percentage of trains that arrive at their destination within the "threshold of tolerance" for delay
5. Ridership Growth - percentage of increase (or decrease) in riders

E.4.2 Current Local Perspective and Service in the Region

Amtrak operates approximately 56 trains daily in Massachusetts, including the Acela Express and Regional trains on the Northeast Corridor, and boarded/alighted almost 2.8 million passengers in FY '10. Amtrak operates the following shorter-distance trains through Massachusetts:

The *Downeaster* (five daily round trips Boston - Portland, Maine)
The *Vermonter* (daily Washington, DC - St. Albans, Vermont)
The *Lake Shore Limited* (daily Boston - Springfield - Albany, New York with direct connection at Albany to Cleveland and Chicago).

Amtrak operates and maintains the 37.9-mile Attleboro High Speed Line, between Boston and the Rhode Island state line for Amtrak and commuter rail service, however the line is owned by the MBTA. About 300 weekday trains operate at Boston South Station, including Amtrak and MBTA commuter rail trains. Amtrak maintains equipment at Southampton Yard in Boston, which is also the location of one of three of Amtrak's high speed rail maintenance facilities dedicated to Amtrak's Acela Express high-speed train sets.

The Acela Express offers hourly service downtown to downtown during peak morning and afternoon rush hours between New York, Washington, and intermediate cities, as well as many convenient round-trips between New York and Boston. Amtrak Shuttle Trains provide additional service between New Haven, Connecticut and Springfield, which allows for multiple connection possibilities. Over 130,000 passengers depart or arrive at Springfield annually. Worcester is currently handling about 7,400 Amtrak passengers annually, but connections can be made to Albany, Syracuse, Buffalo, Cleveland and other points on the way to Chicago. Worcester's Union Station continues to reposition itself as an intermodal transportation center which means increased utility for Amtrak travelers. If Amtrak service remains in place, Union Station can accommodate the current modest number of trains. In contrast, any significant increase in rail activity might strain the current infrastructure.

III-C. REGIONAL AIRPORT SYSTEM

A. INTRODUCTION

The region's airports are an essential component of the overall transportation system in Central Massachusetts. They serve a variety of purposes, including personal, business, and recreational travel as well as freight movement. Both people and goods are moved by air transportation. Although the number of passengers and the volume of freight moved by air may be relatively small compared to that of other modes serving the region, air transportation plays an important role.

The five airports located within the Central Massachusetts region are illustrated in Figure III-25. The airports shown are Hopedale Industrial Park Airport, Southbridge Municipal Airport, Spencer Airport, Tanner-Hiller Airport in New Braintree, and Worcester Regional Airport. All five have been designated by the Massachusetts Aeronautics Commission (MAC) as part of the statewide airport system. The purpose of the statewide airport system is to ensure that all areas of Massachusetts are accessible by air. With the exception of Worcester Regional Airport, these sites are all utility airports that are designed to accommodate smaller, lighter, general aviation aircraft. Worcester Regional Airport is classified as a "General Transport Airport", accommodating 727 and 737 class aircraft on routes with stage lengths up to 1,000 miles.

In addition to the five public airports, there are several private heliports serving local business needs. These include the UMass Medical Center Heliport for emergency medical transport, the Parker Heliport operated by the Parker Manufacturing Company, and the Atlantic Trade Heliport serving a locally owned private business. These facilities are not discussed any further in the RTP.

B. CHARACTERISTICS

B.1 Worcester Regional Airport

B.1.1 Existing Conditions

B.1.1.1 Introduction

Worcester Regional Airport is located approximately four miles west of the downtown area on the Worcester/Leicester town line. The airport is situated on a 2.04 square mile parcel of land on Airport Hill at an elevation of 1,009 feet above sea level. The National Plan of Integrated Airport Systems (NPIAS) has categorized Worcester Regional Airport as a "Primary Commercial Service" airport, designed to accommodate aircraft in the "Transport Short Haul" service. "Transport" airports, as opposed to "Utility" airports, are designed to accommodate the larger, heavier aircraft operated by commercial airlines as well as business and corporate jets. "Short Haul" service refers to a typical route length less than 500 miles.

The largest commercial aircraft that can be accommodated at Worcester Regional Airport is the Boeing 757 that has a capacity of 190 passengers. For an airport of Worcester's size, a Boeing 737, with a capacity of 100 to 130 passengers, is more typical. Long haul, intercontinental jumbo jets, which fly

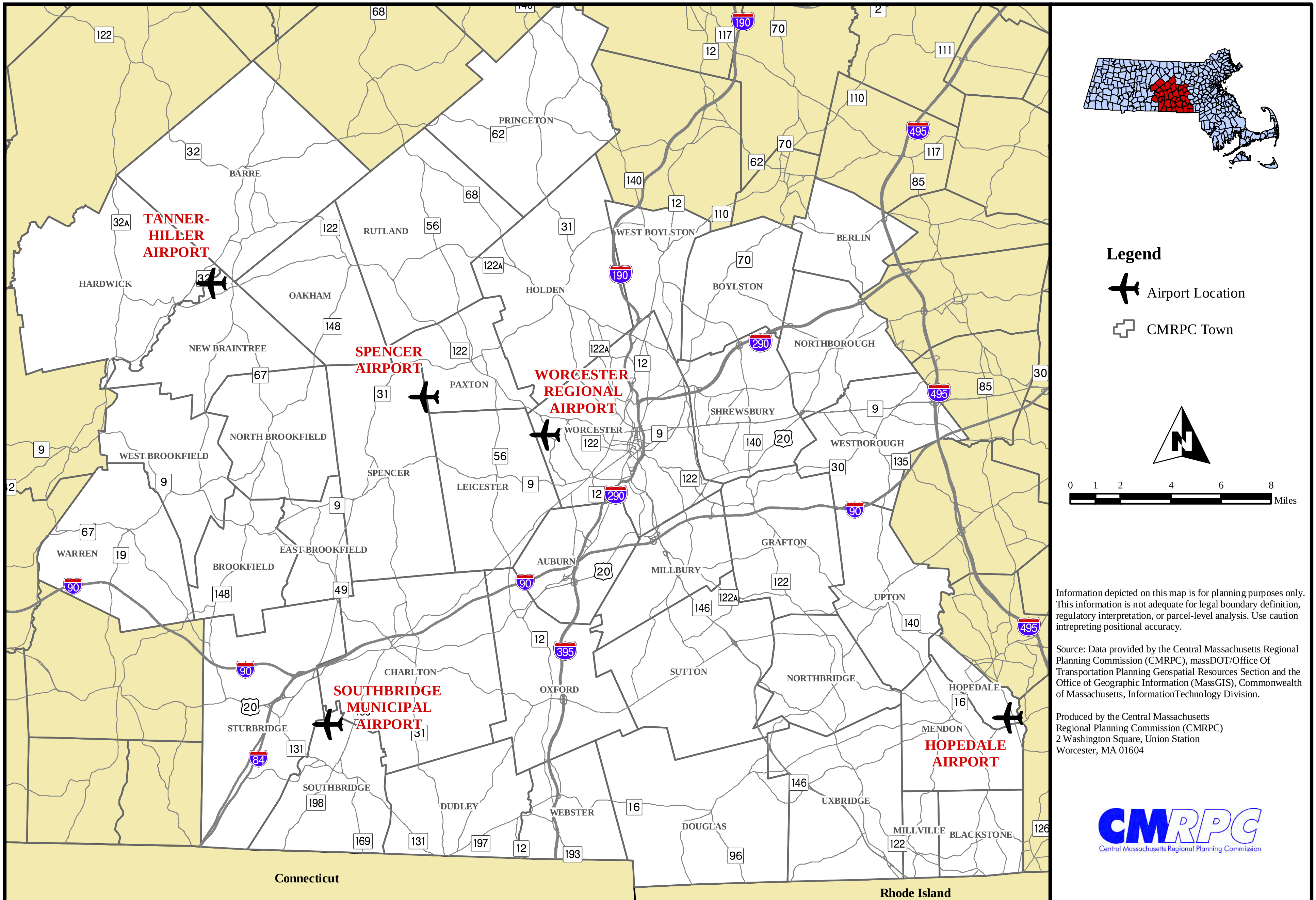


Figure III-25 Locational Map of the Region's Airports

over 1500 miles, could not operate from Worcester, mainly due to short runway lengths. Any large scale physical expansion of the airport is precluded by limited land area, steep topography, and wetlands.

In March 1993, due to the decrease in aircraft operations as well as cutbacks in service, the FAA's Air Traffic Division reclassified Worcester as a "Level One" air traffic control facility, reflecting an average rate of fewer than 17 landings and takeoffs per hour. To obtain a "Level Two" status, the airport must reach an average of between 35 and 90 landings and takeoffs each hour.

Until very recently Worcester Regional Airport had been owned by the City of Worcester. In November 1999, Worcester reached an agreement with the Massachusetts Port Authority (Massport) on terms that would allow the agency to operate Worcester Regional Airport beginning in the 2000 fiscal year. Massport assumed operational responsibility on January 15, 2000, agreeing to operate and manage all aspects of the airport. Massport contributed $250,000 in the first fiscal year to offset some of the Airport's estimated $1 million annual operating deficit, and in the following four years, gradually assumed responsibility for more. The City continued to be responsible for outstanding debt obligations associated with ongoing and new capital projects as well as for city employees at the airport.

In early 2004, the agreement with Massport was modified and extended to June 2007. Massport agreed to absorb the entire operating deficit for 2005, but only 85% of it in 2006 and 68% in 2007. A specific termination date of July 1, 2007 was added. This time frame was selected in order that both the New England Regional Airport System Plan study and the Worcester Regional Airport Plan would be completed before further details and agreements were solidified.

In January of 2008, while still in waiting for Master Plan results, Massport agreed to extend its support at its existing level. Shortly thereafter, it was proposed that Massport purchase the airport from the City, and this was accomplished as part of a state transportation reorganization plan passed by the legislature. In anticipating revenue from the sale, Worcester hoped for funds that could be use for other area needs as well as to be relieved of the operating expense burden. However, due to past commitments and investment by the FAA and other federal sources, it would soon become evident that only limited City reimbursement would be possible in implementing this transfer. While some concerns as to the state of ground transportation congestion in the immediate area in the future were expressed, and with all parties agreeing that access to the airport was “challenged”, ongoing studies to alleviate pressure and improve the future outlook were cited as sufficient reason for optimism on both sides of the deal. A nine-member advisory group was to be formed, including seats for local residents, to take the place of the existing Airport Commission in the near future and to advise and inform management about local neighborhood and other issues.

In the end, the City received six years’ worth of costs incurred plus release from future liabilities, net of a share of some environmental costs, and was able to retain ownership of the industrial park. Net transfer of funds to Worcester amounted to $14.4 million.

B.1.1.2 Air Carrier Operations

There is currently a small amount of regularly scheduled air carrier operations at Worcester Regional Airport. Looking back over recent history, passenger traffic, totaling 49,727 in 1999, grew to 106,145 in 2000, but a shrinking economy in 2001 topped by the infamous events of September of that year conspired to reduce traffic from an expected redoubling down to 130,566. 2002 saw enplanements cut in half, and in the years 2003-2005 there were fewer than 5,000 annually, as scheduled service was totally lost in early 2003. Allegiant Airlines was responsible for a jump back to almost 15,000 in 2006; after its departure there were essentially no enplanements until 2008. Passenger boarding activity has again increased to the level of the Allegiant period, if not better. Still, Worcester Regional Airport is relatively sparsely used today in comparison to its own recent past and to the levels of other major regionals.

The reasons for this are many, and it is unclear which holds the greatest weight. Pricing has always been a problem, yet low-cost service did not thrive. Worcester is cited as an access hub, but this positioning also makes it easier for travelers to access airports "on the rim", such as Manchester and Providence. It has never been easy to locate and travel to Worcester airport, but over the years, people have been able to "get there from here", at least locally. Many believe that improved access would help generate increased passenger service; others take the point of view that other market forces would need to inspire the provision of new service which would in turn inspire the need for appropriate ground linkages. What follows is a look at the recent history of service at Worcester with the existing ground network in place that demonstrates at least some periods of relative success. Going back to the turn of this century:

- American Eagle Airlines, the regional carrier of American Airlines, once offered three round-trips daily from Worcester to New York's John F. Kennedy International Airport. Twice-a-day service was even extended to Chicago for a time. New York service was cut in early Sept. of 2001, one Chicago flight was ended in February 2002, and the remaining flight was ended in September of that same year. The need to retrench economically was cited.

- Pan American Airways, a subsidiary of Guilford Transportation Industries, began once-daily flights to Orlando in early February of 2001. By April of 2002, service was dropped. The operator cited insufficient traffic originating here, despite prices as low as $200 round-trip.

- Atlantic Southeast Airlines, a wholly owned subsidiary of Delta Airlines, once offered three flights a day from Worcester to its major hub in Atlanta. In November of 2001, two of those flights were axed, and one year later the remaining one was gone. Although planes were relatively full, Delta cited insufficient return on its investment when reasonable prices were in effect.

- US Airways Express once provided four daily commuter flights to Philadelphia, where many connections to domestic and international destinations were made. In January of 2003, US Air announced its departure from the Worcester market. After its departure, Worcester was left with no regularly-scheduled passenger service.

- Allegiant Airlines returned scheduled service to Worcester in December of 2005, but became the 13th airline in 18 years to leave the city in August of 2006. With initial one-way fares to Florida as low as $39, interest was generated rapidly. However, as time went on, load levels fluctuated. While the City felt that strong numbers were seen in all but two months, the 100% load level was always a moving target (as 2 different size jets were used), and the effect that varying ticket prices had was not clear. As prices rose to more sustainable/profitable levels, more bookings would likely be lost to service at other nearby airports, as price differentials would begin to outweigh the conveniences of local flights. (Conversely, at $39 fare levels, 100% ridership was no surprise, though of no long-term financial use to the aviation enterprise.) Fuel prices and taxes at Worcester were never low, and were cited publicly as the reason for Allegiant's decision to terminate service. However, it was clear in less public forums (as well as in subsequent remarks made by Allegiant officials and management) that load level factors and the overall profitability of the service were the core reasons for Allegiant's business decision.

- In September of 2008, Direct Air made its initial announcement that it would begin service in Worcester in November of that year, ending a two-year drought with respect to local scheduled passenger service. Service was scheduled 3 times a week to Orlando and Punta Gorda FL, with later seasonal flights to Myrtle Beach SC to be added. Many at the time feel that its success or failure would be critically important to the airport's near-term prospects for success. In August of 2009, some flight reductions were made, but in December it was reported that flights were 80-85% full and that expectations were that around 50,000 passengers would have used the service in the first year of operation. In July of 2010 it was announced that three flights to Palm Beach FL were being added in the fall. Ticket sales were reported to be running above the level experienced in the previous year. And, in April of 2011 Direct Air announced that flights to San Juan, P.R., and Nassau, Bahamas would be added in November. Planners continued to report that ground service improvements being studied both for the general Worcester east/west travel corridor as well as those that might result from the regional mobility study could only help further this developing success at the airport. However, there are no plans seen at this time to expand service to any destinations west of New England - routing that would help create access to a much wider range of ultimate destinations.

While Massport and others have been working to increase service and provide the beginning of a range of destinations, and while Direct Air, although not a full-service airline itself, has been somewhat successful to this point, at time of writing no additional air service routes or airlines were seen to be coming to the area in the near future.

B.1.1.3 General Aviation Operations
General aviation accounts for most of the aircraft landings and departures at Worcester Regional Airport. General aviation includes not only business and corporate flights, but also medical, air taxi, charter, crop dusting, flight training, and personal and recreational trips. General aviation is an important transportation mode for the Worcester business community. In addition to using charter services for business trips, several companies in the greater Worcester area own planes that are based at Worcester Regional Airport.

A rising level of general aviation operations supports MAC's classification of Worcester Regional Airport as a regional facility vital to the business and economic needs of central Massachusetts. As stated by Airport officials, Worcester Regional Airport attracts new businesses and jobs as well as major performers scheduled to appear at the Worcester DCU Center. According to the MAC's *Business Benefits of General Aviation Access*, over 25% of all employers in the Worcester area utilize the airport at least occasionally. The Worcester Area Chamber of Commerce has noted that the airport is one of the major reasons companies cite for locating in Worcester's Biotechnology Park off Belmont and Plantation Streets, as air transportation is critical for maintaining competitiveness in the time-sensitive biotechnical market. A general aviation airport is also important to electronics manufacturers for the delivery and receipt of supplies as well as for the transportation of real estate business staff and clients.

B.1.2 Current Situation / Future Requirements

Over time, the future of Worcester Airport had been suggested to be anything from a nature's wonderland to affordable housing territory to a casino. With Massport's financial and business investment, it will be retained as an air facility, with cargo/general aviation emphasis, while they work towards the day when the local flying public begins to seek (and can obtain) an easier, more convenient, less congested outlet with a suitable flight selection, for long-range travel. Abandonment of the site as a functioning airport, as had once been discussed, would have required the repayment of millions of dollars of aviation-associated grants over recent years, making any such strategy even more questionable. Now the future direction of the facility has been determined, and it will be led by an agency which is in the transportation business, and will not be a further burden to city coffers and personnel talent that can best be used in more direct and useful ways.

Massport has consistently emphasized the need for better ground access to the airport. Their purchase of the facility indicates a belief that this situation can be appropriately settled over time.

When looking at the overall state of regional air service, Worcester has not been in a unique situation in recent years. Other regional airports across the country have lost service totally. Recent fuel price increases have caused even more dislocation in the industry, and airports that cannot support larger 70-80 (and more) seat planes with more efficient fuel utilization have been lost for that reason alone, in addition to general travel patterns and levels. Some airports have kept service alive via efforts such as dedicated flight accounts, into which local businesses deposit travel funds that are pledged to be used for tickets on locally-based flights. This type of action has at times kept major airlines running in marginal regions, but has become more difficult to put into place effectively more recently. Worcester has attempted to rally local economic support many times in the past but certainly has never been successful at the level of fixed financial commitment, for example. Most of the market that could have been won in one way another for traditional passenger travel has seemingly long been lost to other major regional airports, Providence and Manchester airports in particular. These regionals are now solidly entrenched, and those planning for Worcester can anticipate only marginal inroads to service levels at those locations, at best. Long term strategy and provision for eventualities to be realized over many years must be part of a rational plan for Worcester.

Fares have always been an area of contention. They quite clearly have often been substantially higher than those available at other major regional venues. It is said that lower prices would build volume, but in the instances where that has been attempted here it appears that not enough (if any) extra volume was generated to pay for the price cut, let alone to create profits. If flight usage is to be that inelastic, the argument that prices should, if anything, be increased - if not maximized - is hard to ignore. Under current general conditions there does not appear to be a level of pricing that would generate profit, and this has been borne out by the exodus of all carriers from Worcester in economic circumstances when they could afford to sustain no further loss. Airline executives have repeatedly declined to operate in a situation where there is no major service or even other minor operators to feed other flights – nobody is connecting in Worcester, and this hurts the potential for additional fared passengers. Low-fare competition at any of the other ring airports is enough to severely hurt any one carrier who is trying to get a grip here on its own; that has happened time and time again. It simply appears as if the other ring regionals are providing sufficient low-cost accessible service to make Worcester a redundancy. Direct Air appears to be modestly successful because it is severely limited in its number of flights and well-targeted in its destinations and fare levels. Leased equipment has perhaps allowed a margin of profit to emerge when it would otherwise be unlikely. However, passenger loads in the marginal range plus the again –increased price of fuel will put increased financial pressure on this operation.

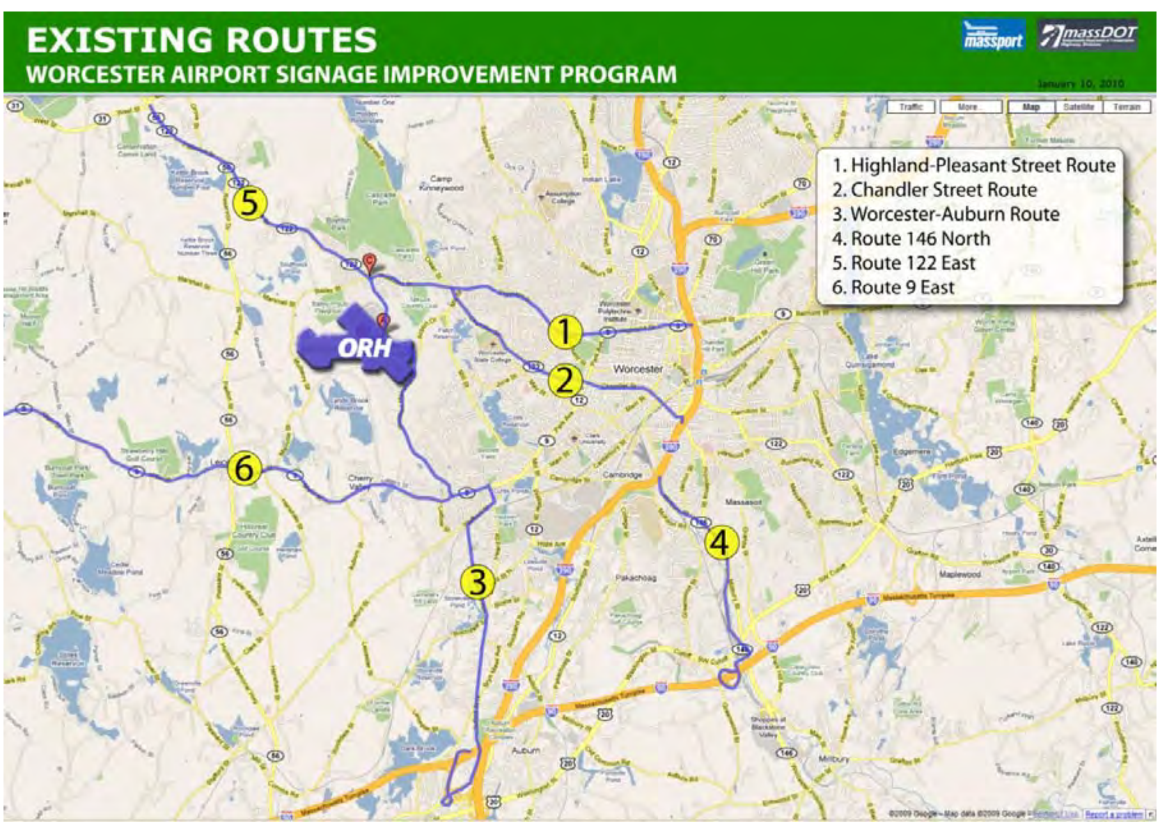
Massport once said that Worcester could someday be a major air transportation center under the right conditions, carrying up to a million passengers a year, ten times what it did a few years ago and 3 times its best year ever. However, they have felt that improved access to the airport is a precursor to attaining that passenger volume. The NERASP suggests the Worcester could eventually handle 1.5 million passengers – if infrastructure and access were improved and airlines were in fact willing to offer service to popular destinations. Conditional predictions aside, others feel that if improved access is ever needed, it will first be evidenced in the conditions in the ground network, and then the travel facts can help generate a unified approach to access improvement. Many feel that access itself will not bring travelers to Worcester, and they may have a valid point under current traffic conditions. Certainly no one on any side has cited access problems as one of the reasons that Allegiant decided to leave. However, all can agree that if various future conditions, such as worsening regional airport congestion at other venues or some new and attractive long-range destination point in the Worcester area itself, create the right conditions, profitable flights might thrive, and people will come regardless of the state of ground access. If and when there is a passenger load greater than ever before, ground conditions will have to be improved or effects will impact even those who are not flying. On top of the passenger issue, any increase or sustained usage of the airport for general aviation or freight will also force the consideration of ground connection enhancements.

In the meantime, Massport, MassDOT, the City of Worcester and the CMRPC have developed a plan for improving directional signage to ORH in the near-term. Due to the fact that a large percentage of Worcester Regional Airport users come from the local Worcester area, there is no one preferred route. Instead, it has been recognized that multiple routes are needed to meet current demand. The goal was to improve directional signage between ORH and the MassPike and I-290 by achieving the following objectives:

- To ensure that key decision points would be adequately signed;
- To reduce sign pollution by removing old and unnecessary signs (see the figure entitled *Example: Previous Airport Signs*); and,
- To design and install new airport trailblazer signs consistent with Logan Airport and MassDOT way-finding.

Six primary routes that travelers now use to access the airport (refer to the figure entitled *Existing Routes*) were identified. MassDOT and Massport consulted with local jurisdictions in which the signs would be placed, and MassDOT installed the signs that were produced by their own sign shop. A total of eighty (80) signs were installed on the six primary routes. These newly posted consistent signs should be of great help to those seeking quick ground access routes within the area.


EXAMPLE: PREVIOUS AIRPORT SIGNS
WORCESTER AIRPORT SIGNAGE IMPROVEMENT PROGRAM
massport
massDOT
January 10, 2011
WORCESTER AIRPORT EXIT 10
WORCESTER AIRPORT
DCU CENTER
Worcester Airport EXIT 17
Highland St. 9
Worcester Regional Airport
County Courthouse
Lincoln S
WORCESTER AIRPORT
9
WEST
9
Worcester Regional Airport
35MI / 55KM
QUAKER
WORCESTER REGIONAL AIRPORT
Worcester Airport
Anna Maria College
Worcester State College
CLARK
Worcester Regional Airport
U. Mass. Medical Center
Worcester Airport


EXISTING ROUTES
WORCESTER AIRPORT SIGNAGE IMPROVEMENT PROGRAM
massport
massDOT
January 10, 2010
1. Highland-Pleasant Street Route
2. Chandler Street Route
3. Worcester-Auburn Route
4. Route 146 North
5. Route 122 East
6. Route 9 East
ORH
Worcester
1
2
3
4
5
6

One factor that may be hard to change in any case is the weather. While it has been said that “the perception of the weather issue is worse than the reality here”, Worcester airport’s siting is not conducive to good flying weather. Its relatively high elevation puts it into fog and clouds often, as well as keeping temperatures about five degrees colder in an area which is very much impacted by winter weather effects. While it can be ascertained that not many more flight departures are delayed here due to weather, the fact remains that landings are often forced to divert to other area airports, and departures are often affected by icing conditions not experienced at other nearby regionals. Once aloft, an aircraft must come down in a reasonable amount of time. For Worcester-bound passengers, at times this means landing in Providence, Boston or elsewhere. No matter how cheap or convenient the parking is in Worcester, it isn’t particularly beneficial to use it if you have to take a bus to your car from another airport. Even cargo outfits have the perception that Worcester is not a good, efficient destination point by air, and dependability and delivery time are part of what drives their profitability. Enhanced landing equipment in recent years, and the possibility of more of the same, is encouraging, but the general weather conditions are just one more negative in an overall picture that has always seemed to result in an overall situation that airlines have been unable to conquer thus far.

However, it is generally recognized that a viable, functioning airport may be critical to the city and the region’s long-term economic development. Every effort should be made to envision, plan and build a total working infrastructure that will make economic contributions in the present as well as when general passenger demand grows again in the future. The general business and governmental community has seemed to do all it can in recent years to overcome the obstacles, but that alone does not appear to be enough. Perhaps Massport can help swell a tide which can lift Airport operations and economic contributions to a new level, one which will again command respect and appreciation from the public and business communities.

B.2 Other Airports in the Region

B.2.1 Existing Conditions

In addition to Worcester Regional Airport, four other airports serve the Central Massachusetts region. The Southbridge Municipal Airport in Southbridge, the Hopedale Industrial Park Airport in Hopedale, the Tanner-Hiller Airport in New Braintree, and Spencer Airport in Spencer are utility airports that are designed to accommodate smaller, lighter, general aviation aircraft. Table III-20 lists some of the characteristics of these area airports, along with those of the larger Worcester facility.

As shown in Table III-19, the majority of the operations at these smaller airports consist of general aviation flights. However, air taxi services are offered at the Hopedale Industrial Park Airport and Southbridge Municipal Airport. Also, a relatively small number of military flights have occurred at the Hopedale airport.

Of the four utility airports in the region, Southbridge Municipal Airport is utilized the most and has been designated by MAC as part of the statewide airport system. Southbridge Municipal Airport is owned and operated by the Town of Southbridge. The airport is located three miles northwest of downtown Southbridge and approximately five miles from the regional highway system in Sturbridge. The Massachusetts Turnpike (I-90), Interstate 84, and US Route 20 are all accessible via State Route 131 west to Sturbridge.

Southbridge Municipal Airport has two runways. The first, Runway 2/20, is a 3,500 foot, paved runway, serviced by a full-length, parallel taxiway. Runway 2/20 also has a non-precision instrument approach and lighting. The second runway has a grass surface and has been closed indefinitely.

Table III-20
Airport Characteristics

	HOPEDALE INDUSTRIAL PARK AIRPORT	SOUTHBRIDGE MUNICIPAL AIRPORT	SPENCER AIRPORT	TANNER-HILLER AIRPORT	WORCESTER AIRPORT
Location	Hopedale	Southbridge	Spencer	New Braintree	Worcester-Leicester
Elevation	267 Ft	699 Ft	1040 Ft	584 Ft	1009 Ft
Runway	18/36	02/20, 10/28(closed)	01/19	06/24	11/29, 15/33
Runway Dimensions	3172'x90'	3500'x75', 1450'x100'	1950'x50'	3027'x40'	7000'x150', 5000'x100'
Runway Lighting	Low Intensity	Medium Intensity	Low Intensity	No	High/Medium Intensity
Airport Attended	Dawn-Dusk, Mon-Fri	8 AM-Dusk	9 AM-6 PM, Mon-Sat	8 AM-6 PM M-F 8 AM-4 PM Sat	Continuous
Registered Based Aircraft	14 Single Engine 1 Multi Engine	30 Single Engine 2 Multi Engine 1 Helicopter	25 Single Engine	3 Single Engine	56 Single Engine 6 Multi Engine 1 Jet
Operations Per Year	28,000	52,000	12,000	500	45,000
% Air Taxi	12%	2%	0	0	4%
% Local General Aviation	36%	59%	82%	89%	31%
% Transient General Aviation	52%	39%	17%	9%	61%
% Military	<1%	0	<1%	2%	2%
% Commercial	0	0	0	0	1%

B.2.2 Future Conditions

Beginning in the fall of 1998, the Tri-community area of Charlton, Southbridge and Sturbridge undertook a Corridor Planning Study. The goal of the study was to identify projects that might alleviate transportation problems in the area bounded roughly by Route 131, Route 169, and US Route 20, and to meet three specific objectives:

(1) reduce traffic congestion on Route 131 between Southbridge and Sturbridge
(2) reduce the traffic impacts from the Hobbs Brook shopping plaza
(3) improve access to industrial/commercial land and, indirectly, to the adjacent airport, in Southbridge.

To guide the study, a Technical Task Force was established, consisting of 20 local and state officials plus 10 interested citizens from the three towns. That group met nearly every month from September 1998 through November 1999. All meetings were open to the public, and many individuals took advantage of those meetings to share their thoughts and concerns with the Task Force. Suggestions and proposals were obtained from the public and from Task Force members during an open meeting in October 1998 as well as throughout the study. The group initially considered 17 different alternatives and options to alleviate the problems. After careful evaluation, six complete alternatives, including a No-Action Alternative, were selected for more complete analysis. CMRPC staff conducted the analysis and presented the results to the Task Force. The Task Force also heard from recognized authorities on Massachusetts environmental regulations, highway planning and design procedures, and computer models for travel demand forecasting.

Only Southbridge supported the construction of the Northern Connector from US Route 20 in Charlton to the proposed access road described above which will connect to Route 169 in Southbridge. This approach was not favored by either the Charlton or Sturbridge groups because of potential negative impacts to nearby residents and potential environmental and societal impacts. Southbridge favored this approach as the one providing the greatest reduction of Route 131 traffic and improved access to the regional highway system. At present, only the link from Route 169 to the Airport/industrial park will be constructed. This link, called Commercial Drive, was finally completed and opened in 2011. It serves as access to Casella Waste Systems on Barefoot Road as well as being a more convenient, direct link to the airport. It is hoped that further industrial development can occur on this route as well.

In early 2011 Southbridge Airport was in the midst of undergoing an update to its Airport Master Plan. Additionally, the potential installation of solar energy generation equipment on the site was being pursued with the FAA and other concerned parties.

On June 1, 2011, severe local weather in the form of two tornadoes affected the south-central portion of Massachusetts. One of these travelled to the east just far enough to cross Airport property. Hangars were damaged, some totally, and many aircraft were strewn about as well. Up to $3 million in damage occurred. With this particular area of the storm path not eligible for federal assistance, insurance and town money will need to be allocated to the rebuilding effort. The FAA hoped to fast-track the master plan update effort in recognition of the need to get back to normal operations as quickly as possible.

III-D. FREIGHT RAILROAD SYSTEM

A. INTRODUCTION

A.1 Rail Freight

The railroad network within the Central Massachusetts region is a critical component of the area's transportation system. Rail is an especially efficient mode for moving large volumes of low-to-moderate value freight that is too bulky to ship over long distances by other means. Examples include coal, forest products, grain, unfinished industrial products and other raw materials. Delivering raw materials and shipping out finished goods makes rail freight transportation a valued service for many local industries. Rail freight also provides essential transportation for a wide range of other commodities, including consumer goods, high-value over-dimension cargo and double stacked container freight.

Passenger rail, as discussed in the Public Transportation section of the RTP, is also available in the region, with Commuter Rail service provided by the Massachusetts Bay Transportation Authority (MBTA) and, on a limited basis, the National Railroad Passenger Corporation (Amtrak). At this time, freight movement is the dominant function of the railroads serving the greater region.

Reversing nearly three decades of decline, rail freight transportation rebounded in the 1980's. Presently, the railroads remain diligent in working to increase their market share of intercity freight traffic. Service improvements, technological developments and cost efficiencies have helped restore rail freight's advantage as an inexpensive mode for the long distance movement of bulk materials. Continued future growth in the nation's rail freight traffic is expected. Planning and coordination are critical in preparing for this growth.

A.2 Staggers Rail Act

In October 1980, President Carter signed the *Staggers Rail Act* into law. The Staggers Act deregulated rail freight, once the most regulated of all industries in the United States. It resulted in a resurgence of the nation's freight railroads and led to lower rail rates and stronger railroads. Staggers gave railroads the necessary flexibility to adjust rates quickly to respond to market conditions in order to effectively compete with the trucking industry as well as each other. While freight rates decreased, railroad profitability and productivity increased.

Both the Staggers Act and the Northeast Rail Service Act (NERSA) of 1981 encouraged the establishment of new "shortline" railroads to operate trackage unprofitable or marginally profitable for the larger carriers. Shortline is the term applied to small railroads that, in many cases, began operating branch lines that the larger carriers no longer wanted. Many shortlines have found ways to profit through lower operating costs and, partly because they are locally owned and operated, improved customer service. NERSA also enabled the freight railroads to shed the expensive burden of operating commuter trains.

The Staggers Act also expanded the authority of the Interstate Commerce Commission (ICC), which wielded far-reaching regulatory powers over the railroads, to remove segments of traffic from rate regulation. In turn, the ICC used this authority to deregulate intermodal and most boxcar traffic. For traffic that continued to be regulated by the ICC, Staggers also provided statutory authority for negotiated shipper-carrier contracts. Later in 1995, under President Clinton, the Surface Transportation Board (STB) replaced the ICC.

The STB is an economic regulatory agency charged by Congress with the fundamental missions of 1) resolving railroad rate and service disputes and 2) reviewing proposed railroad mergers. The STB is decisionally independent, although it is administratively affiliated with the U.S. Department of Transportation. Created by the ICC Termination Act of 1995, the STB is the successor agency to the ICC. The STB has jurisdiction over railroad rate and service issues and rail restructuring transactions (mergers, line sales, line construction, and line abandonment); certain trucking company, moving van, and non-contiguous ocean shipping company rate matters; certain intercity passenger bus company structure, financial, and operational matters; and rates and services of certain pipelines not regulated by the Federal Energy Regulatory Commission.

A.2.1 Environmental Advantages of Rail Freight

Rail freight transportation also helps address current environmental concerns. The railroad industry has stated that:

- *Railroads are more efficient than trucks. Every railcar trip removes approximately three truck trips from congested major highways*
- *Railroads consume less fuel. Railroads can move one ton of freight three times as far as a truck on a gallon of fuel*
- *Railroads generate less pollution. On a per ton-mile basis, railroads emit one-tenth the hydrocarbons and diesel particulates as trucks, and one-third the oxides of nitrogen and carbon*

The railroads stand to benefit from government policies that capitalize on these benefits. Tax and user charge policies also affect railroad performance. The railroads indicate that, as an industry, they remain at a competitive disadvantage to the extent that the user charges that motor carriers are assessed - fuel taxes & registration fees - do not reflect the true costs that heavy trucks have on the highway system.

A.2.2 Movement of Hazardous Materials

Each year, 1.7 to 1.8 million carloads of hazardous materials ("hazmat") are transported by rail in the United States. Toxic Inhalation Hazards (TIH) - gases or liquids, such as chlorine and anhydrous ammonia that are especially hazardous if released - are a smaller subset of hazardous materials and are a major (though not exclusive) focus of hazmat-related rail safety and security efforts. Each year, railroads transport around 100,000 carloads of TIH, virtually all in tank cars.

The federal government requires railroads to transport these highly-hazardous materials. Unlike other industries, including other transportation companies, railroads have no choice when it comes to transporting hazmat. Railroads cannot refuse a shipment from a chemical manufacturer or user (unless there is some overarching reason other than the inherent risk of a product release). Absent this federal mandate, many railroads would not transport these materials. Although the rail hazmat safety record is outstanding - 99.997% of all rail hazmat shipments reach their destination safely - the chance of a catastrophic accident still remains. Safety concerns for railroad employees and the communities served are paramount.

Railroads support prompt, bold actions by all stakeholders to reduce the risks associated with hazmat transport. Railroads themselves are taking the lead:

- Railroads help communities develop and evaluate emergency response plans; provide training for more than 20,000 emergency responders each year through their own efforts and the Transportation Community Awareness and Emergency Response (TRANSCAER) Program; and support Operation Respond, a nonprofit institute that develops technological tools and training for emergency response professionals.

- Railroads work closely with chemical manufacturers in the Chemical Transportation Emergency Center (Chemtrec), a 24/7 resource that coordinates and communicates critical information for use by emergency responders in mitigating hazmat incidents.

- Railroads participate in a variety of R&D efforts to enhance tank car and hazmat safety. For example, the Tank Car Safety Research and Test Project (which is funded by railroads, tank car builders, and tank car owners) analyzes accidents involving tank cars to help identify the causes of tank car releases so that tank car standards can be improved to prevent future occurrences.

- Upon request, railroads provide local emergency response agencies with, at a minimum, a list of the top 25 hazardous materials transported through their communities. The list helps responders prioritize emergency response plans.

- For trains and routes carrying a substantial amount of highly-hazardous materials, railroads utilize special operating procedures to enhance safety.

- In addition to implementing the Terrorism Risk Analysis and Security Management Plan, railroads are working with DHS and the DOT to identify opportunities to reduce exposure to terrorism on rail property.

- As required by DOT, railroads provide hazmat awareness training to all employees who are involved in hazmat transportation. Employees responsible for emergency hazmat response efforts receive far more in-depth training.

- Railroads are pursuing a variety of technological advancements to enhance rail safety, including hazmat safety.

A.2.3 Regional Freight Advisory Group

As recommended in the prior 2007 RTP document, a *Regional Freight Advisory Group* was established by the CMMPO staff. As summarized in Table III-21, the Advisory Group consists of a "core" group of participants as well as other secondary parties. Meeting on at least an annual basis for the past few years, a number of freight and passenger challenges and issues have been discussed. Initially known as the *Regional Rail Task Force*, early discussion focused on efforts in the region to increase the number of daily round trips provided by MBTA Commuter Rail between Worcester and Boston. Later discussions focused on freight rail and transloading operations in the greater region. Future efforts will be aimed at more directly involving the trucking industry in regional transportation planning activities, such as the selection of major highway improvement projects.

In retrospect, the *Regional Freight Advisory Group* has been an excellent means to allow the CMMPO, the CMRPC and the region's communities to be made aware of the nature of freight and passenger flows as well as the impediments that limit their mobility and growth. In the spirit of SAFETEA-LU, the Advisory Group has enabled the CMMPO to become more informed about the issues affecting the mobility of both freight and passengers. The *Regional Freight Advisory Group* has provided the CMMPO with improved information concerning existing operations, identified challenges and potential improvements, particularly those that have the potential to reap regional and/or statewide benefits.

A.3 The Region's Rail Freight Network

The rail system within the Central Massachusetts planning region, shown on Figure III-26, has a radial orientation with the city of Worcester serving as the hub of activity. The rail lines serving the area must also be viewed in the wider context of the entire state, the greater New England region and the entire Northeast, due to the nature of the global economy and the structure of the rail systems themselves. Six freight railroads own track and operate in the Central Massachusetts region. CSX Transportation, the largest, operates the Boston Line through the area, an east-west route that connects Boston and Albany, NY. The Boston Line is the major route of travel for much of CSX's traffic into and out of New England, including the planning region. The movement of passengers also follows a similar pattern, as all MBTA Commuter Rail and Amtrak trains that stop in Worcester utilize trackage rights over the CSX Boston Line. The other eastern rail giant, Norfolk Southern (NS), with the formation of Pan Am Southern (PAS), also intends to increase the utilization of the recently improved northern east-west rail line in Massachusetts between Mechanicville, NY and Ayer, MA.

Table III-21

Regional Freight Advisory Group
General Structure

Core Participants

Public:

CMRPC staff
MassDOT Planning
MassDOT Highway Division Districts #2 & #3
WRTA
MBTA
City of Worcester, other regional communities

Private:

Mass Railroad Association
Mass. Motor Truck Association
Worcester Regional Chamber of Commerce
East Brookfield & Spencer Railroad
New England Automotive Gateway (NEAG)
Grafton & Upton Railroad Company
Massachusetts Central Railroad Corporation
Providence & Worcester Railroad Company
Intransit Container Incorporated (ICI)
Boxcar Services, *railcar leasing services*

Secondary Participants

Adjacent RPAs:

Metropolitan Area Planning Council (MAPC)
Montachusett Regional Planning Commission (MRPC)
Pioneer Valley Planning Commission (PVPC)

Others:

495/MetroWest Corridor Partnership, Inc.
City of Marlborough Transportation Initiative
Rail Interests from the State of Connecticut
Rail Interests from the State of Rhode Island

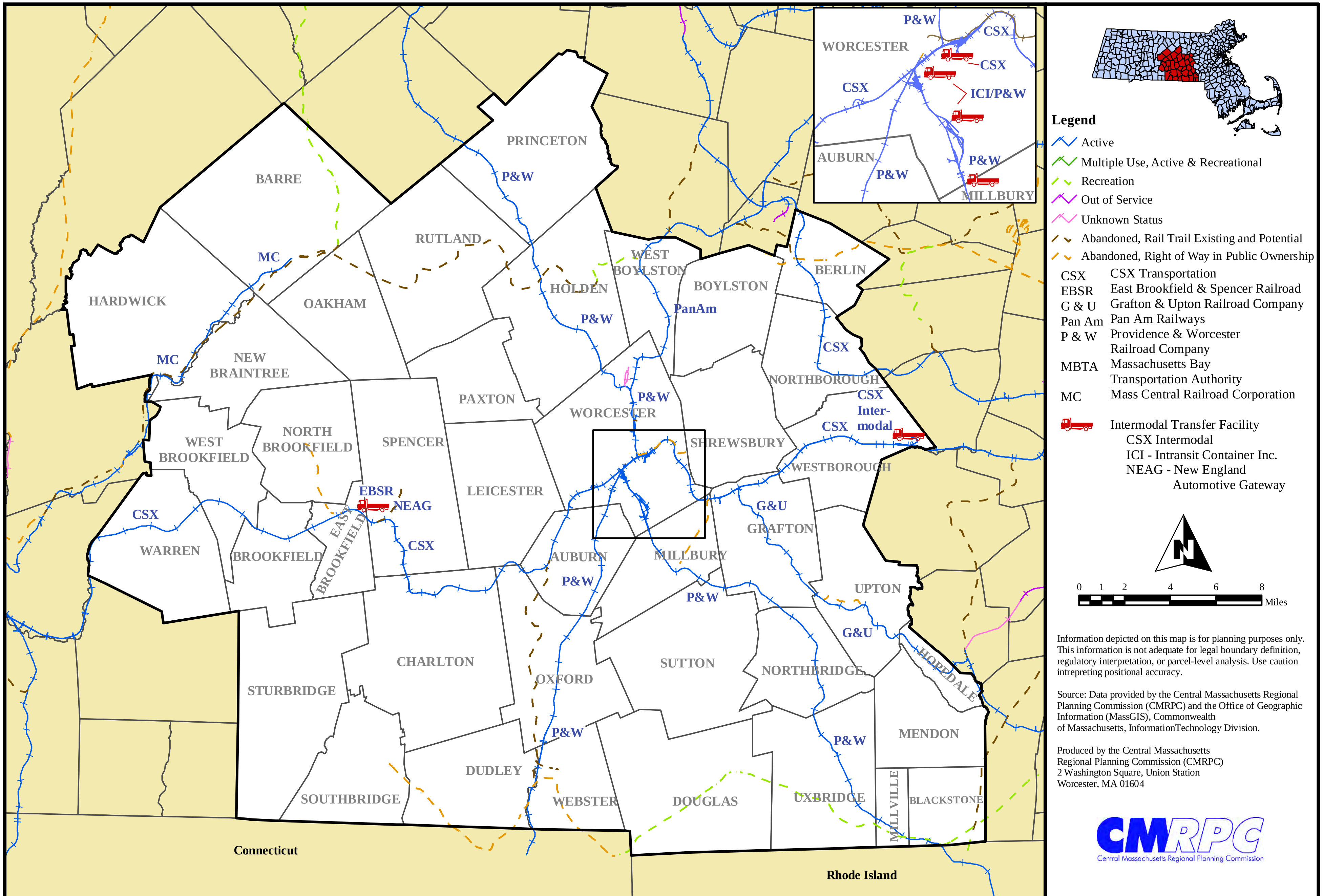


Figure III-26 Regional Railroad System

B. RAIL FREIGHT SERVICE OPERATORS

As listed below, there are six freight railroads operating within the Central Massachusetts region:

1. CSX Transportation
2. East Brookfield & Spencer Railroad
3. Grafton & Upton Railroad Company
4. Massachusetts Central Railroad Corporation
5. Pan Am Railways
6. Providence & Worcester Railroad Company

In addition to the freight railroads, passenger rail service is also available to the region. Passenger service to Boston and other points east is provided by MBTA Commuter Rail service from Worcester, North Grafton and Westborough. Further, intercity passenger service is provided by the National Railroad Passenger Corporation (Amtrak). At this time, one Amtrak train, the "Lake Shore Limited", stops in Worcester. As mentioned, the region's passenger rail service is discussed in the RTP's *Public Transportation* sectional materials.

The following provides background materials on each of the freight railroads operating in the region, an overview of their existing operations, major challenges & issues, and any projections for the future.

B.1 CSX Transportation (CSX)

B.1.1 Background

CSX Transportation is the largest freight railroad operating in the Central Massachusetts planning region. CSX was established in 1986 when the Chessie System, Seaboard Coast Line Industries and the Western Maryland Railway formed one company. CSX entered the region when the Surface Transportation Board (STB) voted in 1998 to approve the division of the assets of the Consolidated Rail Corporation (Conrail) between CSX and Norfolk Southern (NS) at a total cost of $10.2 billion. When the transaction was completed in 1998, CSX expanded considerably, obtaining 42% of Conrail stock while NS acquired 58% of Conrail stock. CSX received Conrail lines originally belonging to predecessor New York Central (NYC), including the eastern half of the *Water Level Route* between Boston, Albany, Buffalo and Cleveland. CSX and NS commenced operations over their respective portions of Conrail in 1999.

The major benefit of the Conrail split between CSX and NS was the restoration of rail freight competition between two Class I carriers in the Northeast. By introducing competition to the areas formerly served exclusively by Conrail, both CSX and NS worked to increase traffic densities while improving service reliability. Other benefits included more options for shippers, better railcar utilization, and easier interchange with Western railroads. Cost savings also resulted through the elimination of redundant rail lines, equipment and labor union negotiated personnel reductions.

B.1.1.1 CSX Corporate Overview

CSX Corporation, based in Jacksonville, FL, is one of the nation's leading transportation companies, providing rail, intermodal and rail-to-truck transload services. CSX corporate goals include the following:

- *Provide safe, efficient, competitive transportation and related services to customers*
- *Deliver superior value to the company's shareholders*
- *Make a positive difference in the communities served*

B.1.1.2 System Characteristics

CSX Transportation, the rail unit of CSX Corporation, provides rail freight service on a privately owned and maintained network of more than 21,000 route miles in 23 eastern and Midwest states, the District of Columbia, and two Canadian provinces. CSX rail lines connect with over 230 regional and shortline railroads as well as 70 river, lake and ocean ports. Its lines connect Chicago, East St. Louis, Memphis, and New Orleans on the west, through Appalachian coal country and industrial cities along the eastern Great Lakes to Boston, New York, Philadelphia, and Baltimore on the east and down the Atlantic coast to Tampa and Miami.

CSX System Facts

- Operates an average of 1,200 trains per day
- Transports an average of 20,000 carloads per day
- Maintains a fleet of more than 4,000 locomotives
- Maintains a fleet of nearly 80,000 freight cars
- Provides service to every major population and industrial center east of the Mississippi River
- Provides service to 36 automobile distribution centers
- Provides service to more than 165 bulk intermodal distribution terminals and rail-to-truck bulk transloading facilities
- Provides service to more than 130 active coal mines, and serves over 100 coal-fired power plants and cogeneration facilities

CSX Role in Massachusetts

- Operates over and maintains 430 miles of railroad track
- Operates through 500 public and private grade crossings
- Handles nearly 280,000 carloads of freight annually in Massachusetts
- Provides service to 150 industries
- Employs more than 300 Massachusetts residents with an annual payroll of nearly $19 million
- Products shipped include automobiles, construction materials, municipal waste, and paper/pulp

B.1.1.3 Commodities

CSX provides essential transportation services to a wide range of customers across a broad spectrum of industries. Primary commodities carried by the railroad include agricultural products, automobiles & auto parts, chemicals, coal, food products & other consumer goods, forest products including lumber and paper, metals, minerals such as cement, sand, limestone, and gravel, phosphates & fertilizer as well as intermodal truck trailers and containers.

B.1.2 Existing Operations

B.1.2.1 CSX Freight Corridors

In Massachusetts, CSX operates the Boston Line between Boston and Albany, NY, as shown in Figure III-27. Essentially bisecting the Central Massachusetts region, the 200-mile Boston Line is the busiest rail freight line in New England. Established in 1867 when the Western Railroad and the Boston & Worcester merged to form the Boston & Albany (B&A), it was the first railroad to connect the port of Boston with the upper Hudson River Valley. This line was considered the first mountain railroad in America. In 1900, the B&A was leased to the New York Central (NYC). Under the NYC, the line was substantially rebuilt in 1912 as a realigned, double track route which included major grade separation improvements through the city of Worcester. Later, in 1968, operation of the Boston Line was passed to Penn Central and, in 1976, to Conrail. In 1998, CSX gained all Conrail assets in Massachusetts. Passenger service is also accommodated as both MBTA Commuter Rail and Amtrak trains utilize the Boston Line. MBTA Commuter Rail serves Worcester and points east. One daily Amtrak train, the "Lake Shore Limited", also uses the Boston Line between Boston and Chicago.

Also shown in the figure, CSX operates the Fitchburg Secondary, which provides service between Framingham, to the east, and Fitchburg, in the Montachusett planning region. The 35-mile Fitchburg Secondary passes through the northeast subregion communities of Northborough and Berlin. Additionally, an agreement with the Providence & Worcester Railroad enables CSX to use the tracks on P&W's Gardner Branch between Union Station and Barber's Crossing in Worcester to connect with the Pan Am Railway's Worcester-Ayer Mainline.

CSX interchanges railcar and intermodal traffic with the other railroads operating in the planning region, including the Providence & Worcester Railroad and Pan Am Railways at Worcester. CSX also connects with two shortline railroads in the area, interchanging traffic with the revitalized Grafton & Upton Railroad in North Grafton as well as serving MassCentral's Ware River line.

B.1.2.2 CSX Intermodal Operations

The large metropolitan areas of Boston, Hartford, CT and Providence, RI are all within 50 miles of Worcester. CSX, long aware of the region's central location as a distribution center, is working to expand and modernize area intermodal facilities. The railroad provides service to three major intermodal transload facilities within the Central Massachusetts planning region. All are strategically located to provide access to other rail-related facilities, major arterial roadways and the Interstate System.

CSX
How tomorrow moves

CSX Rail Line

Map Not to Scale
Source data provided by CSX

Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Produced by the Central Massachusetts Regional Planning Commission (CMRPC)
2 Washington Square, Union Station
Worcester, MA 01604

CMRPC
Central Massachusetts Regional Planning Commission

Figure III-27 CSX Transportation System Map of Southern New England

- *East Brookfield-Spencer*
  CSX serves the New England Automotive Gateway (NEAG) automotive transloading facility located in the host communities of East Brookfield and Spencer. Railcar switching at the NEAG is provided by the East Brookfield & Spencer Railroad (EBSR). A detailed overview of both the NEAG and the EBSR is included in this document.

- *Westborough*
  The Tate & Lyle Westborough Bulk Station is located at 30 Walkup Drive off Flanders Road. It is a rail-to-truck bulk transloading facility servicing tank and hopper cars carrying food products. Tate & Lyle is a global leader in cereal sweeteners and starches, sugar refining, value added food and industrial ingredients and citric acid, providing ingredients to almost every famous food and beverage producer in the world.

- *Worcester*
  A CSX Trailer Van Terminal (TVT) Yard is located at 271 Franklin Street in the city of Worcester. The Franklin Street Yard provides railcar-to-truck transfer services for both container-on-flatcar (COFC) and trailer-on-flatcar (TOFC) freight. A sizable bulk railcar-to-truck transloading facility is on site. There are also rail sidings for transloading oversized loads as well as the open-air repair of damaged railcars. CSX also interchanges conventional freight with Pan Am Railways and the P&W Railroad through the Franklin Street Yard.

B.1.3 Current Major Events

CSX Agreement with MassDOT
After years of work and negotiations, in June 2010 MassDOT announced a $100 million agreement on a number of issues with rail freight provider CSX. Basically, the Commonwealth's goal was the future expansion of MBTA Commuter Rail service while CSX's goal was the preservation and expansion of the company's freight transloading facilities in the state. The following are highlights of the agreement between MassDOT and CSX:

- The state will pay CSX $50 million in 2012 to purchase the tracks between Worcester and Framingham. MassDOT already owns the line from Framingham to Boston. These will allow for potential increases in MBTA Commuter Rail service between Boston and Worcester, up to 20 round trip trains per day. The state will eventually dispatch all trains along the Worcester to Boston route.

- Clearance improvements to accommodate full Phase II double stack freight service will be implemented along the CSX Boston Line from the NY state line to Westborough at I-495.

- CSX plans to relocate freight handling activities from Beacon Park yard in Allston Brighton to an improved and expanded facility in Worcester. The CSX intermodal facility at Walkup Drive in Westborough will also be improved and modernized.

- The state will purchase the 8-mile Grand Junction track in Boston from CSX, which provides a connection from the Worcester line to North Station through Cambridge, accommodating envisioned future service increases. As emphasized by MassDOT, there exists the need to increase track capacity at South Station in order to accommodate additional future year trains.

- In the southeastern part of the state, 30 miles of CSX track will be purchased to accommodate the planned South Coast Commuter Rail extensions. In addition, short line Bay Colony Railroad was selected to provide continued freight rail service in Southeastern MA to customers formerly served by CSX.

The existing MBTA Commuter Rail schedule between Worcester and Boston consists of 13 inbound and 12 outbound train trips per day. Citing continually increasing ridership, economic development prospects as well as the potential for reverse commute, the supporters of expanded passenger rail service, particularly the city of Worcester, have emphasized the need for a “full” schedule of 20 round train trips per day.

B.1.3.1 Massachusetts Clearance Increase Project

Efforts are now underway to address clearance limitations along the CSX Boston Line in order to accommodate full “Phase II” double stack container service along this key railroad corridor serving the Commonwealth. The clearance project is considered essential to reducing transportation costs for Massachusetts businesses competing in the global economy.

- Due to the lack of full double stack clearances in Massachusetts, a “fillet” operation in Syracuse, NY converts *full* double stack trains to a “Hi-Low” configuration for furtherance to Boston.

- Clearance limitations on the CSX Boston Line from the New York border to Worcester only allow for *short* double stack container service at 9’-6” & 8’-6”, called “Hi-Low” service.

- “Phase II” clearances allow for the stacking of two 9’-6” intermodal containers, the international standard.

- Clearance increases are necessary to allow for *full* double stack service at 9’-6” & 9’-6”, called “Hi-Cube” service

The clearance increase project involves a combination of raising bridges and lowering track grade beneath a range of structures between the NY state line and Westborough at I-495. This improvement, envisioned since the early 1990’s will allow CSX to carry full Phase II double stacked containers. This will end the need to fillet high cube trains from the west at Syracuse, NY. In turn, while being provided more shipping options to the nation and the globe, the costs to Massachusetts shippers should be reduced.

B.1.4 Future Projections

The CSX freight market in Massachusetts has slowly been migrating westward for well over a decade, especially with the decline of manufacturing in the greater Boston area. Strong interest by Harvard University to redevelop Boston's Beacon Park rail yard into a district called Allston Landing has lead CSX to seek the expansion and modernization of other outlying, existing intermodal facilities in Westborough, Worcester and elsewhere in Massachusetts, including West Springfield.

B.1.4.1 CSX Intermodal Expansion Projects

Worcester Intermodal Facility Expansion

Overview
In early 2010, CSX introduced plans to officials in the city of Worcester for the expansion of the Franklin Street intermodal facility, known traditionally as the "East Worcester Yard". A preliminary early site plan is shown in Figures III-28a through 28c. Freight operations have occurred on this site since the 1830's, when the railroads first reached Worcester. Coal to power industry and heat homes was delivered to this place. The Boston & Albany Railroad's large freight house formerly occupied part of the site. Further, the former American Express and Railway Express Agency, the predecessors of today's UPS and FedEx, were also located in buildings that stood where I-290 now passes adjacent to the facility.

A private investment of approximately $120 million, major features of the planned expansion include:

- The footprint of the site will increase from 28 to 52 acres.
- Estimated 50% annual increase in the number of containers handled, increasing from approximately 100,000 per year to 150,000 per year. The yard will also be able to accommodate projected future increases in freight movement.
- As a result of the now-underway Boston Line clearance improvement project, the expanded facility will be able to accommodate Phase II double stack domestic and international containers.
- Brand new overhead gantry cranes will be used in the expanded facility. The cranes offer increased handling capacity along with cleaner, quieter operations in comparison to the lift vehicles currently used on the site.
- Improved storage areas for containers, trailers and truck chassis
- Improved access to I-290 Eastbound with an improved site drive located directly opposite the existing ramp system.
- A bridge will be constructed to carry Franklin Street over roadways internal to the CSX site, eliminating the intermingling of yard operations with local traffic.
- Other city streets surrounding the overall site will undergo a number of specific improvements aimed at improving traffic flows.

- Extensive mitigation will be provided to lessen the impacts of the expansion, both on and off-site. Monies will be provided by CSX for open space, park improvements and streetscape improvements. Further, CSX will donate $1 per container handled at the site to a community improvement fund.

- Environmental mitigation provided will improve site drainage and aesthetics. The site will be buffered from the surrounding neighborhoods using a variety of techniques.

The relocation of CSX freight handling activities from Boston’s Allston Brighton Beacon Park Yard will free track capacity for the envisioned expansion of commuter rail service between Worcester and Boston, up to 20 round trips per day. CSX representatives indicate that an expanded facility and likely economic spin off from enhanced freight handling capabilities could eventually add 400 jobs to the city and the surrounding region. The Worcester City Council seeks to mitigate the impacts of planned expansion to the neighborhoods that surround the CSX site.

Mitigation for Host Community

Host community elected officials and neighborhood residents raised a number of concerns associated with the proposed CSX expansion, seeking a robust mitigation package as part of the project. A number of meetings were held between proponent CSX, state officials, locally elected officials, members of the local business community and persons in the host neighborhoods. The result of the community discussions and negotiations resulted in a mitigation package tailored to the needs of the surrounding neighborhoods.

The city and the host neighborhoods will gain mitigation totaling $5 million for open space, park and streetscape improvements. This amount includes $1 million for an open space fund and $3 million for reconstruction and improvements for aquatics at both Holmes Field and East Park. In addition, $1 per freight container handled in the expanded yard will be donated to an ongoing community improvement fund. A community-based board will be established to determine how the mitigation dollars are spent.

Based on the provided mitigation, with host neighborhood concerns being addressed to various extents, some in the Shrewsbury Street neighborhood indicated support for the expansion of the intermodal facility. Other parties continued to hold reservations against the project’s traffic generation, noise and potential pollution, including a number of businesses in the Grafton Street neighborhood.

On-site improvements proposed by CSX include landscaping to improve the appearance of the intermodal facility along with the construction of natural sound barriers at key locations. CSX will also reconstruct a retaining wall parallel to Franklin Street, a 100 year old structure. Site drainage will be vastly improved and storm water retention basins added to the site.

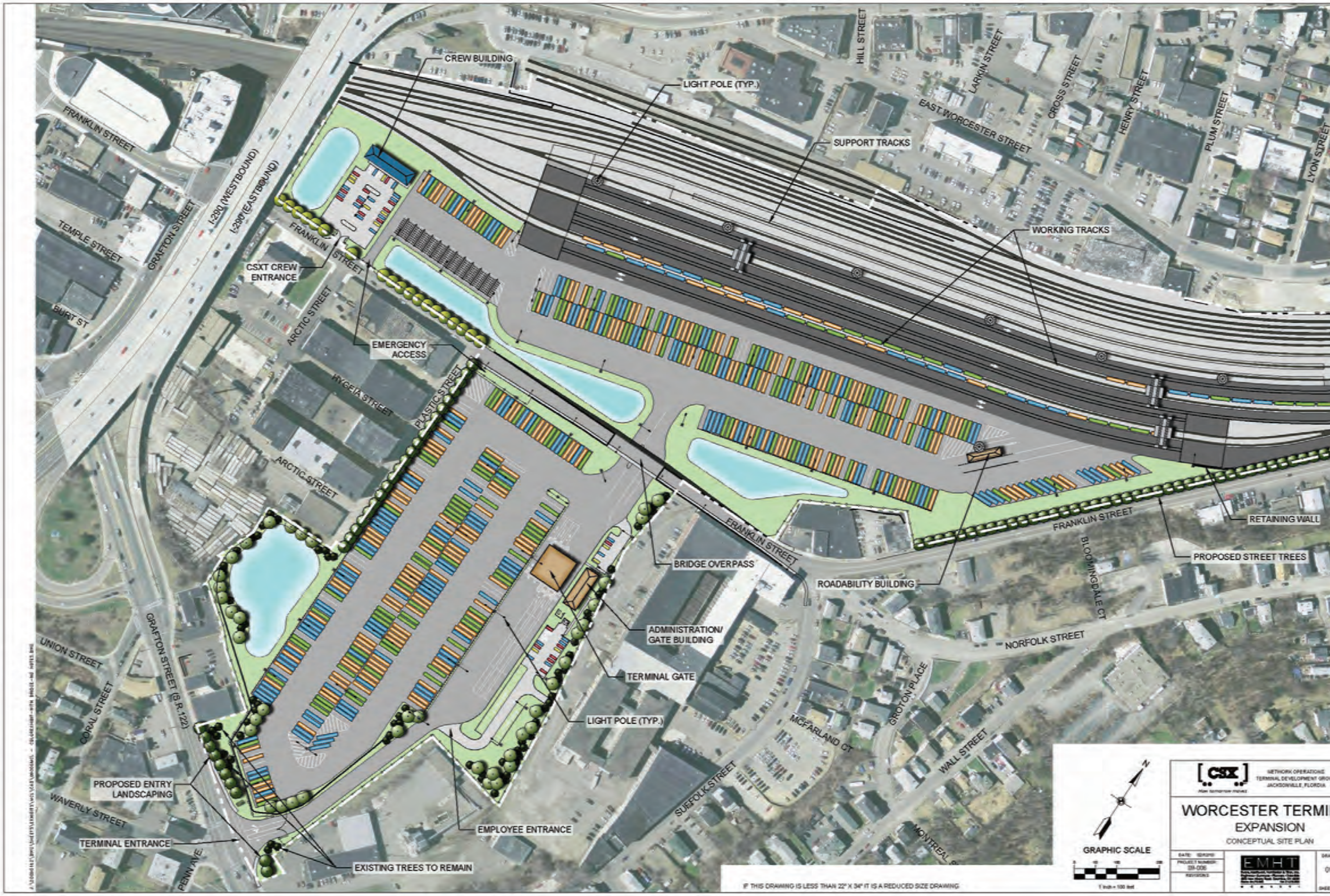


Figure III-28a CSX Worcester Intermodal Facility Expansion

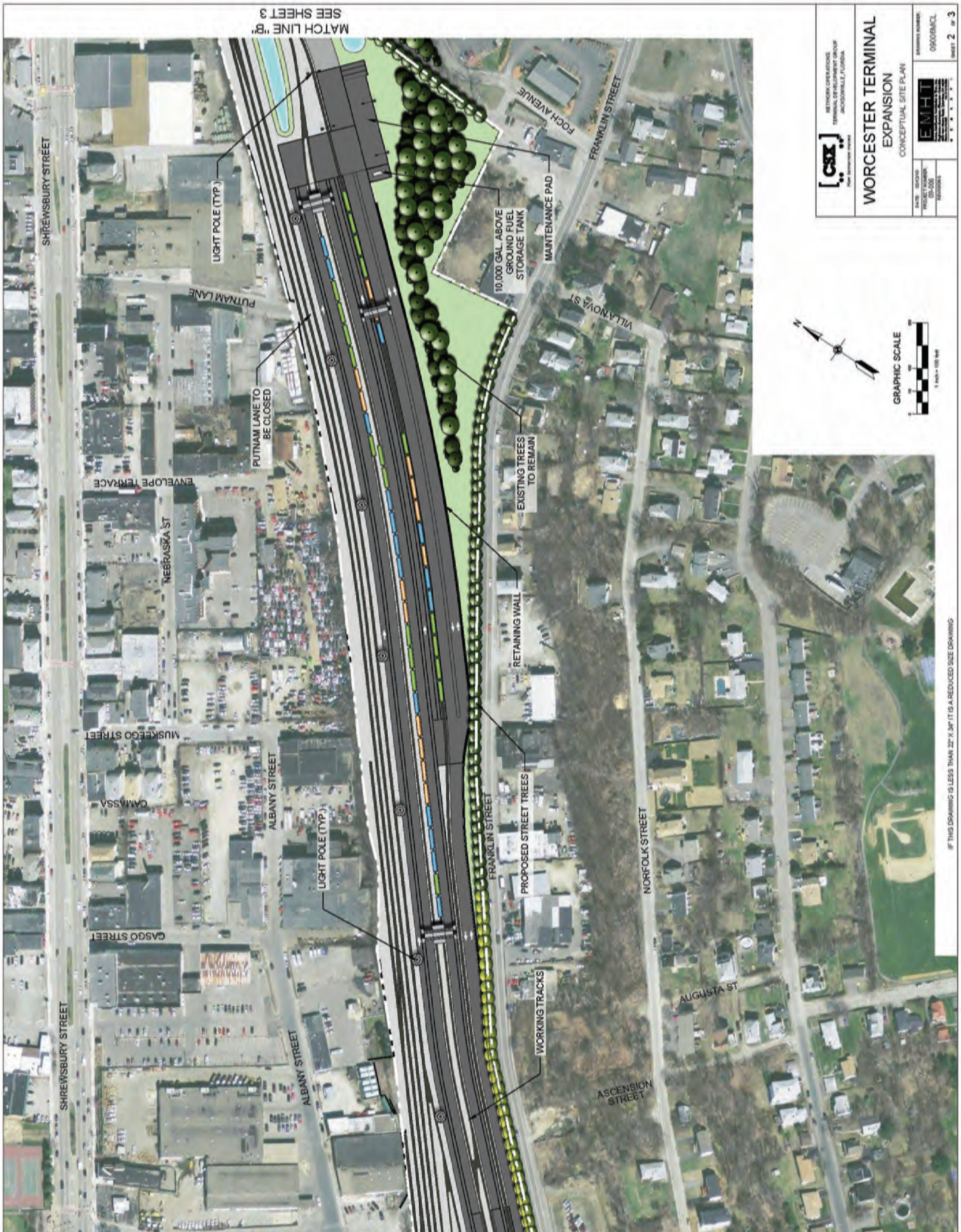


Figure III-28b CSX Worcester Intermodal Facility Expansion

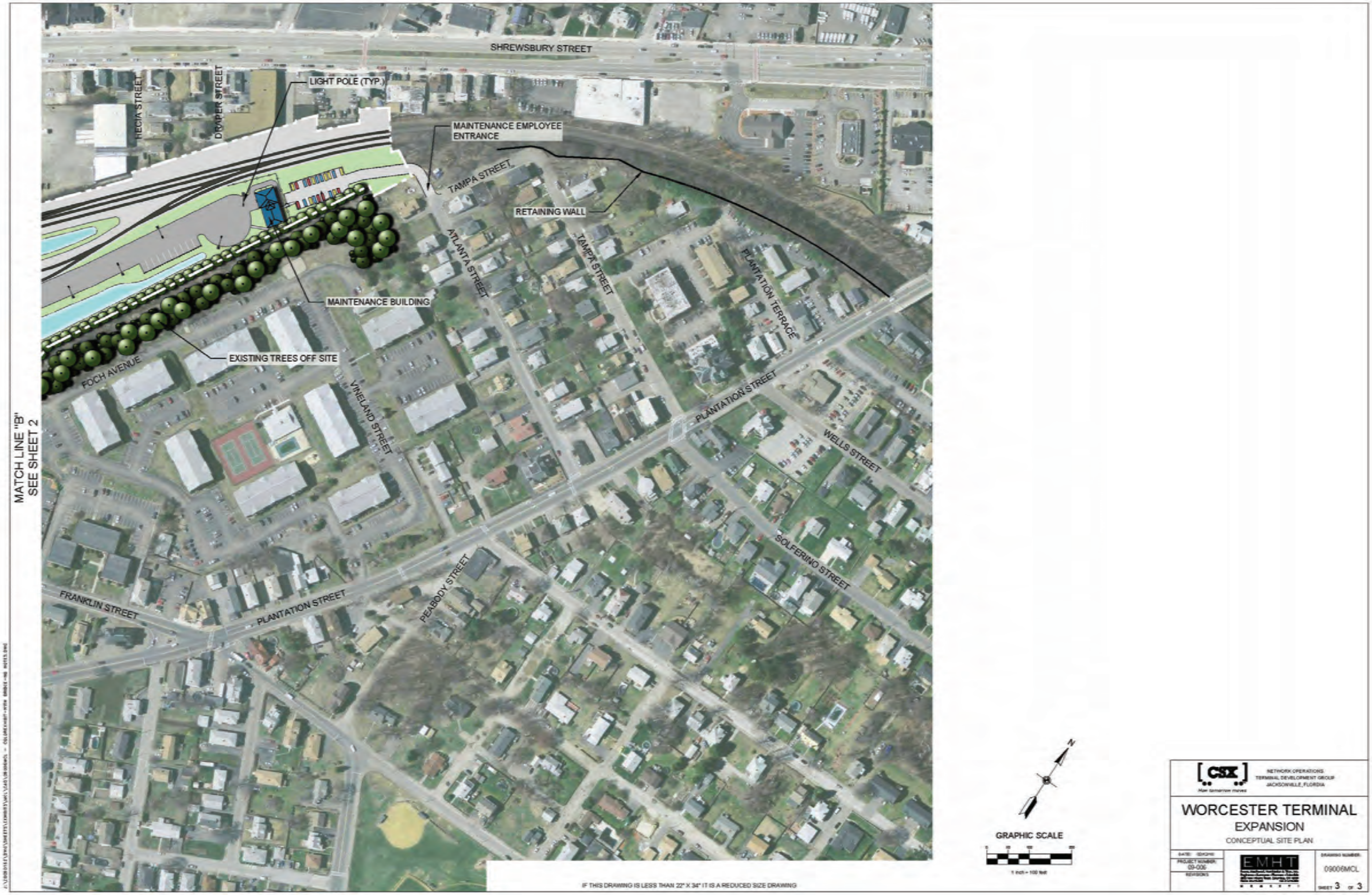


Figure III-28c CSX Worcester Intermodal Facility Expansion

Modifications to the site plan evolved from the initial introduction of the project. At this time, CSX is planning site drive access directly across from I-290 Exit 14, as opposed to further south on Grafton Street at the signalized intersection that once served the defunct supermarket. Rearrangement of the main site drive also required the acquisition of additional properties.

Putnam Lane Underpass

As part of the site design process, CSX indicated the need to close Putnam Lane, a local shortcut embraced by the host neighborhoods. In years past, Putnam Lane provided access to railroad and other private properties. The Putnam Lane bridge carries CSX over narrow city street Putnam Lane. The bridge is a substandard structure, the unique combination of a circa 1830's bridge situated within a circa 1912 underpass. It appears that the full replacement of the 1830's bridge was never completed. Both provide limited vertical clearance.

When CSX suggested that Putnam Lane be closed as part of the expansion project, the shortcut was embraced by locally elected officials on behalf of the host neighborhood. In turn, CSX examined several alternatives in conjunction with the Worcester DPW in order to determine if a new bridge structure could carry a relocated Putnam Lane over the CSX property. After consideration of the alternatives, all were deemed infeasible based on accepted engineering standards. Eventually, the closure of Putnam Lane was determined to be a reasonable alternative by a majority of locally elected officials, despite ongoing objections by neighborhood leadership. Ultimately, Putnam Lane was closed in May 2011.

Construction Commences

In early 2011, preliminary site preparation work continued in and around the CSX yard. By March 2011, CSX submitted the application for the finalized definitive site plan for the expansion project. With the site plan being subsequently approved by the city, construction commenced and was fully underway in the spring of 2011. The demolition of the closed supermarket and other derelict structures were part of this work. An official groundbreaking ceremony was held on June 6, 2011. Locally elected officials continue to serve a "watch dog" role to monitor the expansion implementation and associated mitigation measures.

Westborough Intermodal Facility Expansion

During 2010, CSX filed plans to modernize and expand the Westborough intermodal facility located on Walkup Drive. Formerly an automotive transloading facility, global food products company Tate & Lyle currently uses the site to transload such ingredients as cooking oils, corn syrup and other sweeteners for the baking industry. In the future, the intermodal site will accommodate bulk materials transloading. Following improvements, a range of products will be transloaded by CSX at this site for their customers in the greater region including chemicals and other raw materials needed by local businesses and manufacturers.

CSX is planning extensive upgrades to the Westborough transloading facility. Proactive environmental mitigation will serve to raise the elevation of the site above that of the adjacent environmentally sensitive Cedar Swamp. Site drainage will be improved along with storm water filtration basins. A new track arrangement with increased capacity is also planned.

B.2 East Brookfield & Spencer Railroad (EBSR)

B.2.1 Background

Privately owned and operated East Brookfield & Spencer Railroad (EBSR) provides railcar switching services for the New England Automotive Gateway (NEAG). The location of the NEAG in relation to the region's major rail lines can be seen on previously shown Figure III-26. The EBSR has an office in the NEAG's main administration building. A CSX operations desk is also located in the building. Also, a number of small offices for Northeast Vehicle Services and the various trucking companies serving the site are located in an adjacent building.

Interchanging railcars exclusively with CSX, EBSR handles an annual volume of over 23,000 multi-level automotive carrier railcars called "autoracks". EBSR leases and operates approximately 4 miles of railroad track from CSX consisting of a portion of CSX passing track along with approximately 270 feet of lead track on the yard siding. The siding serves six yard tracks that have a total capacity of 30 railcars. Within the NEAG site there are over 3 miles of railroad track for the storage of unloaded railcars. Damaged railcars are also stored on these tracks while awaiting necessary repairs. EBSR crews perform mechanical repairs on damaged or defective railcars in an open-air area. The railroad has the capability to swap out defective wheel sets on-site.

B.2.1.1 Railcars Handled

Bi-level and tri-level "autorack" railcars are utilized to deliver the finished vehicles from the manufacturers to the NEAG site. The loading deck arrangement for each car varies. Bi-level auto carriers have two loading decks and can accommodate larger vehicles, such as pick-up trucks, SUVs and cross-over vehicles. Generally, depending on automotive type, transloading personnel can typically fit 5 or 6 autos per deck, for a total of 10 to 12 vehicles per bi-level railcar. Tri-levels autoracks, which provide three loading decks, can carry the most, but the smallest of vehicles. Depending on the length of the auto or truck being delivered, typically 4 to 6 vehicles can be loaded per deck. This results in a total that ranges from 12 to 18 vehicles per tri-level railcar.

B.2.1.2 Upgraded Locomotive Power

The EBSR locomotive power serving the NEAG site was recently upgraded. The switching locomotives were recently upgraded through the lease of a SD40 unit with 6 axles and dynamic brakes. Six axles help spread the load of the locomotive while providing improved traction. Dynamic brakes provide an added safety measure and help provide increased control over the locomotive. There is a downhill grade on the CSX Boston Line adjacent to the site's lead track into the NEAG's holding and unloading tracks. EBSR personnel realize the need for safe operations in this area. The SD40 locomotive is also equipped with Auxiliary Power Unit (APU) equipment.

B.2.2 Existing Operations

B.2.2.1 Overview

A typical day for the EBSR at the NEAG entails locomotives setting out empty autoracks on a siding parallel to the CSX mainline for pickup by an early morning westbound train. Later in the morning or early afternoon, a unit train originating in Cleveland, OH drops an average of 80 to 100 railcars for subsequent transloading. The Cleveland train is assembled with railcars originating from various assembly plants located throughout a wide area of the nation's heartland. The autoracks are combined for the eastward trip from Cleveland through Buffalo, NY across the Empire State to Selkirk, NY.

B.2.2.2 Transloading Activities

When they are ready and available, the EBSR switches strings of railcars into the site's transloading area where "Vehicle Handlers" from Northeast Vehicle Services begin processing by driving the vehicles from the railcars to assigned parking spaces. Unloading continues until finished. The empty autorack railcars are then set out for the next day's CSX train to return them westward to Cleveland. Then the entire process begins all over again. Site operator George Bell has indicated that "the NEAG needs to earn its stripes every day". As such, NEAG management is constantly seeking to improve internal operations for increased safety and efficiency.

All spaces in the NEAG's large parking lots have an ID number to which the bar-coded vehicles are assigned. The vehicles are placed in designated locations in the lots to be readily available to the various trucking companies serving the site. After loading onto car carrier trucks, the vehicles are shipped to dealerships throughout central and southern New England. Empty railcars, following inspection and, if necessary, repair by the EBSR, are set out for CSX to remove the following early morning.

B.2.3 Operational Challenges

B.2.3.1 Host Community Relations

The EBSR operator has addressed a number of local concerns including, most notably, nighttime train whistle blasts by CSX locomotives passing parked railcars adjacent to the NEAG site. Residents in East Brookfield and South Spencer complained of excessive train whistle blasts along the CSX mainline. Site operator Bell proactively worked with CSX to reduce the whistle blasts from passing trains, a long observed railroad safety practice meant to warn personnel of trains moving on adjacent tracks next to where railcars are parked or stored. CSX eventually agreed to reduce the number of nighttime train whistle blasts, allowing for the use of radio communications and flagmen by EBSR.

EBSR crews make a conscious attempt to limit the noise associated with railcar switching movements. A number of years ago, large noise attenuation panels were installed adjacent to the NEAG's lead track on the yard siding in order to buffer the noise and view of EBSR switching operations. Another challenge to the EBSR is keeping noise levels to a minimum in the South Spencer Village area. Located southeast of the NEAG, railcars often back up on the CSX passing track in vicinity of residential homes located in the Village area. The operator is committed to attempting to limit and mitigate impacts to abutting properties.

B.2.4 Future Vision

B.2.4.1 CSX Clearance Improvements

Impacting the dynamics of freight movement in Massachusetts, highway bridges over the CSX Boston Line are being raised and tracks are being lowered from the NY state line to I-495 in Westborough to accommodate full Phase II double stack container service. *(Phase II intermodal containers are 9.5 feet in height, Phase I are 8.5 feet in height.)*

In the Central Massachusetts planning region, highway bridges are being raised by MassDOT, in part through the Accelerated Bridge Program (ABP), to increase the vertical clearance above the tracks in the communities of Brookfield, Charlton, Spencer and Worcester. Elsewhere, CSX is lowering the railroad tracks beneath various bridge structures where this procedure is feasible. The CSX clearance improvements along the Boston Line that will allow for full Phase II double stack container trains will also accommodate larger Auto-Max II railcars. The Auto-Max is an articulated autorack that requires the higher clearance.

B.2.4.2 Auto-Max II Railcars

According to the manufacturer, the “Auto-Max II” railcar is a fully integrated, two-unit railcar design that offers superior security. Tight-sealing composite doors have lockable bars while deck access ladders are hidden inside the doors to prevent roof access by unauthorized persons. The Auto-Max II is the only railcar serving the automotive industry that carries most vehicles in a tri-level configuration. The internal decks are adjustable and can be moved to adapt the railcar as necessary in order to respond to auto industry model changes. On either side of an articulated center, the railcar holds eleven (11) vehicles for a total of 22 vehicles per railcar. Other features include a smoother ride due to the articulated design, a wider interior as well as door edge protection.

B.2.4.3 Potential Railcar Repair Building

On-site railcar repair is also accommodated by the EBSR on the NEAG site. Damaged railcars cannot be placed back into service, or moved from the NEAG, until repairs can be made. This is common procedure for railcars in interchange service across the continent. The future vision for the EBSR includes the construction of a building where railcar repairs can be completed indoors. At this time, all work is done outside exposed to the elements. A range of repairs, including wheel set replacement and welding can be performed by the EBSR.

B.2.4.4 Potential NEAG Expansion

Future on-site improvements at the NEAG could possibly include increased track capacity. Additional trackage would assist the EBSR in reducing the backlog of railcars waiting to be unloaded. As originally envisioned, there also exists the potential for further site development at the NEAG to include other automotive related uses. The future vision for the NEAG also includes the potential for internal expansion to handle the transloading of other types of freight arriving in unit trains.

Additional track work could be accommodated within the site. In addition to the forthcoming and future needs of the automotive industry, other sidings could potentially handle various materials and products related to agriculture, energy or other industries, such as the delivery of forest products. CSX also owns other nearby properties that, if developed, the EBSR could perform the necessary terminal switching services for product transloading and distribution.

B.3 Grafton & Upton Railroad Company (G&U)

B.3.1 Background

B.3.1.1 Corporate History

The Grafton & Upton Railroad (G&U), as shown in Figure III-29, is a 17-mile industrial shortline linking the communities of Grafton, Upton, Hopedale and, in the MAPC region, the town of Milford. Until recently, the entire line south of North Grafton was dormant. The G&U interchanges with rail giant CSX Transportation's Boston Line in North Grafton. From there, the line travels southeasterly through its namesake communities to its terminus at a CSX branch line in Milford.

The North Grafton interchange with CSX, rebuilt during the 1990's, remains in use. A small rail-to-truck transloading terminal that can accommodate boxcars and flatcars is situated in North Grafton adjacent to the CSX Boston Line. It consists of a mini freight house with a loading dock as well as parking for a modest number of truck trailers.

Originally founded in 1873, the G&U has remained independent throughout its existence, never having been controlled by another railroad. See the 2012 RTP's Technical Appendix for a brief history of the Grafton & Upton Railroad.

B.3.1.2 New Railroad Owner-Operator

The G&U is owned by railroad entrepreneur Jon Delli Priscoli. Private ownership has full title to G&U; the railroad is *not* a state owned property. The company indicates that the G&U is the *only* privately owned freight railroad east of Worcester.

The G&U is a rail freight provider that is:

- Privately owned (Right-of-way, track and other structures are wholly owned)
- Independent
- Completely debt free
- Seeks partnerships with affected stakeholders

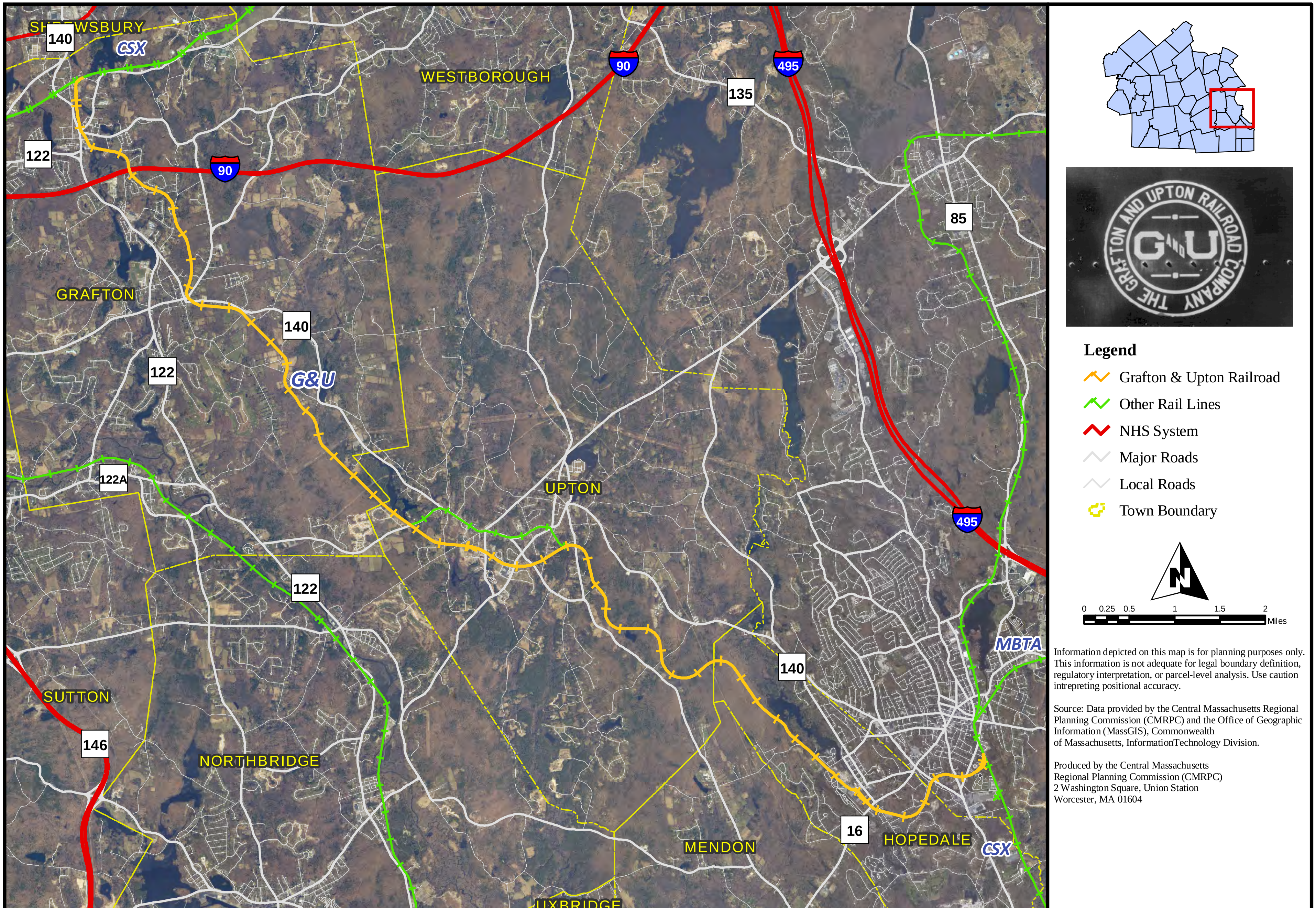


Figure III-29 Grafton & Upton Railroad Locus Map

from local authority, ownership has indicated a willingness to work with leadership in the host communities.

B.3.1.3 G&U Property Holdings

The G&U is 16.5 miles in length and provides an 82 foot right-of-way, essentially 41 feet from the track centerline to the edge of the G&U property. *(Encroachment on the railroad right-of-way that has occurred during dormancy is in the process of being removed by the company.)* The company also has property holdings that total in excess of 100 acres along the line in the host communities of Grafton, Hopedale, Milford and Upton. The G&U owner is a real estate development expert, having built approximately 1 million square feet of structures in MetroWest with the permitted potential for an additional 2 million square feet.

B.3.1.4 Partnership with CSX

Connecting to rail giant CSX on both ends of the line in North Grafton and Milford, G&U ownership has sought a "partnership" with CSX. As a "shortline" railroad, the G&U can take the freight carried over long distances by CSX and handle final delivery to line-side customers. Customer freight originating from the Midwest has a direct rail connection to New England via the G&U, minimizing the trucking portion of the trip. Ownership has noted that some materials now handled by the G&U were formerly trucked from as far away as New Jersey.

In order to enable a higher frequency of Commuter Rail service on the CSX line between Boston and Worcester, the freight distribution network in eastern Massachusetts is steadily moving westward. With the imminent closure of the Beacon Park Yard in Boston's Allston-Brighton section, the G&U is positioned to handle freight diverted from Beacon Park. Further, G&U ownership sees opportunity for the railroad with the CSX reconstruction and modernization of the Walkup Drive intermodal facility in Westborough.

B.3.2 Current Activities

B.3.2.1 Resurrection of a Railroad

With the exception of a short segment of track in North Grafton serving the Washington Mills abrasives plant, most of the line through both Upton and Hopedale was dormant for nearly 20 years. In North Grafton, G&U maintains an active interchange with CSX. Here the railroad's operations are headquartered. There are a number of structures here, including a small cross-dock, rail-to-truck intermodal transload facility. Equipment is both maintained and stored at this location in the small rail yard. Parking is also available for truck trailers.

A phased approach was taken to revitalize the line through track reconstruction, ballast placement and extensive drainage improvements.

Phase I

- North Grafton to West Upton
- 7½ miles upgraded and currently operational

- 14,000 cross ties replaced
- Highway grade crossing restoration
- Completed in 2009

Phase II

- West Upton to Hopedale
- 6 miles upgraded and currently operational
- Cross ties replacement
- Highway grade crossing restoration
- Completed in 2010

Phase III

- Hopedale to Milford at CSX
- Complete reconstruction of nearly 2 miles of rail line is necessary
- Highway grade crossing restoration
- Eventual need to increase vertical clearance beneath the bridge that carries the G&U tracks over Hopedale Street in Hopedale; very low for vehicles passing beneath the structure.

Restoring the G&U line to the CSX connection in Milford could result in a shift of some freight traffic away from the CSX Boston Line, providing a greater ability to increase the frequency of MBTA Commuter Rail service. It is estimated by the railroad that the process to reestablish the CSX connection in Milford will take approximately two years.

All upgrades to revitalize the G&U have been funded directly by the company, which has reportedly invested in excess of $12 million to revitalize the long dormant railroad. The project is expected to open up economic development opportunities all along the rail corridor, including truck-rail transloading operations. The company indicates the future potential to upgrade the G&U to handle 315,000 pound railcars, thus moving their customer's goods using fewer, but heavier cars.

B.3.2.2 Revitalized Rail Freight Service

Average train speeds on the revitalized line range from 10 to 20 mph. In the future, the railroad has the potential to upgrade track to accommodate increased train speeds.

Products hauled include:

- Grain
- Plastics
- Various chemicals
- Organic liquid de-icer for customer Safe Roads, a winter road-ice treatment company
- Wood pellets

Essentially, the G&U is working to transport raw materials to local businesses as well as ship finished products out to national and international markets. There is also the future potential for the G&U to provide tank car and kosher railcar cleaning services.

B.3.2.3 West Upton Intermodal Operations

The G&U has reconstructed and reopened the long dormant West Upton rail yard. Here ownership cleaned up an identified "Brownfield" property 22 acres in size. The town's landfill and a defunct fuel company formerly occupied the site. In addition to two new spur tracks, other track work will serve to fully revitalize the 150 railcar capacity West Upton rail yard. Two storage silos for wood pellets have also been constructed at the rail yard. It is envisioned that the West Upton rail yard will handle approximately 60 to 80 freight cars per day. Notably, the G&U planted trees to create a buffer between the revitalized rail yard and nearby residential housing.

An intermodal terminal providing rail-to-truck transloading has also been established at this location. The revitalized West Upton rail yard is situated about 2½ miles from the I-495 interchange in Hopkinton. The MassPike (I-90) is located one exit north of the Hopkinton interchange. At this time, eastern U.S. carrier Dana-Suttles Trucking serves the West Upton yard.

The intermodal yard is open and providing additional tax revenues to host community of Upton. In fact, G&U ownership indicated in early 2011 that the West Upton yard is "sold out". There is the need for facility expansion or another location for product transfer. Currently, trucking handles various deliveries in the area that have the potential to shift to rail.

B.3.2.4 Hopedale Intermodal Operations

An intermodal facility is also proposed by the G&U ownership adjacent to the former Draper Mill site in Hopedale. Here the G&U owns a 30 acre parcel for the development of a rail yard and intermodal terminal similar to that under operation in West Upton. On the site, the G&U owns the former Wickes Lumber building, 90K square feet in size. Renovated by the railroad, the building is unique in that it provides an internal floor-to-ceiling clearance of 50 feet and has a rail spur running through the structure. It is ideally suited for a variety of industrial and warehousing uses.

B.3.3 Future Vision

B.3.3.1 Potential Development Sites

The G&U's Delli Priscoli has indicated that his business concept is to provide commercial and industrial properties along with freight railroad service, "one stop shopping". The railroad has acquired 100's of acres of land parcels along the revitalized rail line, ideal for rail-served development. An expert in land development, ownership has demonstrated an understanding of site development procedures, permitting and expediting. Construction services can also be provided by First Colony Development. Ownership reports that different companies are considering the available development sites adjacent to the revitalized G&U.

B.3.3.2 Potential Commuter Rail Extension

In addition to ownership's intent to fully revitalize the freight hauling capabilities of the G&U, in the longer term the railroad seeks to potentially host MBTA Commuter Rail service. Connecting the G&U

line from Hopedale through Milford and Bellingham to Forge Park in Franklin, the current terminus, would allow for an extension of MBTA Commuter Rail to directly serve three additional communities.

In the spring of 2011, MassDOT indicated that the *Milford Commuter Rail Feasibility Study* completed in 1997 will be reviewed and updated, perhaps later in the year. When the MBTA studied the option of extending the Franklin line into Milford in 1997, it was determined that the number of new riders would not justify the expense of line reconstruction. It was, at the time, listed as a "medium priority" project by the MBTA.

The potential for a Commuter Rail extension to Bellingham, Milford and Hopedale could provide Transit Oriented Development (TOD) opportunities for the host communities as well as better commuter rail service to Blackstone Valley residents. This is particularly true for the town of Hopedale's former Draper Mill complex, where approximately 1 million square feet of redevelopment potential exists.

B.3.3.3 Potential Draper Mill Redevelopment

Hopedale's Draper Mill complex closed in the early 1980's. At its peak, the Draper Mill employed nearly 5,000 people. The current owner of the Mill property has removed all hazardous materials from the site and razed many of the outbuildings. The remaining main building is a structure in excess of 1 million square feet.

Guided by a locally-based committee, a reuse study for the former Mill was compiled by consultants Concord Square Development. The study suggests a mixed use redevelopment scenario, including retail, office/commercial and residential uses. The consultants further indicated that the potential reuse of the former Draper Mill would require millions of dollars in historic tax credits. Town officials have indicated that they would prefer commercial uses to avoid being overwhelmed by residential redevelopment. Further, host community Hopedale is considering establishing an overlay district in the area of the Draper Mill as well as determining compatible uses.

G&U ownership states that the presence of the revitalized railroad provides unique opportunities for the reuse of the Draper Mill. The Draper Mill site has an existing layover facility and, in the past, there was a passenger station located there. A range of commercial and even industrial uses, those that require rail freight transportation, may be viable at the Draper Mill. As state officials have noted that access to the Draper Mill is somewhat challenging from either I-495 or Route 146, reconnecting the G&U to the MBTA Commuter Rail network at Forge Park in Franklin would perhaps help increase the viability of redevelopment at the site.

B.4 Massachusetts Central Railroad Corporation (MC)

B.4.1 Background

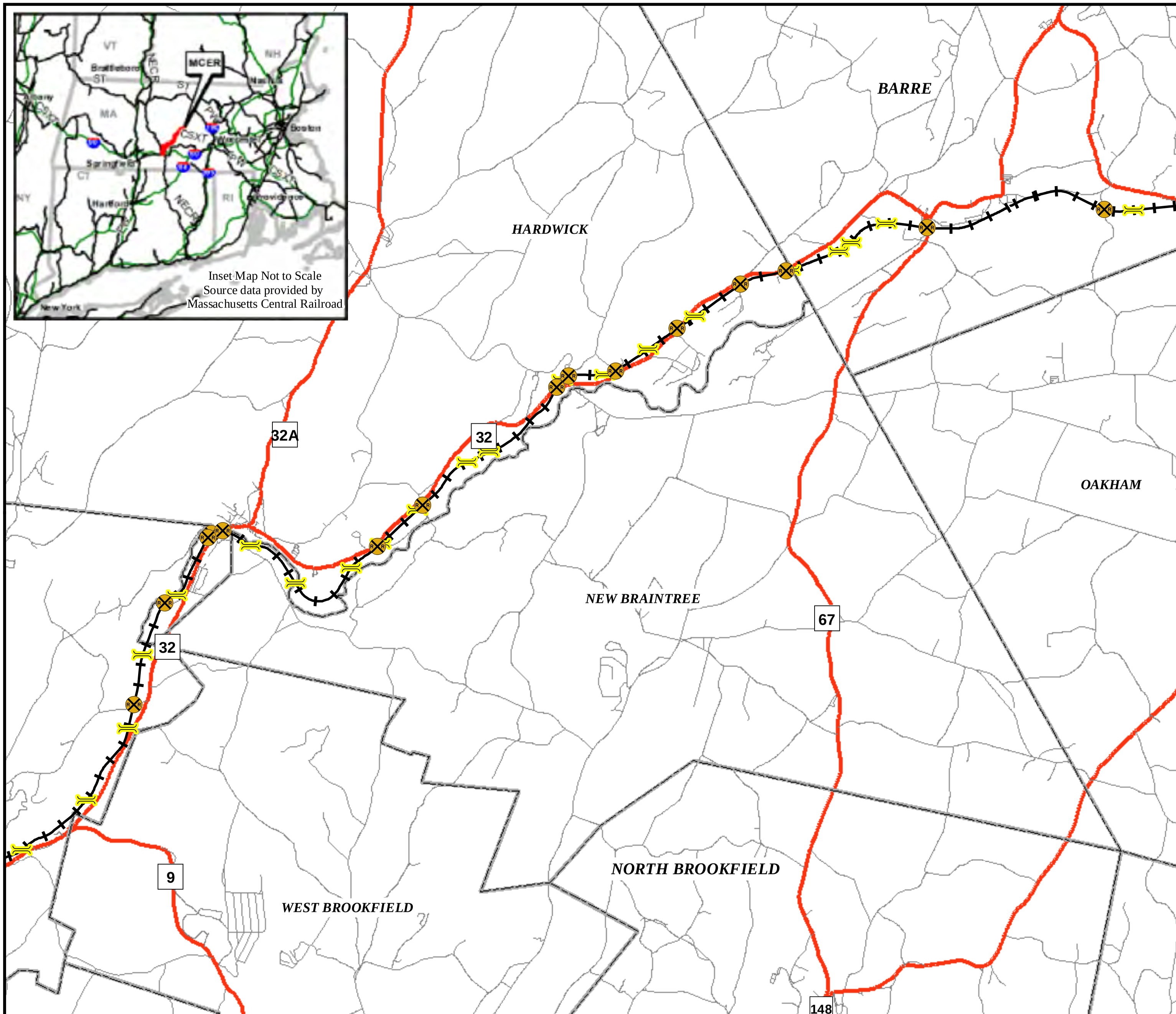
The Massachusetts Central Railroad Corporation, "MassCentral", is an independent, privately owned rail freight provider headquartered in South Barre, Massachusetts. The line's owner is Jon Pondelli and the railroad's primary operator is Robert Bentley. As shown on Figure III-30, the MassCentral operates a 26-mile shortline in the Ware River Valley from Palmer through Ware (in the Pioneer Valley region), through the communities of Hardwick and New Braintree, to the line's terminus in the village of South Barre within the town of Barre. *See the 2012 RTP's Technical Appendix for a brief history of the Massachusetts Central Railroad.*

The railroad's headquarters are located at the newly named Phoenix Plaza Industrial Park in South Barre. In South Barre, intermodal operator Wildwood Reload Company provides transloading and "last mile" trucking distribution services. In Palmer, MassCentral interchanges directly with eastern rail giant CSX as well as regional carrier the New England Central Railroad (NECR). Via the NECR, connections can be made to the Canadian National (CN) and Canadian Pacific (CP) railroads. The connections with these Class I carriers provide MassCentral's customers with access to a number of competitive transportation routes into and out of the Northeast marketplace.

B.4.2 Existing Operations

Since 1994, the MassCentral has run daily freight service along the Ware River Line. The railroad serves customers located along the line as well as the former Barre Wool Combing Company site in South Barre, now known as Phoenix Plaza, the line's terminus. The South Barre site is used for transloading, warehousing and final distribution via area trucking companies. The MassCentral carries a wide variety of consumer and manufactured goods including coal, animal feed, grain, lumber, minerals, paper, plastics, rock salt and wood products. The MassCentral also occasionally provides "scenic" passenger excursion service, called the "Ware River Limited", during the fall foliage season and early winter.

The MassCentral Railroad operator has indicated traffic levels of approximately 2,500 cars per year on the line, many traveling the distance from Palmer up to South Barre. With additional customers along with identified track improvements, the operator has indicated the future potential to handle an additional 1,000 railcars on an annual basis. MassCentral maintains a networked computer system and can provide Electronic Data Interchange (EDI) transmissions for Bill of Lading/Waybill Information to any railroad or shipper with the same capabilities. The MassCentral operator has indicated that the railroad is well positioned to assist the transportation needs of their customers.



Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC) and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

Produced by the Central Massachusetts Regional Planning Commission (CMRPC)
2 Washington Square, Union Station
Worcester, MA 01604

CMRPC Central Massachusetts Regional Planning Commission

Figure III-30 Massachusetts Central Railroad System Map - CMRPC Region

B.4.2.1 Participation in the Regional Planning Process

As requested by MassCentral Railroad operator, the CMRPC staff completed an easy to read map of the state-owned line, previously featured, showing the location of all roadway crossings and bridge structures. The map will be used by ownership as a visual reference to explain the requested track upgrades to uninitiated parties.

An initial Environmental Consultation was also completed by CMRPC on behalf of the railroad that produced an "Environmental Profile" map for the greater area surrounding the Wildwood Reload intermodal site in South Barre using overlay data from the Department of Conservation & Recreation (DCR), the Department of Environmental Management (DEM) and the National Heritage and Endangered Species Program (NHESP). *(This effort has been noted elsewhere in the RTP's Environmental section.)*

The MassCentral's ownership has stated that railroads and intermodal transload facilities are widely recognized as major "Green Transportation Providers" for the safe, efficient and environmentally sound movement of goods in the Commonwealth.

B.4.3 Current Issues

B.4.3.1 State-Owned Infrastructure

Track maintenance is an ongoing challenge to the MassCentral. Recently, highway grade crossing improvements also needed to be implemented at various locations along the line. In some areas along the Ware River Line, periodic flooding is also a concern. The need to rehabilitate the state-owned track has been indicated to MassDOT and other state officials by MassCentral Railroad operator Robert Bentley. The improvements are viewed as necessary to both retain and expand the railroad's business opportunities. Being a state-owned rail line, the railroad's operators have requested CMMPO support in seeking infrastructure improvements along the line in order to insure continued service to customers in the Ware River Valley.

Based on a study conducted by the railroad, there exists the need for approximately $5 million in improvements to keep the line serviceable. An approximate percentage of track length in the CMRPC region and neighboring Pioneer Valley region are as follows:

10.82 miles in CMRPC region	(40%)
16.29 miles in Pioneer Valley	(60%)
Total: 27.11 mile mainline total	(100%)

Based on these mileage percentages, it is suggested that the estimated $5 million cost to rehabilitate the line between Palmer and South Barre be divided between the two planning regions with the CMMPO potentially providing $2 million and the PVMPO providing the balance of $3 million. The improvements requested by the railroad could extend line operations by at least a decade.

B.4.3.2 Inactive Intermodal Operations

Despite the MassCentral's efforts, the Palmer intermodal container facility struggled through the early 2000's and eventually closed in late 2003. However, the railroad's bulk transloading facility at Gibbs Crossing (in the Pioneer Valley region) continues operations. MassCentral's bulk terminal facility provides 165 accessible railcar spots for transloading from rail-to-truck. Further, a truck scale and rail weigh-in-motion scale are on-site.

B.4.3.3 Trespassing

Safety is a major concern of the MassCentral and although the Ware River Line is lightly serviced, trespassing on the railroad's right-of-way regularly occurs. This is especially a concern with the projected increase in the frequency of freight service to Phoenix Plaza Industrial Park in South Barre. Motorcycles and snowmobiles on the railroad tracks have been an issue.

B.4.4 Future Projections

The MassCentral has indicated that the railroad's quality service, safety and marketing program have the freight carrier positioned for future growth. The MassCentral is also actively involved in the communities it serves, as rail freight service has proven vital to many industries located along the Ware River Line, especially in preserving markets and retaining local employment. Additional commercial or industrial development may have the potential to occur along the MassCentral line in the communities of Barre and Hardwick.

B.4.4.1 "Phoenix Plaza" Industrial Park in South Barre

The Phoenix Plaza Industrial Park, 120 acres in size, is located on the former site of the Barre Wool Combing Company industrial complex in the village of South Barre. At the Phoenix Plaza there is an extensive amount of property available for development, preferably for uses, such as warehousing, that require rail freight transportation services. Ownership seeks to locate businesses in Phoenix Plaza that require a combination of rail sidings and truck transport. The Wildwood Reload intermodal facility has operated on the site for a number of years and maintains a rail-served lumber and building products warehouse and transloading area.

In September 2010, a grand opening for the first new building at the Phoenix Plaza Industrial Park was held. The grand opening was for a 34,000 square foot Salt Storage Building capable of storing 40,000 tons of rock salt. Representatives of American Rock Salt, the company that constructed the new Salt Storage Building, intend to serve the needs of local highway departments and other area businesses. Rock salt delivered to the site by the MassCentral Railroad is transloaded from railcars positioned adjacent to the structure via a system of conveyor belts.

The operators of Phoenix Plaza intend to continue being a good neighbor to the surrounding South Barre Village. They hope that the future development of the Phoenix Plaza Industrial Park will serve to invigorate the economy of the town of Barre and the surrounding communities.

B.5 Pan Am Railways (PAR)

B.5.1 Background

B.5.1.1 Corporate Overview

Headquartered in North Billerica, MA, Pan Am Railways (PAR) is a Class II railroad serving northern New England from Calais, ME to Ayer, MA. The primary subsidiaries of PAR are the Maine Central Railroad (MEC), the Boston & Maine Railroad (B&M), and Springfield Terminal Railway (ST). Prior to 2006, the railroad was formerly known as Guilford Rail System. PAR maintains a roster of approximately 120 locomotives and 2,800 freight cars, mostly boxcars. The railroad continues to invest in locomotives and car rebuilding at their Nashua, NH facility. *See the 2012 RTP's Technical Appendix for a brief history of the Pan Am Railways.*

B.5.2 Existing Operations

B.5.2.1 Rail Network

The Pan Am Railways Mainline runs from Mechanicville, NY to Mattawamkeag, ME, a distance of 467 miles. Elsewhere, there are 124 mainline miles on four major routes, 184 miles in branch lines and 20 industrial tracks of varying length. Pan Am also has trackage rights over various MBTA and Amtrak lines. The railroad interchanges with CSX Transportation and the Providence & Worcester Railroad in Worcester.

The only rail line operated by Pan Am Railways within the Central Massachusetts planning region is the 28-mile Worcester Mainline between Worcester, at Barbers Station, and the town of Ayer, in the Montachusett region, as shown on Figure III-31. In Ayer, the Worcester Mainline interchanges with the Pan Am Southern (PAS) Mainline through northern Massachusetts and the nearby Devens intermodal facility. The major interchanges along this line are located in Boston, Ayer, Fitchburg, Greenfield, North Adams and Mechanicville, NY.

At one time a double track route, the major route to Maine from the south, the Worcester-Ayer line was reduced to a single track during the early 1960's. Freight service steadily declined and for nearly two years in the mid-1980's the line was not used north of the town of Clinton. Trackage received minimal maintenance for nearly 25 years and, subsequently, train speeds were restricted to 10 MPH. During 1989, following the decision to reinstate daily freight service, PAR predecessor Guilford rebuilt the line and raised clearances to accommodate tri-level automotive carrier railcars between Barbers and Ayer. Notably, over the past few years, various at-grade highway crossing improvements along the Worcester Mainline have been implemented.

The three miles of track between the CSX Boston Line at Worcester's Union Station and Barbers are part of the Providence & Worcester Railroad's Gardner Branch. PAR and CSX trains are permitted to use this connecting rail line under a trackage rights agreement with the P&W. Under an agreement between the two railroads, PAR crews handle CSX trains over the Worcester Mainline easing rail traffic transfers at the Ayer Yard.

B.5.2.2 Commodities

Nearly half of the railroad's traffic consists of paper, pulp and related chemicals. The remainder consists of automobiles, building materials, coal, general merchandise, grain & food products, fuel, and intermodal containers. The paper industry provides the largest source of business, for inbound chemicals, clay and pulp as well as outbound paper. In fact, rail has a slightly more than 50% market share for outbound paper shipments from the state of Maine, most of which utilize Pan Am Railways while trucks and maritime freighters carry the balance.

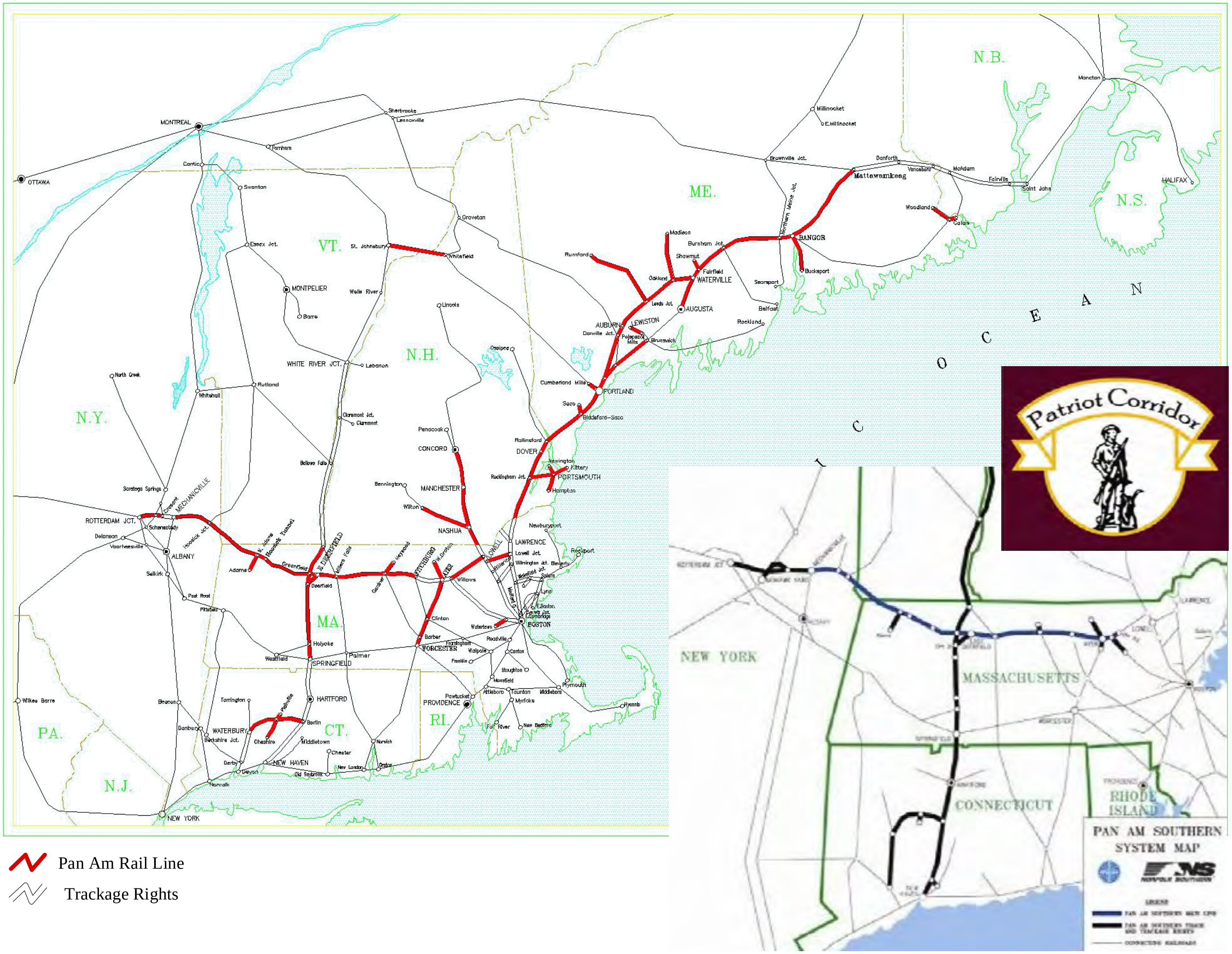
B.5.2.3 Ayer Intermodal Facilities

The PAS rail yard in Ayer, located in the town center, is a traditional classification yard situated adjacent to the PAS "Patriot Corridor" and the PAR line south to Worcester. Container service is provided at the nearby Devens planned community and business park. Also, the newly constructed San Vel intermodal site for automotive transloading is strategically located at the terminus of the Patriot Corridor mainline where the line diverges to either Boston on the MBTA or points north on the PAR system, including New Hampshire and Maine.

The Devens intermodal facility serves as a customs-bonded "inland port" and trucking distribution center, extending the range of the railroad. Guilford Motor Express serves as the terminal and warehouse operator while PAS provides rail service to and from the facility. Corporate residents at Devens have direct access to PAS and, in turn, the vast NS system.

B.5.2.4 Relationship with Norfolk Southern

Following the split up of Conrail between NS and CSX, by the late 1990's NS was seeking new opportunities for the railroad, including gaining improved access to customers in New England. CSX, having essentially acquired the former assets of the New York Central, gained the Boston & Albany mainline between the namesake cities. However, NS had no direct access to Boston area markets. Although CSX competitor NS did not acquire any trackage in Massachusetts as a result of the Conrail acquisition, Pan Am Railways predecessor Guilford and NS agreed in 1998 to interchange traffic at Canadian Pacific's Mohawk Yard in Mechanicville, NY. This operating agreement benefited shippers in the northern part of Massachusetts by linking Ayer, as well as the Waterville, Maine intermodal facility, with the broad NS network of over 30 intermodal terminals, providing a competitive alternative to CSX. The operating agreement allowed Guilford freight originating in New England to be interchanged with NS via the Hoosac Tunnel for points south and west. Similarly, NS freight could continue on Guilford into Massachusetts for points north and east.



Maps Not to Scale
Source data provided by
Pan Am Railways
& Norfolk Southern

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Produced by the Central Massachusetts Regional Planning Commission (CMRPC)
2 Washington Square, Union Station
Worcester, MA 01604

Figure III-31 Pan Am Railways & Pan Am Southern System Maps

Hoosac Tunnel Route
The PAS Mainline across northern Massachusetts provides gentler grades when compared to the competing CSX Boston Line, in large part due to the nearly 5-mile long Hoosac Tunnel in northwestern Massachusetts. The gentler grades allow PAS to pull trains of comparable size using fewer locomotives and less fuel. In the late 1990's, in order to accommodate modern railcars destined to Ayer, PAR predecessor Guilford Transportation worked with eastern rail giant Norfolk Southern (NS) to increase the vertical clearance of the Hoosac Tunnel. In exchange for trackage rights allowing for through rail freight service from Chicago to Boston, NS assisted in funding the clearance increases.

The clearance increases allowed the tunnel to accommodate the passage of *"Hi-Low"* double stack containers, covered tri-level autoracks and other excess height railcars. Additional clearance improvements would be required to allow for full Phase II double stack containers. As such, Phase II double stack traffic from the west enroute to Massachusetts needs to be "filleted" in New York prior to entering the state. The Hoosac Tunnel improvements are widely considered to be the most noteworthy capital improvement ever completed by PAR predecessor Guilford.

B.5.3 Current Major Events

Pan Am Railways Recovers from Economic Downturn
The ongoing national economic recovery has resulted in a steady increase in business for Pan Am Railways. Although business had fallen by nearly 1/3 during the worst of the economic downturn, the situation began to rebound in the second half of 2010, particularly from the northern New England paper companies served by PAR. Accordingly, the railroad is attempting to reverse a downsizing implemented in early 2010. Due to a shortage of engineers and conductors, the company has recently trained 40 new personnel. System wide, Pan Am has also been targeting other improvements that will result in increased reliability for the railroad's customers. The "Patriot Corridor" improvement project alone is expected to particularly benefit Pan Am's customers in Maine and elsewhere on the system through improved service and a broadened market.

New Rail Freight Carrier Established
During the mid 2000's, the corporate relationship between Pan Am Railways and Norfolk Southern continued to evolve. Working together, the corporate partners proposed a new railroad company named Pan Am Southern (PAS) in 2008. In early 2009, the Surface Transportation Board (STB) approved the new PAS. A relationship with mutual benefits, PAS provides eastern rail giant NS with improved access to customers in the greater Boston market enabling it to compete directly with CSX. Pan Am benefits will be felt system-wide as NS brought $140 million to the table, mostly for capital improvements to the newly dubbed "Patriot Corridor".

Patriot Corridor
A major goal of the joint venture was to rehabilitate the 155 mile rail line between Mechanicville, NY and Ayer, MA, named the "Patriot Corridor". Beginning in 2009, nearly $90 million spent over a three year period on capital improvements. Track improvements alone cost approximately $48 million. The investments along the Patriot Corridor allow for heavier railcar loadings and increased train speeds. The weight limit along the line was increased from a 263K to a 286K rating. Vastly reducing transit times, the rebuilt railroad track can handle maximum speeds of 40 MPH of straight segments and 30

MPH on curved section of track. Prior to the improvement project, speeds ranged from 10 to 25 MPH due to the deteriorated conditions along the line.

Improvements to the Patriot Corridor included track resurfacing along with the installation of new switches and nearly 37 miles of new rail. A total of 123,000 new crossties were installed as part of the project. The reconstruction of the rail line also required 80,000 tons of gravel ballast. Railroad signal upgrades, bridge work and at-grade highway crossing improvements were also completed. In 2010, a new two mile siding was constructed along the line near Pownal, VT in proximity to the Hoosac Tunnel.

Intermodal Facility Improvements
Another component of the Patriot Corridor project was to improve and expand the intermodal terminals along the rail line. This work was ongoing in the spring of 2011. Improved transloading equipment was also acquired. In Mechanicville, NY, a moderately utilized freight yard is being revitalized and modernized at cost of nearly $38 million to serve as an intermodal transloading facility and automotive terminal. In Massachusetts, a new automotive terminal to serve the greater Boston area was constructed at cost of $8 million at San Vel site in Ayer.

Fitchburg Line Commuter Rail Improvements
Supplementing the improvements paid for by PAS west of Ayer, federal and state monies are being spent on the line from Fitchburg easterly to improve MBTA Commuter Rail service to Boston's North Station. The Commuter Rail improvements include track and ballast, crossover interlocking as well as station work all aimed at reducing travel times along the line. East of Ayer, federal and state funding is paying for improvements aimed at reducing Commuter Rail travel times from Fitchburg to Boston's North Station.

B.5.4 Future Vision

Pan Am Railways
Previously, PAR officials have stated "the greater Worcester area has played and will continue to play a critical role in our transportation system." According to the railroad, the past growth experienced in the region, particularly at the Devens intermodal facility in Ayer, points to continued future growth in Central Massachusetts. Since the economic downturn, freight traffic and revenues have steadily grown and railroad management is optimistic about the future.

Pan Am Southern
According to the railroad, PAS is working to provide expanded transportation capacity for goods to be moved over long distances to other parts of the country and world. Along with the strength of NS, PAS is attempting to maximize opportunities in the New England marketplace to attract new opportunities for business growth. The recent Patriot Corridor improvements present an opportunity for new businesses to locate in Massachusetts and other points north to utilize a rail freight system with increased efficiency and reduced costs.

B.6 Providence & Worcester Railroad Company

B.6.1 Background

B.6.1.1 Corporate History

Chartered in 1844, the Providence and Worcester (P&W) Railroad Company began both freight and passenger operations between its namesake cities in 1847. Between 1892 and 1968, the railroad was leased and operated by the former New York, New Haven and Hartford. In 1968, the P&W was reincorporated and in 1970 requested independence from bankrupt Penn Central. Early in 1973, the P&W resumed independent freight operations. In 1988, the P&W separated from its parent, Capital Properties, Inc. of Providence, RI, and became a publicly traded company. The P&W serves Massachusetts, Rhode Island, Connecticut, and New York. The city of Worcester, where the railroad's corporate headquarters are located, is the system hub. Since 1992, P&W's administrative, maintenance and operating functions have been housed in the former Wright Wire Mill Building on Hammond Street.

The P&W prides itself on providing superior service. Through its wide range of transportation services, the rail freight carrier directly impacts a large and diverse portion of the Central Massachusetts business community. P&W serves a number of companies that ship and/or receive products on private rail sidings throughout the region. These companies range in size from as few as ten to several hundred employees. Further, the P&W serves hundreds of other companies located across New England through rail-to-truck transfer operations.

B.6.1.2 Participation in the Regional Planning Process

As part of the freight planning work activity, CMRPC works to educate area decision makers, stakeholders and other participants in the planning process about rail freight and intermodal operations

and its critical importance to employment and the local economy. The agency has had an active, ongoing relationship with the rail freight providers operating in the region since the early 1990's. CMRPC has met with P&W officials on a number of occasions as part of ongoing public participation efforts that specifically include outreach to the region's providers of freight transportation.

The P&W Railroad, being headquartered in Worcester, has been a long time participant in the regional planning process. Since the early 1990's, P&W leadership has provided input and comment concerning the development of the region's RTP, Transportation Improvement Program (TIP) and freight planning activities. Further, the railroad has been a member of the CMMPO Advisory Committee since its inception. Recently, in both 2010 and 2011, CMRPC hosted the railroad's Annual Shareholder meeting in Worcester's Union Station. The agency will again host the event in the spring of 2012.

B.6.2 Existing Operations

B.6.2.1 Rail Network

The P&W operates over 516 miles of track system-wide. The railroad owns 180 miles of track outright and, through trackage rights agreements, has access to an additional 336 miles in Connecticut, Massachusetts, New York and Rhode Island. This includes exclusive Northeast Corridor (NEC) freight carrier rights from the Massachusetts-Rhode Island state line to New Haven, CT. As shown in Figure III-32, P&W currently operates approximately 68 miles of track in the area, the most of any railroad operating within the Central Massachusetts planning region. The three P&W lines are the Providence & Worcester Mainline, the Norwich Branch and the Gardner Branch. Since 1973, the P&W has invested millions of dollars on track rehabilitation projects along these Massachusetts rail lines.

P&W's rail network provides for a range of traffic interchange options with a number of other freight railroads. P&W interchanges with the CSX Boston Line at the northern end of the Southbridge Street classification yard. This connection accommodates nearly all of P&W's container-on-flatcar (COFC) traffic and the majority of its carload traffic. The tracks of P&W's Gardner Branch parallel that of the Boston Line between the Southbridge Street Yard and Worcester's Union Station, where they diverge. The Gardner Branch passes through the *North* planning subregion to Gardner, in the Montachusett region, where P&W interchanges with Pan Am Southern.

The Providence & Worcester Mainline essentially follows the Blackstone River to the Port of Providence, RI while the tracks of the Norwich Branch head due south to the Connecticut shore. In Connecticut, P&W has direct access to the New England Central Railroad (NECR) at either New London or Willimantic. In turn, the NECR provides connecting service to the Canadian National (CN) and Canadian Pacific (CP).

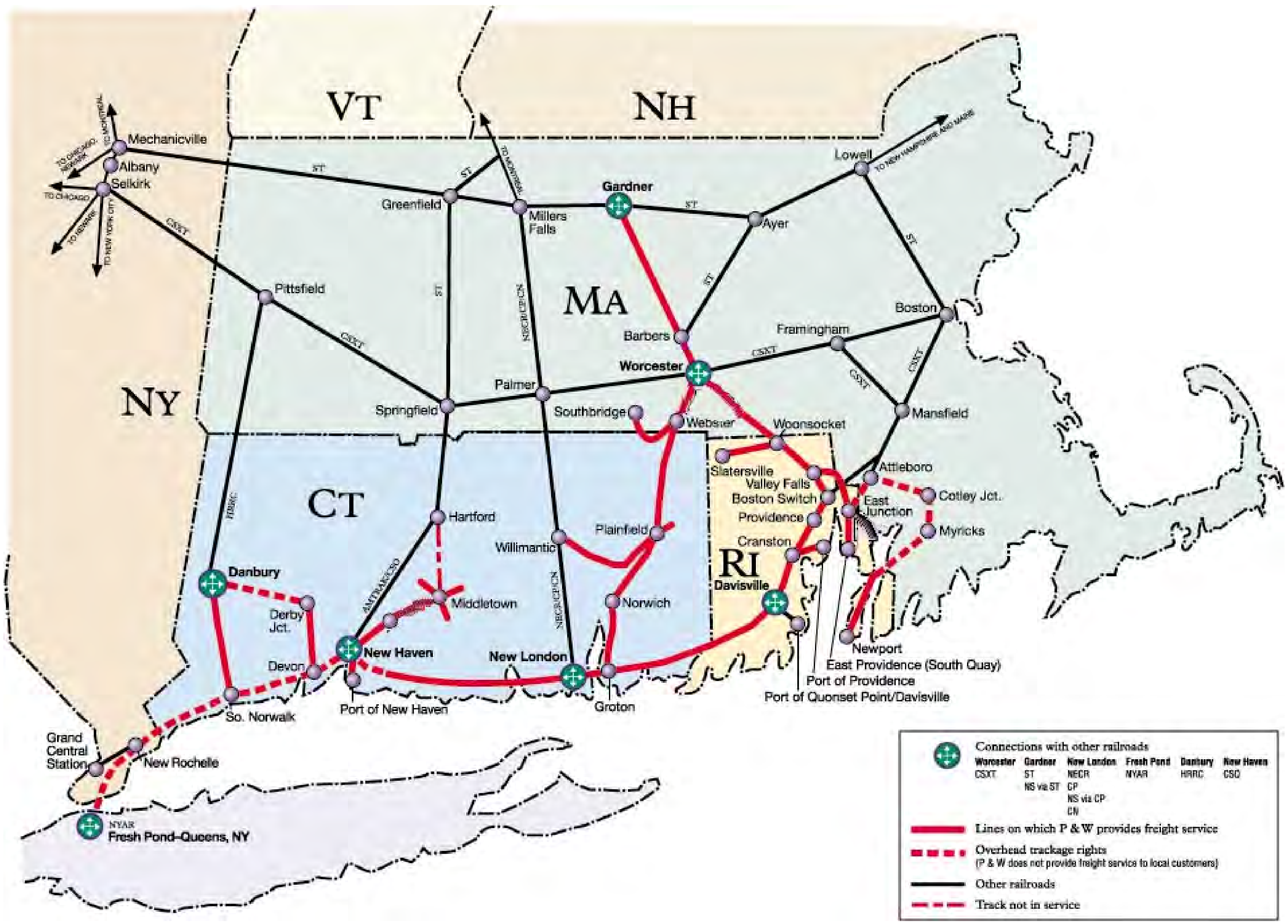
B.6.2.2 Freight Service

System wide, the P&W serves approximately 160 customers in Massachusetts, Rhode Island, Connecticut and New York. The Company's ten (10) largest customers account for more than half of its operating revenues. Its customers include Exxon Mobil Corporation, Ford Motor Company, Frito-Lay, Inc., Global Industries, Inc., GDF SUEZ Energy North America, International Paper Company, Lehigh Cement, Cargill, Inc., Northeast Utilities, Nucor Steel, Rawson Materials, Renewable Products Marketing Group, Subaru of New England, The Dow Chemical Company, Tilcon Connecticut, Inc. and Toray Plastics (America), Inc.

The P&W transports a wide variety of commodities for its customers, including automobiles, construction aggregates, iron and steel products, chemicals and plastics (including ethanol), lumber, scrap metals, plastic resins, cement, coal, construction and demolition debris, and processed foods and edible foodstuffs, such as corn syrup and vegetable oils.

- Autoracks: Shipment of automobiles by rail commenced in the fall of 2007. The Company handled 1,022 autoracks in 2009 and 3,220 autoracks in 2010.

- Coal: Coal was a significant source of revenue for the Company during 2008 and, after a significant decline in 2009, regained its importance as a source of revenues during 2010 with 3,155 carloads moved during the period. The Company continues to move coal.



Map Not to Scale
Source data provided by P&W Railroad

Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Produced by the Central Massachusetts Regional Planning Commission (CMRPC)
2 Washington Square, Union Station
Worcester, MA 01604

Central Massachusetts Regional Planning Commission

Figure III-32 Providence & Worcester Railroad System

- Ethanol: In October 2006, the Company initiated rehabilitation of a substantial portion of its South Providence yard to facilitate handling unit trains of ethanol. This commodity is being transported by rail throughout the country and is a component of the gasoline mix available at gasoline service stations throughout southern New England. Rehabilitation was completed and shipments of ethanol commenced during the third quarter of 2007. During 2010, the Company moved 4,168 carloads of ethanol.

Table III-22 provides a brief summary of P&W's conventional freight revenue by commodity as well as the number of carloads and containers handled at P&W/ICI facilities for the listed years.

B.6.2.3 System Infrastructure Improvements

The P&W Railroad continues to move forward with a number of major capital investment projects throughout its extensive rail network. Maintenance and improvements are, by necessity, an ongoing activity. In Central Massachusetts, depending on the improvement, various combinations of P&W, private and MassDOT funds have been utilized.

In the planning region, improvements to P&W's Gardner Branch track and ballast, along with earlier implemented clearance improvements, have poised the line for increased interchange with Pan Am Southern (PAS) in Gardner, MA, and, in turn, eastern rail giant Norfolk Southern (NS). Beyond Massachusetts, the P&W has also implemented network improvements in the other states where the railroad operates, namely Connecticut, New York and Rhode Island. *A number of recent infrastructure improvements to the P&W network are summarized below:*

Bridge Clearance Improvements
Since the late 1980's, the P&W worked to improve the under clearance beneath 19 bridges on the Providence to Worcester Mainline to at least Phase I (19'-6") clearances. This has allowed the railroad to move tri-level autoracks from Davisville, RI, through Worcester to points north.

Gardner Branch Improvements
Well aware of the opportunities presented by the PAS formation, the P&W has worked to improve the track and ballast on the Gardner Branch. This route, clear of overhead obstructions, can accommodate the largest railcars handled by PAS, as constrained by the vertical clearance of the Hoosac Tunnel. As the tunnel cannot accommodate full Phase II double stacked international shipping containers, NS "fillets" Phase II containers in New York prior to furtherance to New England.

As traffic has increased on the Gardner Branch, growing pains associated with railcar interchange in the Gardner yard have resulted in a fair amount of congestion and less than optimal dwell times. As the yard is fairly small, it has been reported that various switching maneuvers are somewhat difficult. With improvements underway at Mechanicville, NY, relief for the Gardner rail yard will be forthcoming.

Table III-22

P&W RR
Conventional Freight Revenue by Commodity: 2008
(Thousands of dollars)

Chemicals & plastics:	$9,761
Construction aggregate:	$3,389
Metal products:	$2,793
Forest & paper products:	$2,467
Food & agricultural products:	$2,522
Coal & other fuels:	$3,281
Scrap metal & waste:	$2,900
Total:	$27,113

Number of containers handled at P&W/ICI facilities

Conventional carloads

2003: 31,900
2004: 33,200
2005: 33,200
2006: 33,800
2007: 30,400
2008: 34,000

Intermodal containers

2003: 65,500
2004: 64,800
2005: 62,900
2006: 63,200
2007: 40,500
2008: 20,900

During the Port of Worcester's first year of operation in 1987, the P&W handled a total of 800 containers. During 2006, the P&W handled a peak of 63,200 containers. During the economic decline of 2008, the number of containers handled dropped to 20,900.

Willimantic, CT Improvements
Working with the state, the P&W recently revitalized the long dormant Willimantic, Connecticut interchange with the New England Central Railroad (NECR), which provides a gateway to the state of Vermont and eventual interchange with the Canadian National (CN) and the Canadian Pacific (CP) railroads. Work was also necessary to improve the under clearance beneath 8 bridges between Worcester and Plainfield, CT to prepare for Phase I traffic interchange at Willimantic.

Bellows Falls, VT Improvements
The P&W also worked with the New England Central Railroad (NECR) and the state of Vermont to develop a cleared railroad route between Worcester and the Canadian National (CN) and the Canadian Pacific (CP) railroads. The undercutting of the NECR tunnel in Bellows Falls, VT, has increased vertical clearances to Phase I to allow for the passage of modern rail equipment, including multi-level autoracks and other excess height railcars railcars.

B.6.2.4 Intermodal Service

The P&W provides three intermodal services in the city of Worcester. A U.S. Customs-bonded intermodal container terminal, the "Inland Port of Worcester", handles both container-on-flatcar (COFC) and trailer-on-flatcar (TOFC) traffic, a bulk product transfer and distribution facility with a public truck scale, and a warehouse/distribution center with both rail and truck doors. In each case, P&W provides the rail freight transportation and independent operator Intransit Container Incorporated (ICI) performs the loading, transfer and distribution services. *(Please refer to this section's "Intermodal Service Operations" for an overview of ICI operations.)*

As previously mentioned and indicated on Figure III-26, one container terminal is located on Southbridge Street, the other on Wiser Avenue, off Millbury Street. Both have excellent access to the regional highway system. Collectively, the Worcester facilities comprise "New England's largest double stack intermodal freight terminal". *At this time, ICI's Southbridge Street operations have been consolidated at the Wiser Avenue intermodal facility.* As indicated by P&W, the Worcester terminals are rebounding after the economic downturn of 2008.

By the early 2000's, approximately 20 ocean-going shipping companies moved intermodal containers both in and out of P&W's two Worcester facilities. Containers originating from both Europe and the Far East and are moved by rail from ports on both East and West Coasts into and out of New England. After arriving in Worcester, trucking completes the final delivery of the containers within an approximately 100-mile radius. This segment of P&W's business touches several hundred manufacturing and distribution firms throughout New England.

In addition to intermodal containers, P&W operates and provides bulk material facilities in Worcester for the rail-to-truck transfer of plastic pellets and bulk chemical products. P&W also operates several bulk yards where product is transferred from railcar to truck for distribution throughout New England. Bulk plastics are distributed to distinct accounts through various transfer agents. In turn, these customers either package and redistribute or manufacture products for over 100 companies throughout the region. Products range from juice bottles to plastic furniture. A carrier specializing in liquid products also distributes other bulk chemicals to accounts through P&W's yard.

Another category of intermodal freight service is rail-served warehouse operations. P&W services a large warehouse in Worcester. Paper, food and lumber products are brought in by railcar, unloaded and later distributed by truck to several “off rail” companies in Southern New England.

B.6.2.5 Waste Disposal Industry - Hazardous Materials Service

The P&W Railroad is also involved in New England’s waste disposal industry. Since 1995, when service was initiated, the P&W has handled a significant number of containers, many holding PCB-contaminated building debris, destined for disposal at Clive, Utah. At the Southbridge Street intermodal yard, the P&W hosts a facility for transloading contaminated soils from truck to railcar. The facility is operated by MHF Logistical Solutions, Inc. MHF is noted for its expertise in transporting hazardous, toxic and radioactive waste (HTRW) materials in a safe, economical and reliable manner. Trucking delivers the hazardous materials to an enclosed transloading facility where the waste is transferred from truck to gondola railcars for shipment. Since 1999, thousands of tons of contaminated soils have successfully been shipped from the P&W facility to several different remediation companies for treatment and disposal. Carloads of low-level radioactive soil have been shipped to a western landfill.

Port of Providence Resurgence

The Port of Providence, Rhode Island, is reemerging as an active, moderate sized East Coast maritime facility through an ongoing series of incremental improvements that have increased utilization and have poised “Prov Port” for future growth.

P&W notably serves a recently established ethanol transfer facility at Prov Port, helping to expand the type and amount of freight handled by the railroad for its customers. P&W also hauls imported coal brought to Prov Port from global sources such as Brazil, moving the fuel to power plants in Holyoke, MA and Bow, NH. In the future, the railroad hopes to handle the export of American coal to world-wide markets from the Appalachian mines serviced by Norfolk Southern.

New mobile dock cranes purchased through the recent national American Recovery and Reinvestment Act (ARRA) economic recovery effort will replace older cranes and increase the land side freight handling capabilities at Prov Port. The Port is also currently considering the purchase of a mobile coal loading mechanism.

Davisville Industrial Park

The P&W Railroad also serves Rhode Island’s Davisville Industrial Park located at the former Quonset Point Navel Air Station on the western shore of Narragansett Bay. The P&W accesses Davisville along the FRIP freight track that runs along Amtrak’s Northeast Corridor. At Davisville, the P&W switches railcars with the port’s Seaview Railroad.

The state of RI has made a number of landside improvements at Davisville, including vastly improved highway access to the regional highway system and the I-95 corridor. Internal improvements to the railroad track within the industrial park have also been implemented. Notably, importer Ocean State Job Lot is a major tenant at Davisville.

The deep water berths at Davisville are reserved for regular maritime customers that essentially use all available port capacity. Improvements would need to be made to other unused births and substantial dredging would be required to allow for more ships to call on Davisville. At this time automotive imports from Audi and Volkswagen arrive from Germany while, as an example, large freight hauling trucks are exports to Eastern Europe.

B.6.3 Current Issues

B.6.3.1 Recession Impacts Freight Transportation

The P&W has indicted that the railroad continues to haul a growing variety of commodities for its customers. Traffic decreases resulting from the 2008 economic downturn and by diversion of traffic to all-water eastern routes have made a steady recovery during 2010.

P&W intermodal operations were highly impacted by these events. The downturn lead to the closure of Intransit Container Incorporated (ICI) Southbridge Street yard. ICI operations were consolidated to the company's Wiser Avenue location in South Worcester off Route 146. The Wiser Avenue site offers superior access to the regional highway system. At this time, a portion of the Southbridge Street yard is used by ICI for truck chassis storage. A sizable rock salt operation has set up operations on a portion of the site formerly used by ICI.

Looking to the future, the P&W seeks continued growth of unit trains (trains that carry a single commodity) carrying sand and aggregates, automotive, coal, ethanol and other alternate fuels. Increasing the number of carloads of lumber and chemicals hauled by the railroad was noted at the 2011 Annual Meeting as potential, targeted growth areas. Further, the P&W anticipated increases in the handling of international intermodal containers, in cooperation with intermodal operator Intransit Container, as the railroad continues to recover from the economic downturn of 2008.

The importance of the aggregate industry to the P&W should be mentioned. The P&W serves various quarry operations located on their rail system, notably in the state of Connecticut. Efforts to expand and solidify this business appear to be ongoing. Notably, the railroad provides service to Long Island, NY mixing plants in vicinity of the Fresh Pond rail yard. These plants provide stone and concrete for construction projects in the greater New York City area.

B.6.3.2 Federal-Aid Support

A primary concern of small railroads in the Northeast is the deterioration of infrastructure, especially bridges, much of which is over 100 years old, with some components dating back over 150 years. Federal resources, similar to highways and airports, need to be made available to provide for railroad infrastructure improvements. An example cited by the industry, if the railroads are unable to rehabilitate or replace fatigued bridge structures, bulk rail freight shipments diverted to trucking would require at least four truck loads to accommodate a single railcar of bulk material, further escalating pollution and highway deterioration.

B.6.3.3 Preservation of Property Zoned for Industry

P&W recognizes the need to preserve properties adjacent to existing rail lines that are suitable for potential rail-served customers. The railroad has observed throughout their service territory, including the Central Massachusetts region, that property zoned for industry along rail lines is being absorbed for residential housing, shopping malls and other activities. In order to maintain the region's competitiveness for manufacturing and distribution, the preservation of rail-served properties for such development is viewed as critical. The P&W maintains an inventory of available industrial sites along their rail lines and can assist with business expansion or relocation efforts.

Long-term detriments to the local economy need to be considered when re-zoning properties adjacent to rail corridors. Well-paying manufacturing and distribution jobs are attracted to areas with good rail-highway connectivity. Worcester's combination of major highway access and rail service has established the city as a competitive location for distribution activities. Due to development realities that call for the conversion of industrial zoned property to retail uses in P&W's operating area, the railroad is often challenged to meet the demand for expanded intermodal facilities and operations.

B.6.3.4 Maintenance of the Region's NHS

Continued and regular maintenance of the region's National Highway System (NHS) roadways and connectors is necessary for the efficient movement of goods between area intermodal transload facilities and the Interstate Highway System. Earlier studies have suggested roadway improvement projects that would benefit intermodal terminal operations as well as the greater public. Such projects would serve to alleviate congestion and/or eliminate clearance impediments along the NHS Connectors serving the intermodal facilities in the region.

B.6.4 Future Projections

B.6.4.1 Blackstone Valley Double Stack

Beginning in 1988, the P&W worked to improve clearances under 19 bridges on the Providence to Worcester Mainline through the Blackstone Valley to at least Phase I (19'-6") clearances. This project was completed by 2007. The goal of the clearance project allowed for double stack container service between port facilities in Rhode Island and P&W's intermodal yards in Worcester.

B.6.4.2 South Quay Site Development & Access Improvement

The P&W is the only long distance rail freight provider operating in state of Rhode Island. The railroad has port access in the City of East Providence where it owns and operates the 12-acre Wilkesbarre Petroleum Pier. On a site adjacent to the Wilkesbarre facility, the railroad's land title to 33-acres at the South Quay *(pronounced "Key")* deep-water port was confirmed in 1999.

The South Quay property owned by the P&W Railroad in East Providence remains an opportunity for the future. The South Quay is one of the largest undeveloped water-side, dock-potential facilities in New England. The water is approximately 40 feet deep in this area, but would require periodic dredging. The South Quay has the potential for rail served dock facility, or perhaps eventually will accommodate another use. An interested party would need to invest in the site to construct a 200’ x 2000’ docking facility at a cost of approximately $25 million. Its future is uncertain at this time.

Access improvements to the South Quay site were recently completed in 2008. A new NHS Connector roadway now provides for direct vehicular access between I-195, the South Quay and other properties.

B.6.4.3 Potential Host to Passenger Service

P&W is aware of the various proposals by others concerning the reinstitution of passenger rail service along its lines between Worcester and Providence and between Worcester and New London on the Connecticut shore. With sufficient subsidy, the P&W would consider passenger *demonstration* service along its lines limited to 40 MPH - a freight train speed that the existing track, signaling and grade crossing safety devices can safely accommodate. (System wide, the P&W averages about one grade crossing per mile.) In order to provide for passenger train scheduling and higher speeds, track improvements would be necessary. In some areas, P&W mainlines would need to be double tracked with continuous welded rail. Further, increased routine track maintenance would be necessary with the advent of higher speed passenger operations. Positive Block Control (PBS) signaling would also be required for passenger service.

B.6.4.4 System Expansion

The P&W expects to continue actively pursuing the growth of their rail system through the acquisition of additional track and operating rights, which, in turn, leads to opportunities to expand the railroad’s traffic base. According to P&W officials, the railroad prefers to expand in a contiguous manner and is not necessarily interested in obtaining remote branch lines removed from the core system.

C. REGIONAL AT-GRADE HIGHWAY/RAILROAD CROSSING INVENTORY

An inventory of the region's "public" at-grade highway/railroad crossings has been compiled using the Federal Railroad Administration's (FRA) at-grade highway/railroad crossing database. Publically-utilized, at-grade highway/railroad crossings with the region's highway network, both federal-aid and local, are the focus of this effort as opposed to "private" crossings. The more recently updated FRA database was also cross-referenced with earlier inventory materials provided by MassDOT predecessor agencies. Minor discrepancies were adjusted.

Table III-23 provides a summary of the public at-grade highway/railroad crossings in the region by community. The location of these public crossings is shown in Figure III-33. At this time, there are over 100 active, public highway/railroad crossings within the planning region. Future freight planning efforts will likely include a further investigation of private crossings. Long established from the early days of railroading in the greater region, private grade crossings usually serve established trackside industries, older single family homes and rural farmlands.

FRA's database of documented crash incidents at the region's at-grade crossings was also referenced. The FRA materials contain highway vehicle/railroad equipment crash records that date back to the mid-1970's. The DOT-calculated Accident Prediction Factor has also been included in the table for reference. Based on the FRA records, there appear to have been a minimal number of reported at-grade vehicle crashes over the nearly 40 year period covered by the database. Although crash prevention measures appear to have been fairly effective, grade crossing deterioration has been noted in the region. Preservation and modernization efforts are necessary in order to simply maintain the existing grade crossing infrastructure. This challenge will continue to be the case as highway traffic volumes, as well as train frequencies, steadily increase.

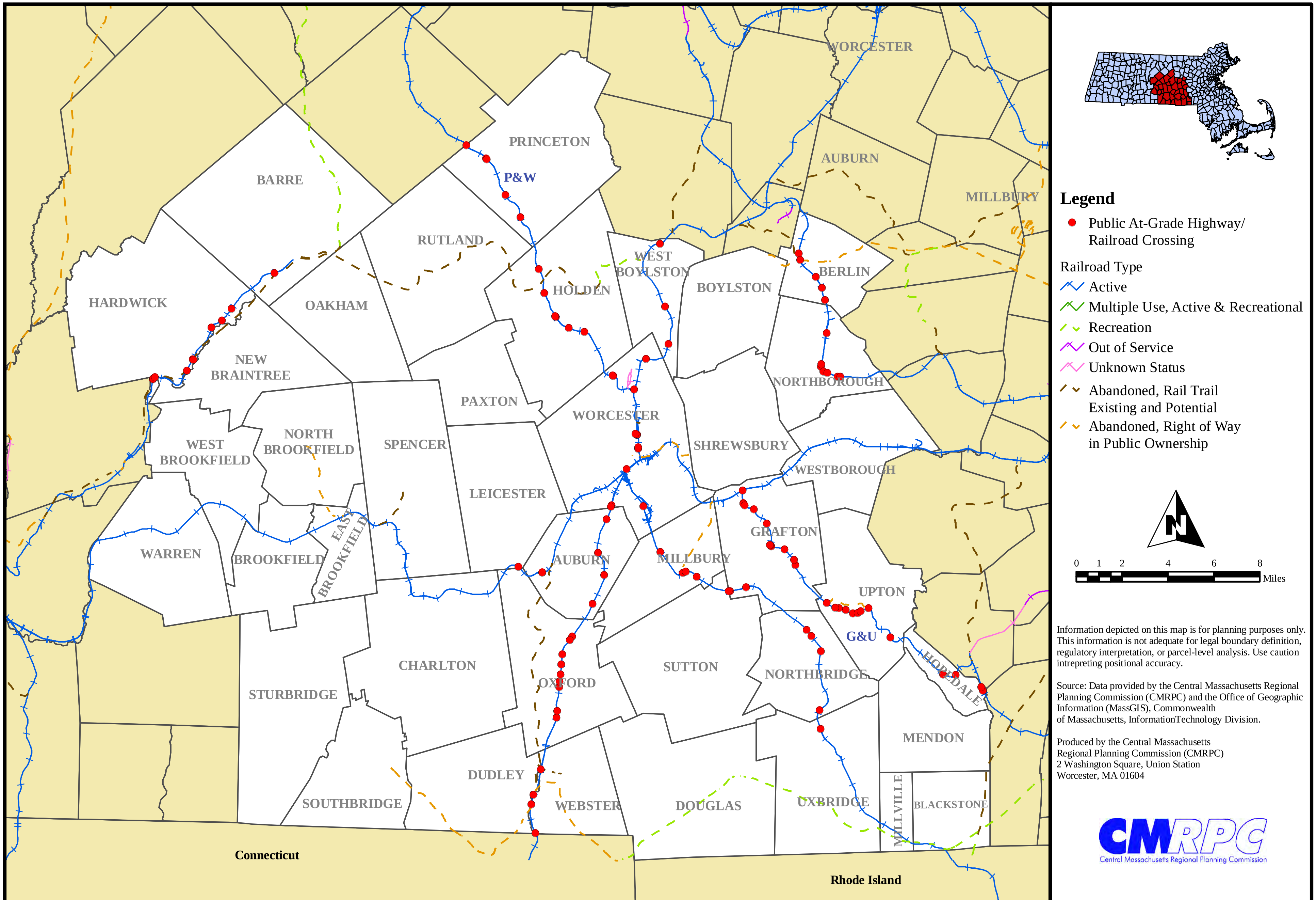


Figure III-33 Regional Public At-Grade Highway/Railroad Crossings

Table III-23
Regional Inventory of Public At-Grade Highway/Rail Crossings
including FRA "Accident Prediction Value"

Community	Street	RR	Division	Subdivision	Crossing ID	AADT	AADT Year	% Trucks	Prediction Value	ACPD Ranking	ACPD Date
AUBURN	ELM ST	PW	NORTHEASTERN	NEW ENGLAND	501860E	4,000	2002	1.0	0.013495	16	11/24/10
AUBURN	SWORD ST	PW	NORTHEASTERN	NEW ENGLAND	501866V	4,700	2002	7.0	0.012821	19	11/24/10
AUBURN	CENTRAL ST	PW	NORTHEASTERN	NEW ENGLAND	501863A	1,800	2003	7.0	0.009312	36	11/24/10
AUBURN	SOUTH ST	PW	NORTHEASTERN	NEW ENGLAND	501859K	1,200	2002	7.0	0.008081	49	11/24/10
BARRE	NO. BROOKFIELD RD	MCER	NORTHEASTERN	NEW ENG. DIV.	526028W	2,700	2002	15.0	0.003538	88	11/24/10
BERLIN	RANDALL RD	CSX	ALBANY	FITCHBURG	547143L	1,900	2001	6.0	0.007003	57	11/24/10
BERLIN	JONES RD	CSX	ALBANY	FITCHBURG	547139W	1,100	2001	5.0	0.005734	67	11/24/10
BERLIN	LINDEN ST	CSX	ALBANY	FITCHBURG	547140R	990	2001	5.0	0.005514	71	11/24/10
BERLIN	CROSBY RD	CSX	ALBANY	FITCHBURG	547138P	230	2001	5.0	0.003163	91	11/24/10
BERLIN	WEST ST	CSX	ALBANY	FITCHBURG	547141X	8,000	2001	6.0	0.000114	104	11/24/10
DUDLEY	WEST DUDLEY RD	PW	NORTHEASTERN	NEW ENGLAND	501830M	200	1970	5.0	0.000195	102	12/19/03
DUDLEY	MILL RD	PW	NORTHEASTERN	NEW ENGLAND	501831U	380	2002	5.0	0.000114	104	11/24/10
GRAFTON	CARROLL RD	GU			861462S	2,100	2002	3.0	0.014241	13	11/24/10
GRAFTON	WATERVILLE STR	GU			861469P	9,300	2002	3.0	0.012777	20	11/24/10
GRAFTON	UPTON RD	GU			861459J	8,700	2002	4.0	0.012506	21	11/24/10
GRAFTON	WESTBORO RD	GU			861470J	3,500	2002	3.0	0.012348	22	11/24/10
GRAFTON	SNOW RD	GU			861465M	1,200	2003	3.0	0.011921	23	11/24/10
GRAFTON	PLEASANT ST.	PW	NORTHEASTERN	NEW ENGLAND	871909F	3,300	2003	5.0	0.011427	28	11/24/10
GRAFTON	NORTH ST.	GU			861460D	5,300	2002	3.0	0.010622	32	11/24/10
GRAFTON	FOLLETTE ST	PW	NORTHEASTERN	NEW ENGLAND	871907S	880	2003	1.0	0.008895	39	11/24/10
GRAFTON	SIBLEY RD	GU			861458C	450	2002	3.0	0.008633	41	11/24/10
GRAFTON	EAST ST.	GU			861468H	2,800	2002	3.0	0.008532	42	11/24/10
GRAFTON	OLD UPTON RD	GU			861455G	390	2002	3.0	0.008228	47	11/24/10
GRAFTON	RAY ST.	GU			861467B	390	2002	3.0	0.008228	47	11/24/10
GRAFTON	BOULEVARD AVE	GU			861461K	2,200	2002	3.0	0.007836	53	11/24/10
GRAFTON	BROWNS RD	GU			861457V	200	1984	3.0	0.003729	85	11/24/10
HARDWICK	SMITH'S XING	MCER	NORTHEASTERN	NEW ENGLAND	526034A	2,700	2004	20.0	0.008424	44	11/24/10
HARDWICK	PAPERMILL/RTE32	MCER	NORTHEASTERN	NEW ENGLAND	526031E	2,400	2006	20.0	0.008081	49	11/24/10

HARDWICK	BRIDGE ST	MCER	NORTHEASTERN	NEW ENGLAND	526039J	590	2001	5.0	0.004836	76	11/24/10
HARDWICK	SHUNPIKE RD	MCER	NORTHEASTERN	NEW ENGLAND	526032L	370	2001	10.0	0.004051	82	11/24/10
HARDWICK	RIVER RUN	MCER	NORTHEASTERN	NEW ENGLAND	526036N	240	2001	5.0	0.003431	89	11/24/10
HARDWICK	CREAMERY XING	MCER	NORTHEASTERN	NEW ENGLAND	526035G	160	2002	5.0	0.002931	92	11/24/10
HARDWICK	GROVE ST	MCER	MASS CENTRAL		526038C	100	1970	5.0	0.000841	96	3/16/09
HARDWICK	WEST RD	MCER	BOSTON & MAINE	US 5 MAP 60	052941N	415	1970	4.0	0.000428	97	10/3/00
HARDWICK	RAILRD LANE	MCER	NORTHEASTERN	NEW ENGLAND	526037V	6	2001	20.0	0.000394	98	11/24/10
HARDWICK	CREAMERY RD	MCER	BOSTON & MAINE	US 5 MAP 62	052944J	200	1970	4.0	0.000236	99	10/3/00
HOLDEN	PLEASANT ST	PW	NORTHEASTERN	NEW ENGLAND	871874G	1,000	2002	4.0	0.008243	46	11/24/10
HOLDEN	BAILEY RD	PW	NORTHEASTERN	NEW ENGLAND	871876V	2,400	2000	4.0	0.008081	49	11/24/10
HOLDEN	INDUSTRIAL DRIVE	PW	NORTHEASTERN	NEW ENGLAND	871891X	2,200	2003	5.0	0.006171	62	11/24/10
HOLDEN	QUINAPOXET ST	PW	NORTHEASTERN	NEW ENGLAND	871871L	3,200	2003	5.0	0.005647	70	11/24/10
HOLDEN	PRINCETON ST	PW	NORTHEASTERN	NEW ENGLAND	871870E	410	2003	5.0	0.003268	90	11/24/10
HOLDEN	SUNNYSIDE ST	PW	NORTHEASTERN	NEW ENGLAND	871872T	70	2000	4.0	0.002119	94	11/24/10
HOPEDALE	MELLEN ST	MBTA	NORTHEASTERN	NEW ENGLAND	546905K	120	2002	4.0	0.004962	74	11/24/10
HOPEDALE	HOWARD ST	MBTA	NORTHEASTERN	NEW ENGLAND	546906S	50	2002	2.0	0.003645	87	11/24/10
HOPEDALE	GREEN STR	GU			861431T	500	1979	3.0	0.000206	100	6/21/01
HOPEDALE	MENDON STR	GU			861433G	6,900	1984	3.0	0.000206	100	6/21/01
MILLBURY	S.MAIN ST	PW	NORTHEASTERN	NEW ENGLAND	871901B	3,700	2003	5.0	0.010460	33	11/24/10
MILLBURY	CURVE ST.	PW	NORTHEASTERN	NEW ENGLAND	871902H	520	2003	5.0	0.005973	63	11/24/10
MILLBURY	RICE RD	PW	NORTHEASTERN	NEW ENGLAND	871903P	470	2003	5.0	0.005754	66	11/24/10
MILLBURY	MCCRACKEN RD	PW	NORTHEASTERN	NEW ENGLAND	871898V	80	2003	4.0	0.003674	86	11/24/10
NORTHBORO	MAIN ST.	CSX	ALBANY	FITCHBURG	547132Y	18,500	2001	7.0	0.015356	9	11/24/10
NORTHBORO	SUMMER ST.	CSX	ALBANY	FITCHBURG	547131S	2,400	2001	6.0	0.007616	54	11/24/10
NORTHBORO	COLBURN ST.	CSX	ALBANY	FITCHBURG	547135U	2,300	2001	6.0	0.007501	56	11/24/10
NORTHBORO	PIERCE ST.	CSX	ALBANY	FITCHBURG	547133F	1,600	2001	6.0	0.006580	59	11/24/10
NORTHBORO	BRIGHAM ST	CSX	ALBANY	FITCHBURG	547129R	1,200	2001	6.0	0.005921	64	11/24/10
NORTHBORO	COLLINS RD	CSX	ALBANY	FITCHBURG	547128J	1,100	2001	6.0	0.005734	67	11/24/10
NORTHBORO	SCHOOL ST.	CSX	ALBANY	FITCHBURG	547130K	1,100	2001	6.0	0.005734	67	11/24/10
NORTHBRIDGE	SUTTON ST	PW	NORTHEASTERN	NEW ENGLAND	871912N	6,600	2003	5.0	0.014270	12	11/24/10
NORTHBRIDGE	UNION ST	PW	NORTHEASTERN	NEW ENGLAND	861580U	700	2003	1.0	0.008315	45	11/24/10
NORTHBRIDGE	ELSTON AVE.	PW	NORTHEASTERN	NEW ENGLAND	871913V	260	2003	5.0	0.004611	78	11/24/10
OXFORD	SUTTON AVE.	PW	NORTHEASTERN	NEW ENGLAND	501847R	20,100	2002	6.0	0.024886	1	11/24/10

OXFORD	FEDERALL HILL RD.	PW	NORTHEASTERN	NEW ENGLAND	501851F	2,900	2003	6.0	0.010948	30	11/24/10
OXFORD	DEPOT RD	PW	NORTHEASTERN	NEW ENGLAND	501854B	2,300	2001	7.0	0.010753	31	11/24/10
OXFORD	DANA RD	PW	NORTHEASTERN	NEW ENGLAND	501850Y	1,500	2001	6.0	0.009298	37	11/24/10
OXFORD	MILLBURY RD	PW	NORTHEASTERN	NEW ENGLAND	501853U	1,400	2003	6.0	0.008532	42	11/24/10
OXFORD	HOLBROOK RD	PW	NORTHEASTERN	NEW ENGLAND	501843N	930	2001	7.0	0.007864	52	11/24/10
OXFORD	GEORGE ST	PW	NORTHEASTERN	NEW ENGLAND	501844V	530	2001	4.0	0.006421	60	11/24/10
OXFORD	WATER ST	PW	NORTHEASTERN	NEW ENGLAND	501848X	620	2003	4.0	0.006372	61	11/24/10
OXFORD	HALL RD	PW	NORTHEASTERN	NEW ENGLAND	501849E	150	2001	4.0	0.004003	84	11/24/10
PRINCETON	BROOKS STATION RD	PW	NORTHEASTERN	NEW ENGLAND	871867W	1,200	2003	5.0	0.004926	75	11/24/10
PRINCETON	ROUTE 62	PW	NORTHEASTERN	NEW ENGLAND	871862M	1,200	2003	5.0	0.004297	80	11/24/10
PRINCETON	BALL HILL RD	PW	NORTHEASTERN	NEW ENGLAND	871866P	770	2003	5.0	0.004165	81	11/24/10
PRINCETON	RALPH RD	PW	NORTHEASTERN	NEW ENGLAND	871863U	290	2003	5.0	0.002875	93	11/24/10
PRINCETON	OLD COLONY RD	PW	NORTHEASTERN	NEW ENGLAND	871861F	20	2003	1.0	0.001866	95	11/24/10
SUTTON	BLACKSTON RD.	PW	NORTHEASTERN	NEW ENGLAND	871906K	180	2003	5.0	0.004009	83	11/24/10
UPTON	MAPLE AVE	GU			861449D	8,700	2002	3.0	0.021770	2	11/24/10
UPTON	PLEASANT ST.	GU			861448W	6,200	2002	3.0	0.019754	3	11/24/10
UPTON	WILLIAMS ST.	GU			861453T	5,000	2002	3.0	0.018547	4	11/24/10
UPTON	MENDON ST.	GU			861447P	4,600	2002	3.0	0.018094	6	11/24/10
UPTON	GROVE ST	GU			861445B	2,500	2002	3.0	0.015035	10	11/24/10
UPTON	CHESTNUT ST	GU			861443M	1,200	2002	3.0	0.011921	23	11/24/10
UPTON	PLAIN ST.	GU			861446H	610	2002	3.0	0.009555	35	11/24/10
UPTON	HARTFORD AVE	GU			861451E	490	2002	3.0	0.008883	40	11/24/10
UPTON	GLEN AVE	GU			861452L	240	2002	3.0	0.006978	58	11/24/10
UXBRIDGE	HARTFORD RD	PW	NORTHEASTERN	NEW ENGLAND	861578T	7,800	2002	6.0	0.015462	8	11/24/10
WEBSTER	N. MAIN ST.	PW	NORTHEASTERN	NEW ENGLAND	501841A	6,300	2003	5.0	0.014065	15	11/24/10
WEBSTER	MAIN ST	PW	NORTHEASTERN	NEW ENGLAND	501838S	19,500	2001	7.0	0.013409	17	11/24/10
WEBSTER	HILL ST	PW	NORTHEASTERN	NEW ENGLAND	501837K	3,300	2001	7.0	0.009035	38	11/24/10
WEBSTER	U PERRYVILLE RD	PW	NORTHEASTERN	NEW ENGLAND	501836D	830	2001	7.0	0.005495	72	11/24/10
WEST BOYLSTON	TEMPLE ST	BM	BOSTON & MAINE	US-6 MAP 8	053838E	7,900	2002	4.0	0.014237	14	11/24/10
WEST BOYLSTON	SHREWSBURY ST	BM	BOSTON & MAINE	US-6 MAP 6	053842U	3,300	2003	4.0	0.011411	29	11/24/10
WEST BOYLSTON	PRESCOTT ST	BM	BOSTON & MAINE	US-6 MAP 12	053837X	290	2002	4.0	0.005809	65	11/24/10
WORCESTER	THOMAS ST	PW	NORTHEASTERN	US-6 MAP-1	844556Y	4,800	2000	7.0	0.018388	5	11/24/10
WORCESTER	MILLBURY ST SO.	PW	NORTHEASTERN	NEW ENGLAND	871893L	7,600	2000	5.0	0.017159	7	11/24/10

WORCESTER	HOPE AVE	PW	NORTHEASTERN	NEW ENGLAND	501869R	9,000	2000	8.0	0.014494	11	11/24/10
WORCESTER	BURNCOAT ST	BM	BOSTON & MAINE	US-6 MAP 5	844540C	3,600	2002	7.0	0.013068	18	11/24/10
WORCESTER	BRATTLE ST.	PW	NORTHEASTERN	NEW ENGLAND	871884M	11,300	2000	5.0	0.011672	25	11/24/10
WORCESTER	HOLDEN ST.	PW	NORTHEASTERN	NEW ENGLAND	871885U	11,300	2000	5.0	0.011672	25	11/24/10
WORCESTER	NEW BOND ST.	BM	BOSTON & MAINE	US-6 MAP 4	844543X	2,200	2003	7.0	0.011641	27	11/24/10
WORCESTER	SCHOOL ST	PW	NORTHEASTERN	US-6 MAP-1	844554K	1,300	2002	7.0	0.009854	34	11/24/10
WORCESTER	RIVERDALE ST	PW	NORTHEASTERN	NEW ENGLAND	871915J	560	2003	2.0	0.007584	55	11/24/10
WORCESTER	JACKSON ST	PW			501875U	500	1970	6.0	0.005046	73	12/19/03
WORCESTER	GARDEN ST	PW	NORTHEASTERN	VS-6 MAP 2	844549N	140	2003	7.0	0.004688	77	11/24/10
WORCESTER	TRACY PLACE	PW	NORTHEASTERN	NEW ENGLAND	501868J	190	2000	6.0	0.004380	79	11/24/10
WORCESTER	GARDEN ST	PW		US 6 MAP 2	844550H	420	2000	7.0	0.000161	103	12/19/03
WORCESTER	PRESCOTT ST	PW	NORTHEASTERN	VS 6 MAP 2	844548G	2,100	2003	7.0	0.000094	106	11/24/10

D. REGIONWIDE RAIL ISSUES

D.1 Overview of Issues/Challenges

As discussed above, there are a wide range of issues affecting rail freight and intermodal service providers within the Central Massachusetts region. Admittedly, many of the subjects raised are outside the range of transportation issues typically addressed by the CMMPO. However, the federal SAFETEA-LU transportation legislation encourages MPOs to proactively engage the freight community: rail, trucking and intermodal. This action is meant to provide the opportunity for the freight community to be represented "at the table" to allow freight interests and concerns to be voiced and considered by the MPOs when various policy and project decisions are made. The identified issues summarized below, as well as others that will undoubtedly emerge, are not fully addressed within the context of the RTP document. Those issues identified as priorities by participating stakeholders will be addressed as appropriate through the region's ongoing *Freight Planning* efforts.

D.2 Rail's Share of Freight in the Commonwealth

In Massachusetts, highway trucking is the mode that carries by far the largest share of freight. Based on recently completed State Freight Plan, rail handles only approximately 8% of the state's inbound freight and approximately 7% of the outbound freight. Other opportunities for freight rail need to be explored in the state as the volume of trucks on the highways continues to increase, fuel costs continue to trend upward and driver shortages persist. Should the industry seek increased rail-truck intermodal operations, the Central Massachusetts region has a number of well located intermodal facilities providing automotive, bulk, container & trailer transload services.

D.3 Massachusetts Double Stack Network

Double stacked Phase II containers from west coast ports have crossed the entire country, from the Port of Los Angeles for example, all the way to New York State. Due to vertical clearance restrictions, any double stacked Phase II containers need to be "filleted" by CSX in Syracuse, NY or NS in Mechanicville, NY prior to continuing eastward into Massachusetts. These extra handling procedures, so close to the final point of delivery, reduce the cost savings offered by full Phase II double stack service. In turn, this results in increased costs to both the railroad customer and the end consumer. Massachusetts needs to complete efforts to increase clearances on the CSX Boston Line to accommodate full Phase II double stack service into Massachusetts. Similarly, future clearance improvements to the Hoosac Tunnel would be necessary to accommodate full Phase II double stack service on PAS's northern Massachusetts mainline.

D.4 Railroad Facility & Property Security

Safety has long been a focus of the railroad industry. Over the last decade, following the 9/11 attacks, railroad security has been brought to the forefront. The nation's railroad infrastructure is vast and includes thousands of miles of track, numerous bridges, tunnels, rail yards, intermodal facilities and water ports. Further, in order to serve their industrial and agricultural customers, the railroads carry a significant volume of hazardous materials. Due to the proprietary nature of rail security issues, the details associated with each carrier's procedures for dealing with ongoing security and emergency situations are unavailable.

From a common sense perspective, staying away from railroad property and equipment is a safe practice. From a security perspective, trespassers seen on railroad property are often reported to either the local police or, if applicable, railroad police. Photography of railroad infrastructure, locomotives, railcars and bridges, a popular hobbyist activity legal on public property, is less welcome in the post 9/11 era.

D.5 Heavier Railroad Freight Cars

The advent of heavier railroad freight cars has led to "shipping lane-specific" concerns about weakened track and fatigued bridges. Modern freight car weights range from 263,000 pounds to 286,000 pounds. (Still larger 315,000 pound railcars, often used mainly for coal, are generally not used in New England.) Older fatigued or undersized steel rails can break or shatter under excessive loadings. Further, a number of bridges on the greater New England rail network, including some in the Central Massachusetts region, are in the vicinity of 100 years in age. Often, the bridges are complicated truss-type structures (with riveted connections), are fairly lengthy, and many are over water. As such, when needed, bridge repairs are very costly.

D.6 Westward Migration of Transloading Operations

The westward migration of rail freight transloading operations from within Route 128 will lead to increased opportunities, and challenges, for other existing or proposed intermodal facilities in South Barre, Westborough, West Upton, Worcester, the New England Automotive Gateway (NEAG) in East Brookfield/Spencer, and, in the Montachusett region, Ayer (Devens).

D.7 Industrially Zoned Land Parcels

The scarcity of adequately sized, industrially zoned land parcels adjacent to established rail lines and intermodal facilities continues to be an issue. Some of these properties have high value due to prime location or, conversely, have expensive "Brownfield" clean up costs. The phrase "right for the region, wrong for the town" is indicative of the challenges the railroads face in expanding their base of line-side customers. Some rail proponents have indicated that many areas use environmental concerns as an "excuse" to zone out rail-related activities. Local community acceptance of the need for improved railroad infrastructure and intermodal transloading facilities is critical in order for the greater region to remain competitive in the global economy. Further, beyond the need to educate local decision makers and stakeholders, P&W Railroad officials have indicated the need for the legislature to establish policy and incentives for the redevelopment of such sites.

D.8 Grade Crossing Maintenance Responsibility

Under Massachusetts law, host communities are responsible for the maintenance of the pavement between the rails at highway/railroad grade crossings. Typically, the railroad deals with the track structure, providing the labor and equipment for any necessary track work. Community responsibility involves paving around the tracks as well as on each roadway approach. However, the pavement between the rails is always susceptible to deterioration from thermal expansion and vehicle & trainloads. Rather than paving to the rails, the installation of synthetic membrane or traditional wooden components next to and between the rails is preferable. Roadway traffic volumes should be considered when selecting the appropriate treatment.

D.9 Rail-Trail Accommodation

There exists the potential for friction between rail-trail projects proposed either parallel to active rail lines or along dormant right-of-way that ownership is reluctant to abandon. If various railroad mainlines in the region need to be double tracked in order to accommodate continued calls for expanded Commuter Rail service, adjacently located rail-trails might need to be relocated.

D.10 Intermodal Issues

- Community acceptance of intermodal facilities is necessary for the greater region to remain competitive in the global economy.

- Public concerns about intermodal facility operations, such as train whistle blasts, transloading noise and bright light spillover at night.

- Intermodal freight yard capacity constraints along with the challenges associated with expansion to meet future projected demands.

- The scarcity of industrially zoned land adjacent to established transload facilities limits the ability for expansion.

- Empty return intermodal containers. New England is a consuming region and thus exports far less than it imports. There is a vast capacity for future exports from the greater region, to other parts of the country as well as worldwide.

III-E. BICYCLE AND PEDESTRIAN NETWORK SYSTEM

A. INTRODUCTION

While recreation has been the primary use for bicycling and walking modes in the past, transportation officials are increasingly recognizing bicyclists and pedestrians as primary transportation modes for everyday activities. Since the early 1970s, bicycling and walking for commuting and travel purposes has been increasing and with recent pushes in combating climate change and promoting energy efficiency, cost effectiveness and health benefits, both of these modes are maintaining, and growing, their foothold as recognized daily transportation modes.

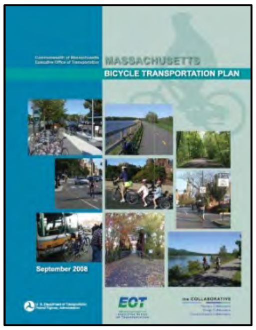
Over the last five years, Massachusetts has made significant efforts to improve the visibility and inclusion of pedestrian and bicycling planning and infrastructure in transportation improvement projects. In 2006, the Massachusetts Highway Department (now a part of MassDOT) developed its *Project Development and Design Guidebook*. This Guidebook replaced the previous *Highway Design Manual* and placed a greater emphasis on context-sensitive design for Massachusetts roadways and identified pedestrians and bicyclists as equal users of roadways as vehicles. Similarly, the Executive Office of Transportation (also now part of MassDOT) released the updated *Massachusetts Bicycle Transportation Plan* in October 2008 which provided a newly prioritized statewide vision for on- and off-road bicycling improvements. MassDOT is currently in the process of developing an updated *Massachusetts Pedestrian Transportation Plan* to coincide with the *Massachusetts Bicycle Transportation Plan*. Momentum for improved pedestrian and bicycle infrastructure has increased both statewide and regionally. Further, Massachusetts Healthy Compact, which was a key requirement of the transportation reform legislation, is designed to facilitate transportation decisions that balance the needs of all transportation users, expand mobility, improve public health and support a cleaner environment through a coordinated public sector, private sector and advocacy groups. Since this legislation passed, the CMMPO has been working with the public health community to advance bicycle and pedestrian needs into everyday activities.

In an effort to build on that momentum in the CMMPO region, a number of policies in this section gives a regional perspective of walking and bicycling activities along with their associated facilities within the region. It is the intent of the CMMPO to evaluate its past and present efforts and offer direction and recommendations for the future development or improvement of pedestrian and bicycle facilities within individual communities and the region as a whole.

Within the CMMPO region, the existing bicycle and pedestrian infrastructure network can be classified as two types: (1) On-Road Accommodations and (2) Long-Distance Bikeways/Trails/ Paths. In addition to these two types, connections to other modes, such as transit, are key in helping to make this network truly intermodal and multimodal.

B. POLICY FRAMEWORK

B.1 Massachusetts Statewide Bicycle Plan



The comprehensive *Massachusetts State Bicycle Plan* was updated in 2008 by the Executive Office of Transportation (now MassDOT) with input from the Massachusetts Bicycle and Pedestrian Advisory Board (MABPAB). This Plan reflects what was identified in the State's *2006 Long-Range Transportation Plan* regarding pedestrian and bicycle facilities, as well as the design and procedures laid out in the *Project Development and Design Guidebook*. The intent of the Plan is to promote multi-modality, economic vitality, and environmental preservation.

The Plan continues to advance bicycle transportation in Massachusetts by:

- Providing a complete and current inventory of available and existing on-road and off-road facilities (shared use paths), projects in the pipeline, and long-term facility proposals
- Recommending a 740-mile, seven-corridor Bay State Greenway (BSG) network consisting of on-road and off-road facilities bound by a single identity and including on-road routes that parallel shared use paths
- Providing an implementation strategy aimed at launching the BSG initially as mostly an on-road system, geared to both utilitarian and recreational travel, and complemented by a long-term investment strategy
- Recommending other programmatic enhancements and interagency initiatives

Other recommendations in the Plan include:

- Better identification of state roads and bridges where bicycles are legally permitted but not accommodated today
- Use of federal Congestion Mitigation Air Quality (CMAQ) funds and other sources to expand ancillary bicycle programs such as "Share the Road" signs, bicycle parking facilities, and regional and local bicycle planning
- Development of bicycle tourist publications through the Massachusetts Office of Travel and Tourism (MOTT)
- Improving safety through education and enforcement initiatives and facility performance measurement
- Further quantification of the benefits of investments in projects and programs that improve bicycling conditions

The establishment of the BSG is motivated by a number of factors, including the Commonwealth's inherently bicycle-friendly nature, the need for more bicycle routes and more coordinated information on them, projected economic benefits, and the ability to implement the BSG incrementally. Within the CMMPO region, the Blackstone River Greenway and the Mass Central Rail Trail are two multi-community bicycle corridor projects that are envisioned to be incorporated into the statewide BSG system.

B.2 Massachusetts Statewide Pedestrian Plan

The comprehensive *Massachusetts Pedestrian Transportation Plan*, created in 1998, is the current plan for the Commonwealth. An updated statewide pedestrian plan is currently being developed by MassDOT with input from the MABPAB and is expected to be completed in 2011.

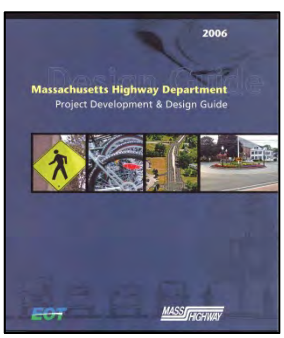
The 1998 Plan included recommendations aimed at developing a more pedestrian-focused statewide transportation system through government and private sector actions. The intended result is a safe, convenient, continuous, coherent and comfortable walking network. Strategies include physical improvements appropriate to the setting, local and statewide encouragement and education programs, increased adherence to laws, and improvements in the process that sets policy and plan facilities.

Massachusetts is already a walking state. Approximately 10.4 percent of all Massachusetts trips are walking trips, a 44 percent higher proportion than the national average and the fourth highest walking trip share of any state. Massachusetts also has the twelfth lowest pedestrian fatality rate, 1.38 deaths per 100,000 population, 40 percent below the national average.

The goal of the 1998 Plan was to make the most effective use of existing resources to improve walking. Pedestrian facilities should be located where the land use generates pedestrian traffic, either seasonal or year-round. Some examples of desirable projects include those that:

- Connect commercial land uses and concentrations of employment to bus or commuter rail stops no more than half a mile away
- Fill walkway gaps less than half a mile long
- Connect schools to residential concentrations within two miles, where creation of the sidewalk will render it an appropriate walking route to the school

B.3 MassDOT Project Development and Design Guidebook



Released in 2006, the *Project Development and Design Guidebook* takes a flexible and accommodating approach to the construction and design of roadways in Massachusetts. By integrating multi-modal planning and design into every chapter, the Guidebook strives to support a transportation system providing seamless, functional and safe access for all users. In addition, this Guidebook provides direction to the design of Complete Streets.

The Guidebook mainstreams non-motorized planning into the project development process and ensures that the needs of non-motorized users remain integral to project planning and design. The needs of, and the methods to accommodate, non-motorized modes of transportation are not segregated into their own sections but are addressed in every chapter of the Guidebook. For example, pedestrian accommodation and design are specifically included in intersection and geometric design, interchanges, bridges and work zones. Chapter 3, *Basic Design Controls*, and Chapter 5, *Cross-Section and Roadside Elements*, have sections which specifically address bicycle and pedestrian design. Chapter 11, *Shared Use Path and Greenways*, and Chapter 16, *Traffic Calming and Traffic Management*, address trails and traffic calming respectively.

B.4 Massachusetts Healthy Transportation Compact

The Massachusetts Healthy Transportation Compact is a key requirement of the landmark transportation reform legislation signed into state law in June 2009 and is an inter-agency initiative designed to facilitate transportation decisions that balance the needs of all transportation users, expand mobility, improve public health, support a cleaner environment and create stronger communities. The Compact's goals and mission are:

- Promoting inter-agency cooperation to implement state and federal policies and programs that support healthy transportation
- Reducing greenhouse gas emissions, improving access to services for persons with mobility limitations and increasing opportunities for physical activities
- Increasing bicycle and pedestrian travel and facilitating implementation of the Bay State Greenway Network
- Working with the Massachusetts Bicycle and Pedestrian Advisory Board (MABPAB) to effectively implement a policy of complete streets for all users, consistent with the current edition of the *Project Development and Design Guide*
- Implementation of health impact assessments for use by planners, transportation administrators, public health administrators and developers
- Expanding service offerings for the Safe Routes to Schools program
- Initiating public-private partnerships that support healthy transportation with private and nonprofit institutions
- Establishing an advisory council with private and nonprofit advocacy
- Developing goals for the Compact and measuring progress toward these goals

In addition to being an inter-agency initiative, the Compact is also committed to facilitating comprehensive coordination among the public sector, private sector, and advocacy groups, as well as among transportation, land use, and public health stakeholders.

B.5 Mass in Motion

In January 2009, Massachusetts launched the *Mass in Motion* project which aims to promote wellness and to prevent overweight and obesity in Massachusetts with a particular focus on the importance of healthy eating and physical activity. *Mass in Motion* provides grant funding to cities and towns in the state to make wellness initiatives a priority. In the CMMPO region, the City of Worcester was that grantee. The project team included state and local departments of public health, public and private health care providers, health researchers, city, regional and state transportation staff (including CMRPC), economic development staff, and local non-profit organizations. The project is a multi-year partnership to address overweight, obesity and chronic disease through access to healthy food and physical activity opportunities at the local level.

B.6 MassDOT's "GreenDOT Policy Directive"

"GreenDOT" is the Massachusetts Department of Transportation's sustainability initiative. Under the "GreenDOT" initiative, the following three goals will be pursued:

- Reduction of greenhouse gas (GHG) emissions
- Promotion of the healthy transportation modes of walking, bicycling, and public transit
- Support for smart growth development

MassDOT hopes to achieve the three GreenDOT goals by integrating these objectives into its vision and mission. The following is a summary of the specific measures, initiatives, and programs that MassDOT will implement and is implementing in order to effect the GreenDOT Policy. In this way, the GreenDOT Policy is supported through all of MassDOT's activities, from long-range planning through system operation and maintenance, informing all decision-making throughout MassDOT. The following sections are excerpts from the policy that relate to long-range planning, project prioritization and selection, and project design and construction related to "complete streets" bicycle and pedestrian transportation.

B.7 Statewide and Regional Long-Range Planning

Statewide planning documents (including the Strategic Plan and Capital Investment Plan) and the Metropolitan Planning Organizations' (MPOs) long-range Regional Transportation Plans (RTPs) will integrate the three GreenDOT Goals as is appropriate. These planning documents will evaluate GHG emission projections and ensure that GHG emissions seem to be reduced over time, consistent with the Climate Protection and Green Economy Act.

B.8 Project Prioritization and Selection

Regional Transportation Improvement Programs (TIPs) and the State Transportation Improvement Program (STIP) will include an evaluation of overall greenhouse gas emissions from the project programs, and will need to be developed in a manner that fits into an overall state greenhouse gas reduction target. This will require that the MPOs and MassDOT appropriately balance highway system expansion projects with other projects that support smart growth development and promote public transit, walking and bicycling.

B.9 Project Design and Construction

B.9.1 Complete Streets

- **Pedestrian and Bicycle Accommodation**. All MassDOT projects <u>must provide for the accommodation of pedestrians and bicycles</u> per the MassDOT Highway Division *Project Development and Design Guide*.
- **Online Plans.** Plans for all MassDOT projects will be posted online at the 25 percent design review stage, along with a basic project checklist that includes measures of pedestrian and bicycle accommodation.
- **Pedestrian and Bicycle Safety Education.** The RMV is updating its educational and licensing materials to increase focus on safety for pedestrians and bicyclists.

- **Permit Requirements.** Recipients of highway access permits will be required to adhere to Highway Division *Project Development and Design Guide* standards on Complete Streets design.
- **Grantee Obligations.** Recipients of state discretionary funding, such as Public Works Economic Development (PWED) and the Transit-Oriented Development (TOD) Bond Program funds, will be required to adhere to Highway Division *Project Development and Design Guide* standards on Complete Streets design.

B.9.2 Bicycle and Pedestrian Transportation

- **Transportation Enhancements (TE) Program.** In order to revitalize the Massachusetts TE program, MassDOT is streamlining the TE application process, conducting early screening for technical feasibility of TE projects, and enabling greater technical support for TE projects. Priority will also be made for TE funds to construct bikeway projects.
- **Bay State Greenway (BSG).** MassDOT is mapping this 740-mile network of seven statewide on- and off-road bicycle corridors, a key recommendation of the 2008 Massachusetts Bicycle Transportation Plan, and will promote it as the state’s bicycle network vision. MassDOT has identified an additional 100 miles of high priority BSG shared-use paths that connect to urban areas and/or extend existing shared-use paths that connect to urban areas.
- **Accelerated Bridge Program.** Through its Accelerated Bridge Program, which will rehabilitate nearly 600 bridges over 8 years, MassDOT is working to improve pedestrian and bicycle accommodation on the bridges that it repairs, including those in the Charles River Basin.
- **Bicycle Facility Data.** MassDOT has developed an online bicycle mapping tool, has publicly released its bicycle facility data layer, and is incorporating bicycle accommodation into its Roadway Inventory to be updated annually by municipalities.
- **Bike to Transit.** The MBTA has allocated $4.8 million in American Recovery and Reinvestment Act (ARRA) of 2009 funds to enhance and expand bicycle parking facilities at MBTA stations. Building on the success of the Alewife and Forest Hills bike cages, this program will fund the construction of 6-8 additional bike cages at major transit stations, and will expand the number of conventional bike racks at other stations. All commuter rail stations have bike racks, as do about 95 percent of subway stations. Seventy percent of MBTA buses are equipped with bicycle racks, and the full fleet will be equipped by 2013.
- **MassDOT Bike Pool.** MassDOT will implement a “bike pool” at appropriate locations for travel to and from meetings.

B.10 Americans with Disabilities Act

The Americans with Disabilities Act of 1990 (ADA) is a wide-ranging civil rights law that prohibits, under certain circumstances, discrimination based on disability. It affords similar protections against discrimination to Americans with disabilities as the Civil Rights Act of 1964, which made discrimination based on race, religion, sex, national origin, and other characteristics illegal. Disability is defined by the ADA as "a physical or mental impairment that substantially limits a major life activity." The determination of whether any particular condition is considered a disability is made on a case by case basis. Certain specific conditions are excluded as disabilities, such as current substance abuse and visual impairment which is correctable by prescription lenses.

Title II of the ADA prohibits disability discrimination by all public entities at the local (e.g. school district, municipal, city, county) and state level. Public entities must comply with Title II regulations by the U.S. Department of Justice. These regulations cover access to all programs and services offered by the entity. Access includes physical access described in the ADA Standards for Accessible Design and programmatic access that might be obstructed by discriminatory policies or procedures of the entity.

Title II also applies to public transportation provided by public entities through regulations by the U.S. Department of Transportation. It includes the National Railroad Passenger Corporation, along with all other commuter authorities. This section requires the provision of paratransit services by public entities that provide fixed route services.

Since its passage in 1990, a number of amendments have been added to the ADA. On September 25, 2008, President George W. Bush signed into law the ADA Amendments Act of 2008 (ADAAA). This was intended to give broader protections for disabled workers and "turn back the clock" on court rulings which Congress deemed too restrictive.[5] The ADAAA includes a list of "major life activities."

C. ON-ROAD ACCOMMODATIONS

Much more common than "off-road" accommodations, "on-road" accommodations for bicyclists and pedestrians can be found in all of the 40 communities in the region. Because all of the communities in the region were established prior to the development of motorized vehicles, almost all of the have a Central Business District, town center or downtown that was developed around high-density land uses with a multi-purpose street network. In addition, many neighborhoods outside of the downtown or town centers were built with pedestrian accommodations that connected to other neighborhoods.

C.1 Types of Facilities

Within any given corridor, bicyclists and pedestrians might ideally be provided with more than one option to meet their travel and access. Below are common "on-road" bicycle and pedestrian facilities and accommodations that are typically found in urban and suburban areas:

C.1.1 Shared Lanes

Shared lanes are streets and highways with no special provision for bicyclists. Shared lanes typically feature 12-ft lane widths or less with no shoulders, allowing cars to safely pass bicyclists only by crossing the center line or moving into another traffic lane. In residential areas with low motor vehicle traffic volumes and average motor vehicle speeds of less than 30 mph, shared lanes work well. Where existing lane width is less than 12-ft, additional lane width or lower operating speeds are called for. With higher speeds and traffic volumes, shared lanes become less attractive routes, especially for less experienced riders. Shared lanes do not usually require any special signing for bicyclists. Exceptions to this include situations where:

- Specific destinations or potential alternate routes for bicyclists need to be shown.
- A short gap exists between special bicycle facilities, such as between two trails, and bicyclists require signing to lead them to the next facility.

C.1.2 Wide Outside Lane

Wide curb lanes, or wide outside lanes, can be defined as right-most through traffic lanes that are substantially wider than 12-ft. Most practitioners agree that 14-ft —usually measured from the lane stripe to the edge of the gutter pan, rather than the curb face—is the minimum width necessary to allow a bicyclist and motorist to share the same lane without coming into conflict, changing lanes, or potentially reducing the motor vehicle capacity of the lane. Where traffic speeds exceed 40 mph, and when annual average daily traffic exceeds 10,000 vehicles per day, 15- or 16-foot lanes are considered desirable. Wide curb lanes have three widely accepted advantages. They can:

- Accommodate shared bicycle/motor vehicle use without reducing the roadway capacity for motor vehicle traffic.
- Minimize both the real and perceived operating conflicts between bicycles and motor vehicles.
- Increase the roadway capacity by the number of bicyclists capable of being accommodated.

C.1.3 Bike Lanes

The American Association of State Highway and Transportation Officials (AASHTO) Guide defines a bicycle lane as:

> *A portion of the roadway which has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists. Bike lanes should be one-way facilities carrying traffic in the same direction as adjacent motor vehicle traffic, and they should not be placed between parking spaces and the curb. The recommended width for a bike lane is 5 ft, at least 4 ft of which should lay to the left of the gutter pan seam.*

Bicycle lanes are intended to delineate the right-of-way assigned to bicyclists and motorists and to provide for more predictable movements by each. Bike lanes also help to increase the total capacity of highways carrying mixed bicycle and motor vehicle traffic. The impact of marked bike lanes is particularly important for less experienced riders. The lanes offer a designated and visible space for bicyclists and can be a significant factor in route choice. In some cases, bike lanes are painted to improve their visibility.

C.1.4 Shoulder

AASHTO's *Policy on the Geometric Design of Highways and Streets* defines a shoulder as:

"... the portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use and for lateral support of the sub-base, base and surface courses."

Shoulders are also useful as places for bicyclists to ride. In certain situations, adding or improving shoulders is often the best way to accommodate bicyclists—especially in rural areas. In urban areas, wide curb lanes are usually preferable to shoulders for experienced riders and bike lanes are usually preferable for less experienced riders.

C.1.5 Sidewalks

Sidewalks are the most common element of an "on-road" pedestrian network and are the preferred facility used by pedestrians. Sidewalks provide a safe walking area for pedestrians only outside of motor-vehicle traffic. Sidewalks can be constructed of various materials such as concrete, brick, asphalt and stone; however, concrete is the preferred material by many designers due to its flexibility during construction as well as durability to the elements.

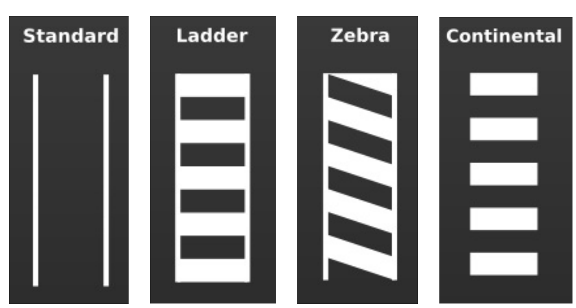
Sidewalks should be constructed at a minimum of five feet in width to accommodate two adult pedestrians walking side-by-side; however, the Americans with Disabilities Act (ADA) mandates a minimum width of three feet of unobstructed sidewalk passageway.

A comprehensive pedestrian network provides safe, convenient and pleasant access to various places. Sidewalks should be located strategically to connect centers of activity including residential and commercial areas, schools, libraries, places of worship, and recreation areas. A well-designed and maintained sidewalk can reduce crashes, as well as encourage more people to walk.

C.1.6 Crosswalks

Crosswalks are used to help designate identified pedestrians crossings to motorists and direct pedestrians to cross streets at safe locations. Factors such as the number of pedestrians likely to cross the street and area locations (e.g. downtowns, neighborhoods, etc.) determine the width and marking type of crosswalks. Markings for crosswalks are typically made as one of three types:

- Standard (parallel bar) design
- Ladder or Zebra design
- Continental design



For a crosswalk to be useful, drivers must be aware of its location and the pedestrian's need to use the crosswalk. A driver's sight distance must be taken into consideration when locating crosswalks, as well as set-back stop line and yield line locations. Crosswalks are typically located at corners of intersections; however, they may also be located between intersections of large blocks (greater than 300 feet in length) to create "mid-block crossings."

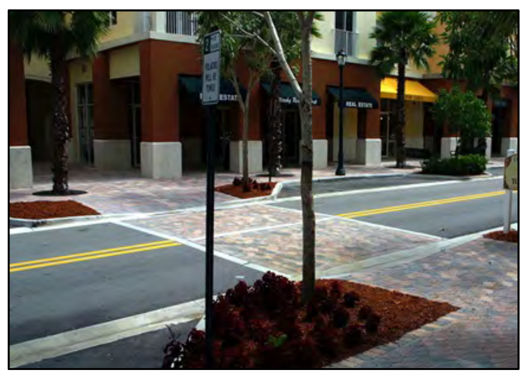
Other variations in crosswalk design include:

Raised crosswalks

Curb extensions

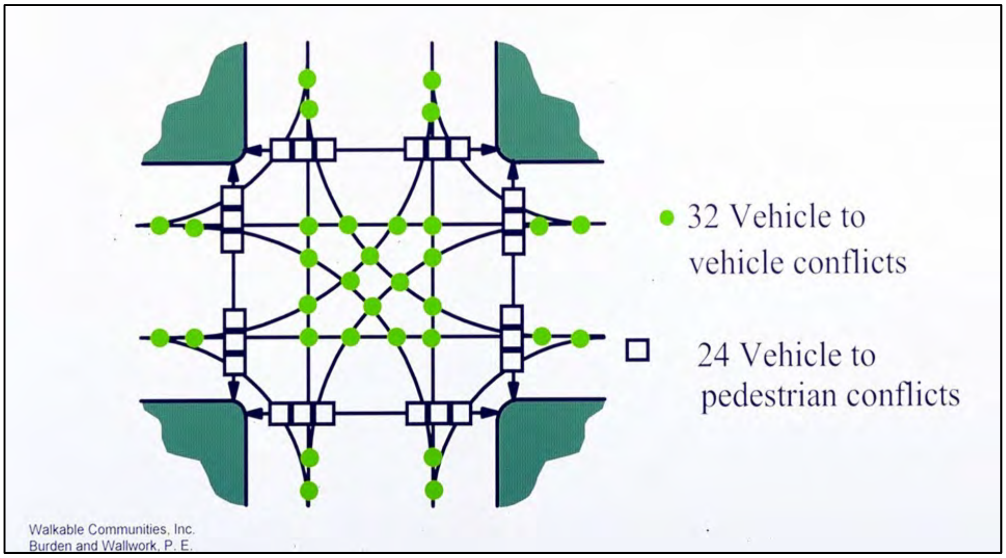
Off-set crosswalks

Textured crosswalks



C.1.7 Intersections

While not a type of facility, intersections are important as points of interaction between facilities and are where pedestrians and bicyclists are most vulnerable. Because of the many turning points, there are more potential conflict points at an intersection than on a standard roadway segment. The diagram on page 19 shows the potential vehicle-to-vehicle conflict points, as well as the potential vehicle-to-pedestrian conflict points, as developed by nationally renowned expert Dan Burden of Walkable Communities Inc.



C.1.8 Bicycle Parking

Parking for bicycles is typically limited to specific locations within the region; however, that is changing slowly. Bicycle parking locations, such as racks or lockers, provide a secure location for patrons to leave their bicycles while conducting other activities. Bicycle racks have various designs; however, the three most common types are:


"Dish" racks


"Ribbon" racks


"U-Shaped" racks

The most common rack used is the ribbon rack; however, studies have shown that the "U" rack provides more security and is replacing ribbon racks quickly. All of these racks are made of steel and sometimes include a protective coating of paint or plastic composite over the steel to make them more weather-proof. Lockers, on the other hand, are the most secure facilities for parking bicycles and provide all-weather protection. Most lockers in use currently hold two bicycles and are usually rented out for a fee to the user.

In addition to the standard design racks above, specialty racks that also function as street art are also found in the region. In October 2010, five racks in the shape of bicycles were installed along Chandler Street in Worcester as part of that street's improvement and repaving project. These racks not only provide a street art component to the neighborhood, but are functional by creating bicycle parking on along a heavily congested automobile corridor. The racks were purchased and installed by five local business owners and compliment other streetscape improvements such as public benches and planting containers.

Bicycle racks are primarily found on school grounds, some town centers, and transit stations, such as Union Station in Worcester and the commuter rail stations in Grafton and Westborough. Union Station is the only location in the region equipped with bicycle lockers.

C.2 Community Survey of Walking and Bicycling Infrastructure

In 2009, CMRPC staff conducted a visual survey of the existing walking and bicycling infrastructure and accommodations in the city and town centers of the MPO's 40-community region. The purpose of the survey was to acquire an inventory of these facilities within a high density but short distance location and to take a cursory examination of what accommodations exist within the region. Future updates of the survey may include other areas outside of city and town centers, such as dense residential areas or commercial corridors, and may be further supplemented by community meetings and Environmental Justice analyses.

Of the 40 communities in the region, 37 (92.5%) had sidewalks on both sides of the street(s) within the city or town center, two (5%) had sidewalks on one side of the street(s) and one (2.5%) had no sidewalks. Sidewalk width in each of these communities varied due to various factors such as right-of-way availability, previous roadway standards, or inferior replacement or "patching" of existing sidewalk locations. Of the communities with sidewalks, three still had no accommodations for curb ramps, curb cuts or mountable curb connections. Lastly, maintenance of the sidewalks varied from excellent to poor. Table III-24 shows this information in further detail.

D. Long-Distance Bikeways/Trails/Shared-Use Paths

D.1 Types of Facilities

Long distance trails and shared-use paths are separated from motor vehicles and classified as "off-road" accommodations for bicyclists and pedestrians. Names such as "paths", "bikeways", or "trails" are used interchangeably in when describing these facilities. However, there are differences between them:

D.1.1 Paths

A path is a place for pedestrian traffic alone, and is typically not a well-designed place like a sidewalk or trail. Paths are usually unimproved "ways" that were created on foot, mostly for recreational purposes. Most paths follow topography and do not have at-grade or level cross-sections.

Table III-24
Evaluation of Bicycle and Pedestrian Infrastructure in City and Town Centers - March 2010

Town	Intersection location	How is audit collected? **F**-By foot, **A** - Auto, **B** - Both walked and drove, **BI** - by bicycle	Are sidewalks present?		Width of sidewalk		Curb ramps, curb cuts, or mountable curbs connect at both ends of segment?		Poorly maintained sections of the sidewalk constitute trip hazards?		Is there a white stripe on edge of road, if so, what is width of stripe?		Is there a marked bicycle lane?		Is the bicycle lane continuous betweent eh segments at both ends?		Is there an off-road trail that has been paved or leveled?		Notes
			N/E	S/W	N/E	S/W	N/E	S/W	N/E	S/W	N/E	S/W			N/E	S/W	N/E	S/W	
			Yes/No	Yes/No	< 4', >/= 4', Both	< 4', >/= 4', Both	Yes/No	Yes/No	**N**-None, **F** - A few, **L** - A lot	**N**-None, **F** - A few, **L** - A lot	**N**- None, **< 4'**, **>/= 4'**, **P** - Parking only	**N**- None, **< 4'**, **>/= 4'**, **P** - Parking only	Yes	No	Yes/No	Yes/No	Yes/No	Yes/No	
Auburn	Central St, Church, St, South St., Town Hall	B	Yes	Yes	< 4'	< 4'	Yes	Yes	F	F	N	N		X			No	No	Awkward intersection, not pedestrian friendly. No attractions for people walking
Barre	Summer St (Rt 122), Mechanic St (Rt. 62), South St, James St	B	Yes	Yes	< 4'	< 4'	Yes	Yes	F	F	< 4'	< 4'		X			No	No	Pleasant neighborhood, public amenities, park accessible for everyone, no sidewalks through segment
Berlin	Central St, Woodward St.	B	Yes	Yes	>/= 4'	>/= 4'	No	No	F	F	< 4'	< 4'		X			No	No	Similar to Boylston, had capability of being very walkable, but during week not occupied
Blackstone	St. Paul St, Main St (Rt. 122)	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	N	N		X			No	No	Pleasant, quiet intersection, pedestrian friendly, not too many public amenities near by, not large volume of traffic (easy to walk/bike)
Boylston	Main St. (Rt. 70), Church St	B	Yes	Yes	< 4'	< 4'	Yes	Yes	F	F	>/= 4'	< 4'		X			No	No	Town common allows for pedestrian activity, however during week, town common is unoccupied
Brookfield	Central Street and Common Street	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	F	F	N	N		X			No	No	Town common allows for pedestrian activity
Charlton	Main St (Rt 31 S), Common Road	F	No	Yes		>/= 4'		Yes		N		< 4'		X			No	No	Town common is very quiet and friendly, town common allows fot social gathering of crowds, well landscaped
Douglas	Main St (Rt. 16), Mechanic St	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	F	F	P	P		X			No	No	Pleasant, not too busy intersection, plenty of on-street parking, pedestrian friendly
Dudley	Mason Rd, West Main St (Rt.197)	B	Yes	Yes	< 4'	< 4'	Yes	Yes	F	F	>/= 4'	>/= 4'		X			No	No	
East Brookfield	East Main St. (Rt. 9), Mechanic St.	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	F	F	>/= 4'	>/= 4'		X			No	No	High speed intersection, no signalization for pedestrians
Grafton	Millbury St, Worcester St (Rt.140)	A	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	< 4'	< 4'		X			No	No	Awkward intersection, cars forced to slow when entering town center, pedestrians feel comfortable crossing the streets
Hardwick	Main Street (Route 32) at Hardwick and Lower Roads	A	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	F	N	>/= 4'	>/= 4'		X			No	No	
Holden	Main St. (Rt 122A), Highland St (Rt 31 N), Reservoir St (Rt. 31 S)	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	< 4'	< 4'		X			No	No	High volume traffic intersection, plenty of room for pedestrians
Hopedale	Hopedale and Depot Streets	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	< 4'	< 4'		X			No	No	
Leicester	West Main St. (Rt. 9), Paxton St. (Rt. 56)	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	< 4'	< 4'	X		Yes	Yes	No	No	Busy/Awkward intersection, does allow for pedestrian activity, plenty of safe crossing zones
Mendon	Main St., Hasting St., Maple St.	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	P	< 4'		X			No	No	Tough area for pedestrians to cross, pedestrians are not visble behind parked cars
Millbury	Elm St., School St., S. Main St.	A	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	P	P		X			No	No	Very pleasant downtown area, parkign availbe, many amenities are available
Millville	Main St. (Rt 122), Central St.	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	< 4'	< 4'		X			No	No	
New Braintree	West Brookfield, Utley and Oakham Roads	A	No	No							N	N		X			No	No	
North Brookfield	North Main Street (Route 67) at Summer and School Streets	A	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	F	F	P	P		X			No	No	
Northborough	Main St (Rt. 20), South St. (Rt. 135)	B	Yes	Yes	< 4'	< 4'	Yes	Yes	N	N	< 4'	< 4'		X			No	No	Very walkable community, however high traffic volume. The timing of the traffic lights seems to allow for pedestrian friendly environment
Northbridge	Church St., Main St., Linwood St. , Hill St.	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	P	>/= 4'		X			No	No	High volume of traffic, pedestrian friendly, most pedestrian accomodations another 100' + down Main St.
Oakham	Ware Corner, Maple St., Coldbrook St.	B	Yes	Yes	< 4'	< 4'	No	No	L	L	N	N		X			No	No	Not a busy intersection, would not have know of this location to be town center
Oxford	Main St. (Rt. 12), Sutton St, Charlton St	F	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	P	P		X			No	No	
Paxton	Pleasant St. (Rt. 31), West St. (Rt. 31), Rts 56/122	F	Yes	Yes	< 4'	< 4'	Yes	Yes	N	N	>/= 4'	< 4'		X			No	No	Nice pleasant, quiet pedestrian friendly town common
Princeton	Hubbardston Rd (Rt. 62), Worcester Road (Rt. 31), Gregory Hill Rd, Mountain Rd	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	>/= 4'	>/= 4'		X			No	No	Large town common, allows for walking, playing, sitting
Rutland	Main St (Rt. 122A), Pommogussett Rd. (Rt. 56), Maple Ave	B	Yes	Yes	< 4'	< 4'	No	No	F	F	>/= 4'	< 4'		X			No	No	walkable area, public amenities nearby, not extremely pedestrian friendle, sidealk sidewalk is about 10' from road on Main St (large buffer)
Shrewsbury	Main Street and Grafton Street (Route 140)	A	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	>/= 4'	>/= 4'		X			No	No	
Southbridge	Main St. (Rt. 131), Eastford Rd. (Rt. 198), Central St.	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	N	N		X			No	No	very walkable, pleasant area, multiple amenities, lots of room for on-street parking, sidewalks
Spencer	Main Street (Route 9) and Pleasant Street (Route 31)	A	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	F	F	< 4'	P		X			No	No	
Sturbridge	Main Street (Route 131) and Maple Street (Route 15)	A	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	< 4'	< 4'		X			No	No	
Sutton	Boston Rd, Singletary Rd, Uxbridge Rd	A	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	P	P		X			No	No	Pleasant town common, all muniipal buildings adjacent to town common, pedestrian friendly
Upton	N. Main St., Grove St.	B	No	Yes		>/= 4'		Yes		N		P		X			No	No	Awkward intersection, pedestrian friendly, plenty of parking esp. in the road
Uxbridge	N. Main St (Rt 122), Mendon St (Rt 16 S), Douglas St (Rt 16 N)	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	F	F	P	P		X			No	No	Very pedestrian friendly, various public amenities, plenty of on-street parking allows for walking
Warren	Main Street (Route 19/67) and Maple Street (Route 19)	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	N	N		X			No	No	
Webster	Lake St., Route 12	F	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	N	N		X			No	No	
West Boylston	Boylston St (Rt. 12), Worcester St (Rt. 140), Central St	B	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	< 4'	< 4'		X			No	No	Public common allows for pedestrian activity, similar to Boylston center
West Brookfield	W. Main Street (Routes 9/67) at Cottage and Central Streets	F	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	N	N		X			No	No	
Westborough	Westborough Rotary (Routes 30 and 135)	F	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	< 4'	< 4'		X			No	No	
Worcester	Main Street at Pleasant and Front Streets	F	Yes	Yes	>/= 4'	>/= 4'	Yes	Yes	N	N	< 4'	< 4'		X			No	No	

High Rating
Medium Rating
Low Rating

D.1.2 Trails

A trail can be used either by foot traffic, bicycles or by motorized vehicles. Trails are usually roadways that are in a primitive condition usually dirt or gravel based, and are also not limited to at-grade or level cross-sections.

D.1.3 Bikeways

A bikeway is for bicyclists only and is typically located on its own separate right-of-way with a level cross section. All bikeways are surfaced ways that must meet rigorous standards for width, grade, pavement and accessibility and typically exhibit a higher rate of speed among the cyclists.

D.1.4 Shared-Use/Multi-Use Facilities

Shared-use or multi-use facilities are where pedestrians and cyclists are expected to share the same route to provide safe, off-road access for more than one user type.

Most bicycle and pedestrian facilities constructed within the United States are shared-use facilities, and this will be the focus of discussion in this plan. The conversion of abandoned and unused rail lines into multi-use trails has been popular throughout the country for quite some time now, and in Massachusetts and the CMMPO region, this trend has been continuing over the last few years. The Northeast Region in general has been slower to develop rail trails than other parts of the nation because railroads were in use later here. Also, some Northeast freight providers have retained their ownership of inactive railroad lines in the hopes that they will become active again in the future. In New England, railroads started closing down in the late 1970s and early 1980s as mills were closed, but in the Midwest, for example, obscure rail lines that served big grain mills and farms starting closing in the late 1960s. There have been 14 rail trails built in Massachusetts and another 65 of these projects are awaiting design or funding.

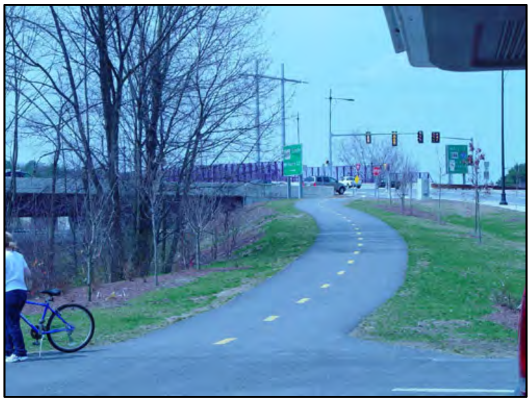
The Washington D.C.-based *Rails to Trails Conservancy* is an influential body that provides technical assistance to communities and helps promote trails and multi-modal transportation. Though it has moved its Northeast district office from Worcester to Camp Hill, Pennsylvania, it remains quite active in the Central Massachusetts region. They have acted as a catalyst in building political clout for rail trails in the state. Local recreational grass roots groups, such as Wachusett Greenways in Holden, often initiate and raise funds for rail-to-trail projects. In many instances, encouraged by the relative ease of a single acquisition of land from one owner, these types of projects build significant support at the local level.

Within the CMMPO region there are several active and proposed rail-to-trail projects. Most of the trails accommodate not only bicycles but pedestrians and other non-motorized activities, such as in-line skating, cross country skiing, and, in some cases, equestrian use. Maps showing the various trails described throughout this section by subregion are included at the end of this section.

D.2 Existing Multi-Use Facilities in Central Massachusetts

The region has a number of multi-use hiking and biking trails located in each of the subregions. Many of these trails connect to other trails, while others do not. Those that don't connect may either be independent trails or are planned to connect to other trails pending further planning and/or construction. Figures III-34 to III-40 show existing, proposed or potential trails and show the current extent of long distance multi-use paths in the region.

D.2.1 Blackstone River Greenway (Massachusetts Portion)



The most significant bicycle and pedestrian project within the region is the Massachusetts Blackstone River Greenway. This greenway will be part of a larger effort supported by the John H. Chaffee Blackstone River Valley National Heritage Corridor Commission (JHCBRVNHCC) to establish a bicycle route traveling the entire length of the Blackstone River, from downtown Worcester to downtown Providence, Rhode Island. The Blackstone River Greenway will link many of the Valley's significant natural and historic features, which help tell the story of the American Industrial Revolution. It will also be part of a larger *East Coast Greenway* project supported by the East Coast Greenway Alliance (ECGA), which is envisioned as a series of linked bikeways and greenways between the major eastern seaboard cities from Maine to Florida.

This project is a commuting and recreational trail originating at Worcester’s Union Station. The route follows the Blackstone River and canal through the CMMPO communities of Millbury, Sutton, Grafton, Northbridge, Uxbridge, Millville and Blackstone to its southern terminus at the Rhode Island state line. It will connect to the Rhode Island Blackstone River Bikeway, the northern terminus of which is planned for North Smithfield, Rhode Island. The length of the proposed route within Massachusetts is approximately 28 miles and it has been divided into seven segments.

In early 2011, the Massachusetts Department of Conservation & Recreation (DCR) became the lead state agency for the greenway project from MassDOT and will complete the remaining sections of the Massachusetts portion. To date, a two and a half mile portion (Segment 6) of the project is already completed. This segment was constructed as part of the Route 146/Massachusetts Turnpike/Interstate 290 Connector Project. Of the 19.5 miles planned in Rhode Island, 11 miles have been completed and are in use.

As of April 2011, remaining project segments have been amended slightly and are as follows:

- <u>Segment 1 (Massachusetts/Rhode Island Line to Central Street in Millville)</u> – Also currently under design at $4.8 million. This segment has 11 bridges, however a large viaduct originally included in the project has been taken out and an alternative off-road solution is being worked. This section will also include access to the Millville Canal Locks. This segment of greenway will

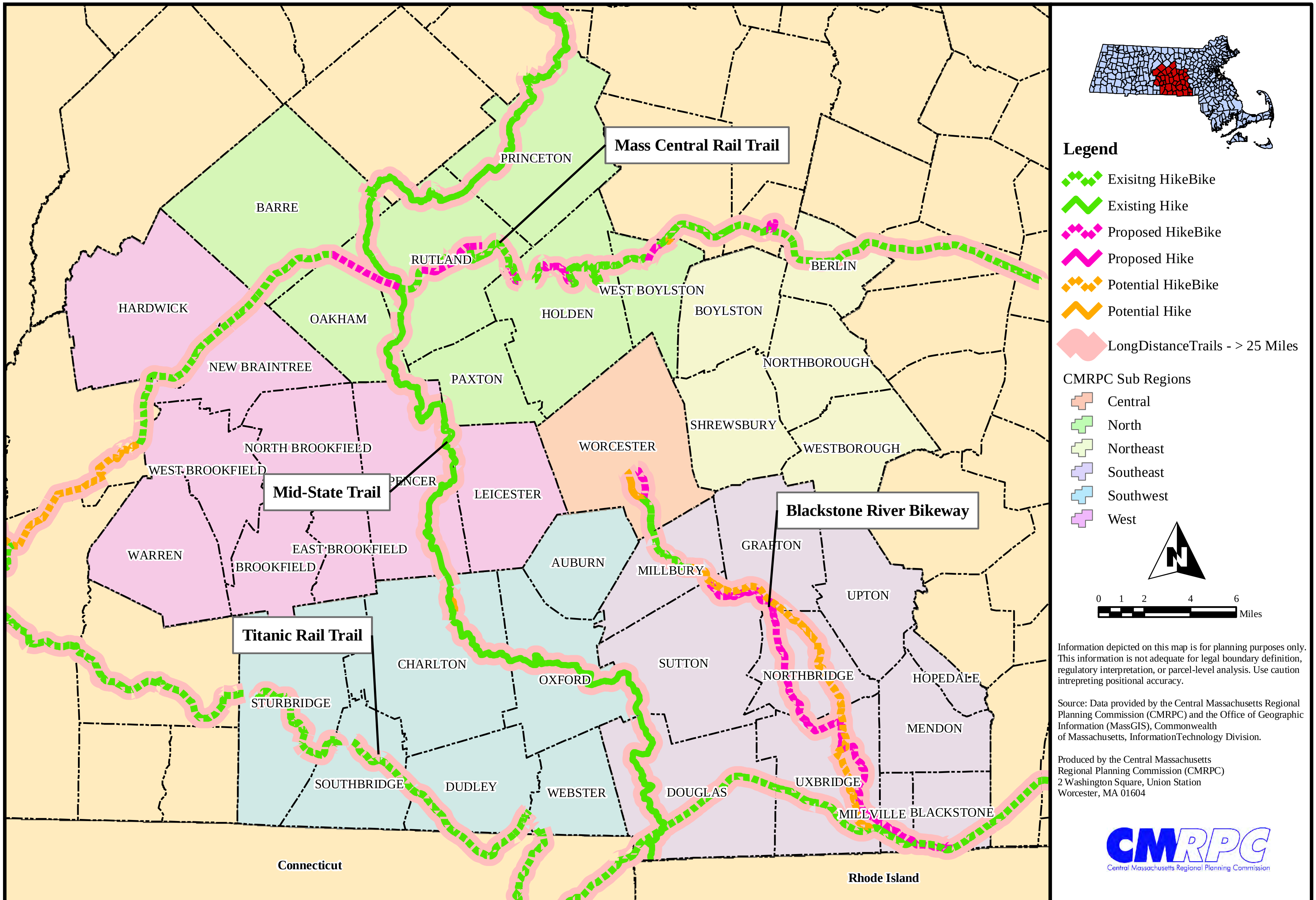


Figure III-34 The Central Massachusetts Regional Long Distance Trails

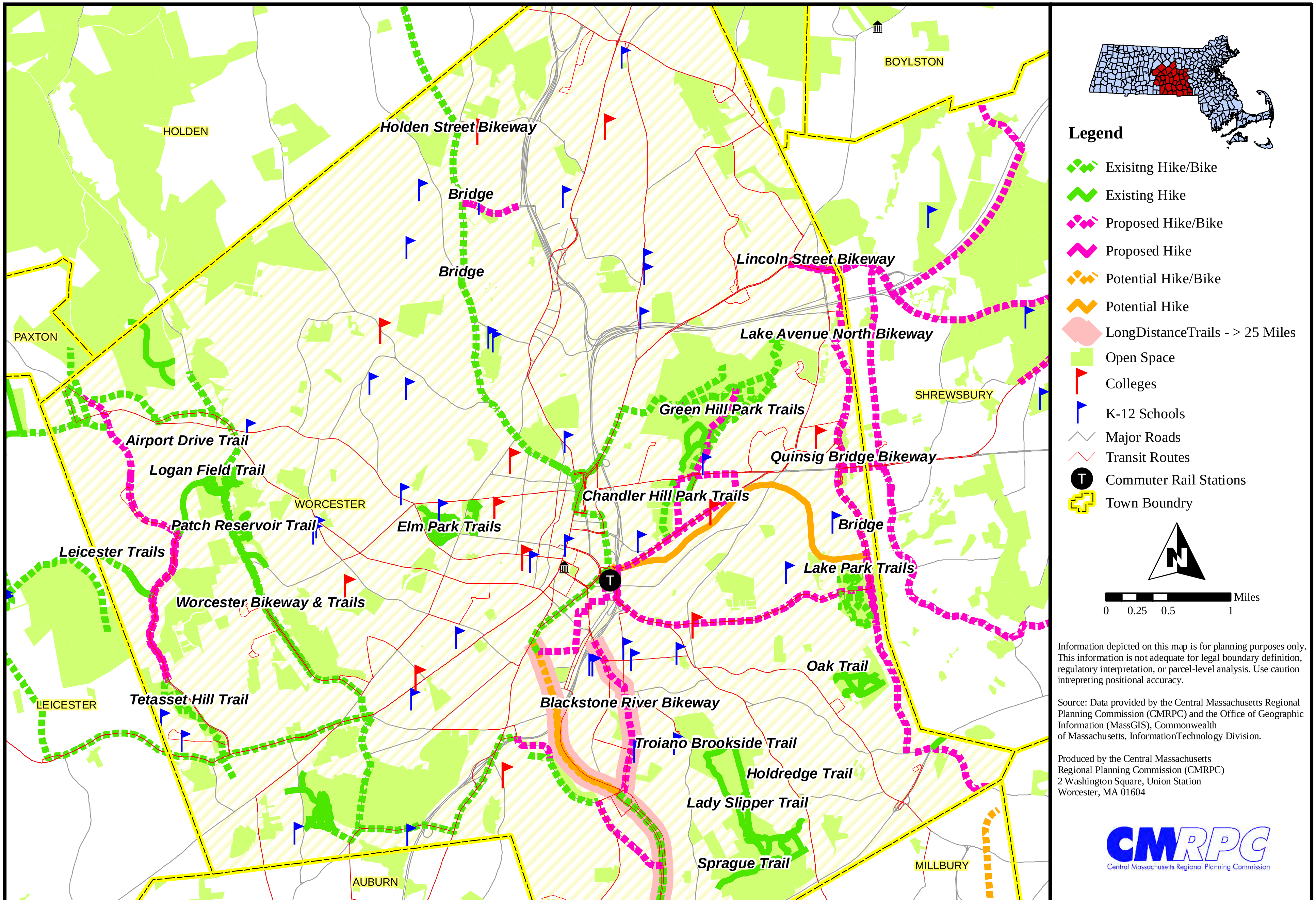


Figure III-35 The Central Sub Region Trails

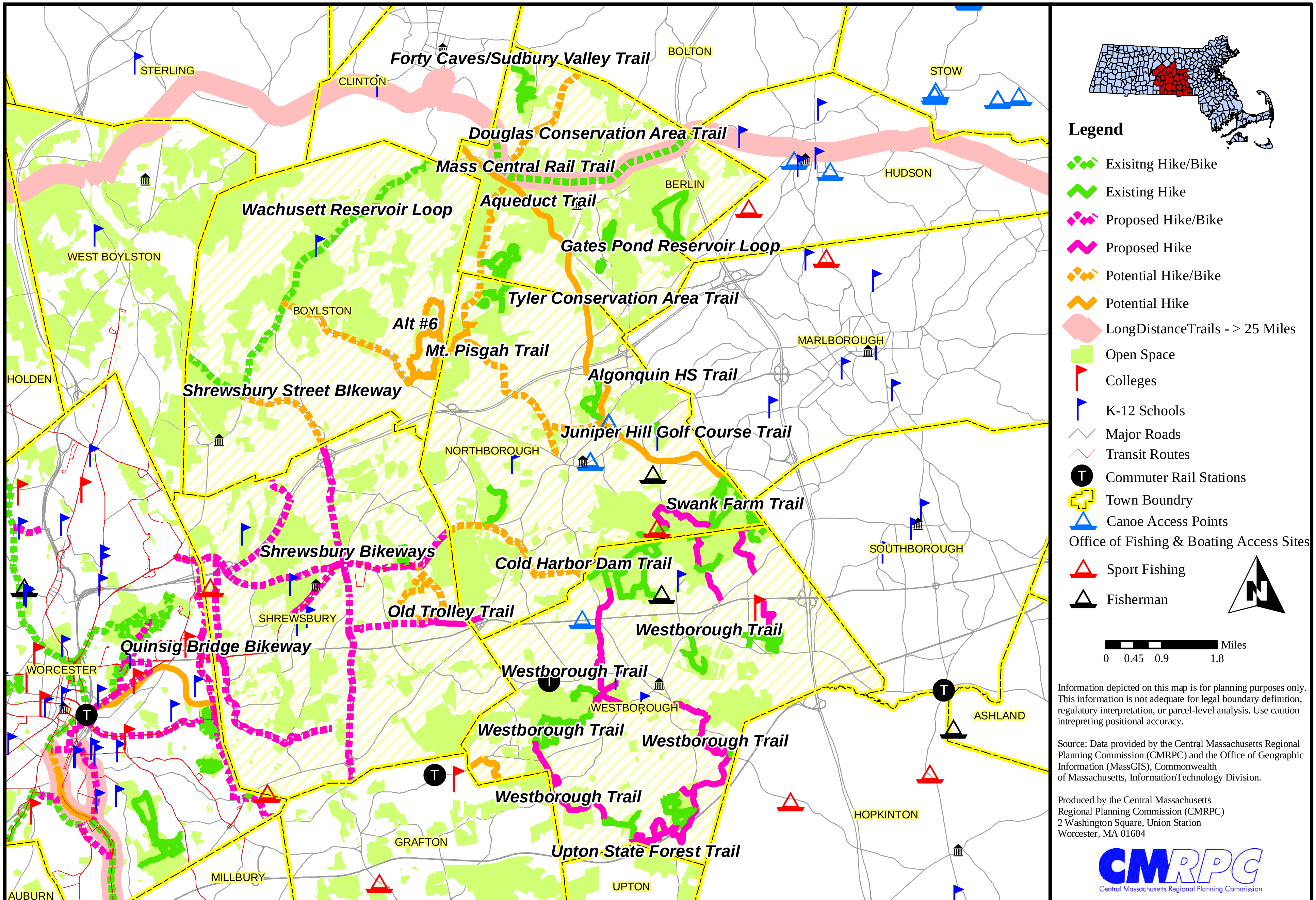


Figure III-36 The Northeast Sub Region Trails

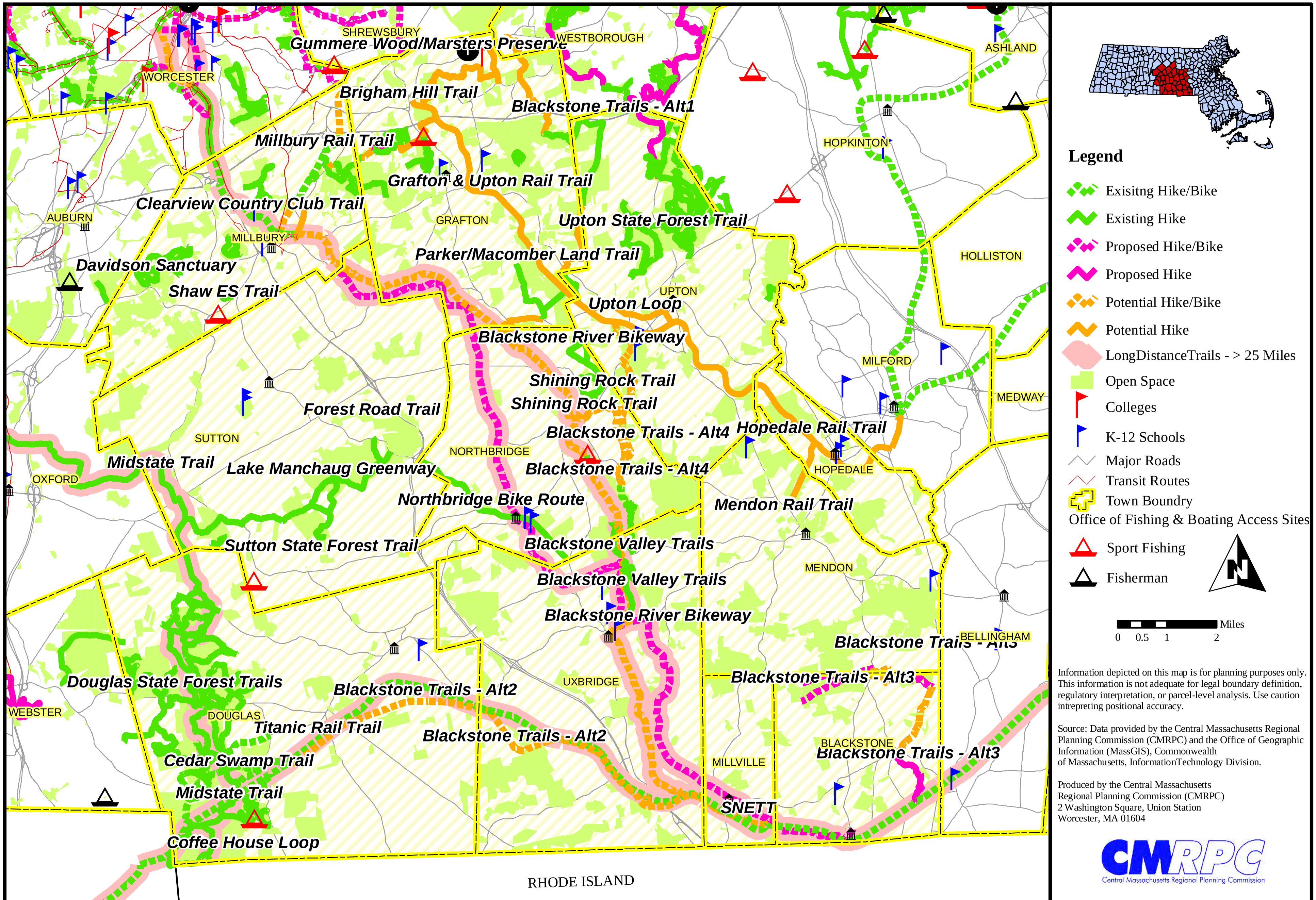


Figure III-37 The Southeast Sub Region Trails

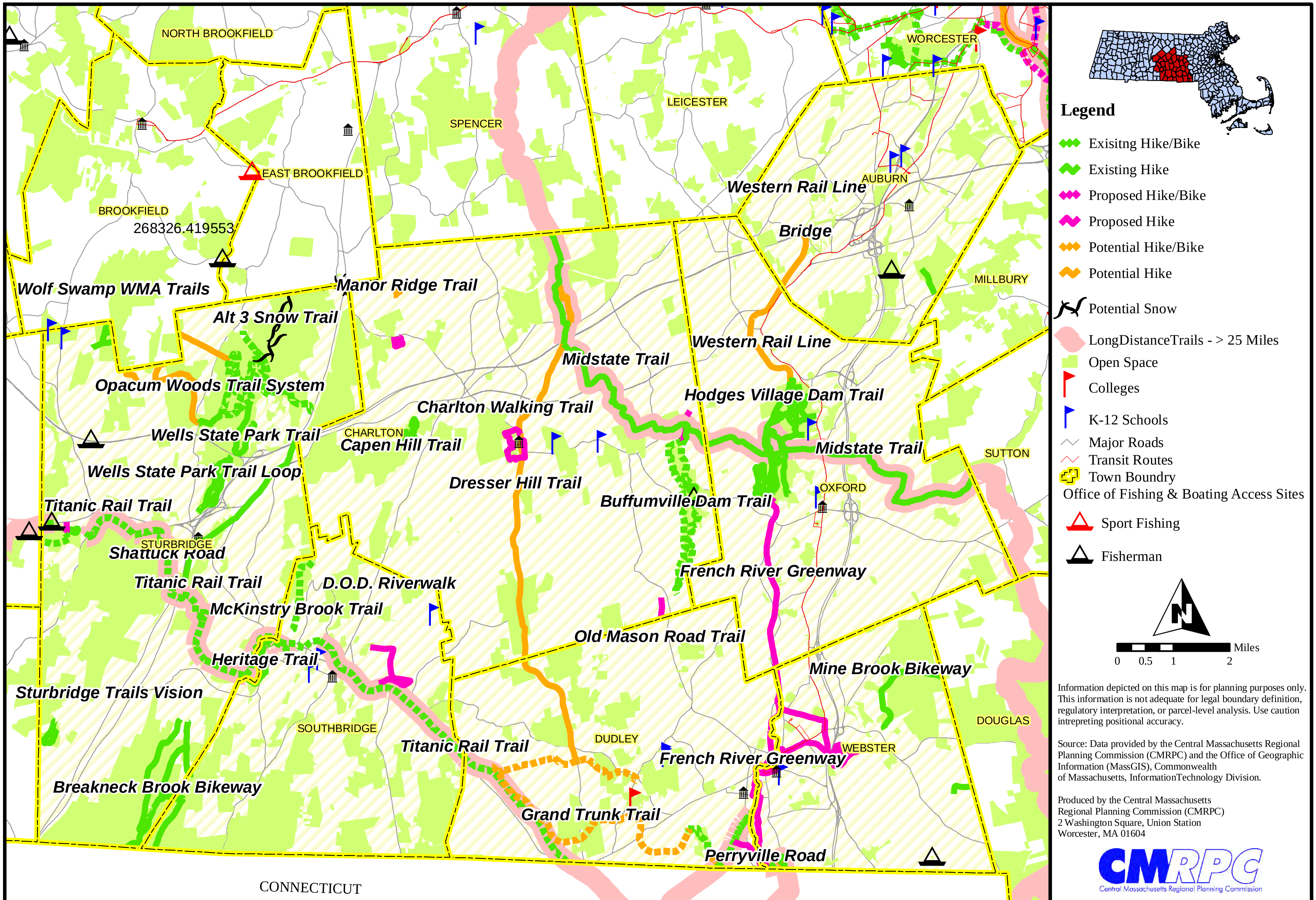


Figure III-38 The Southwest Sub Region Trails

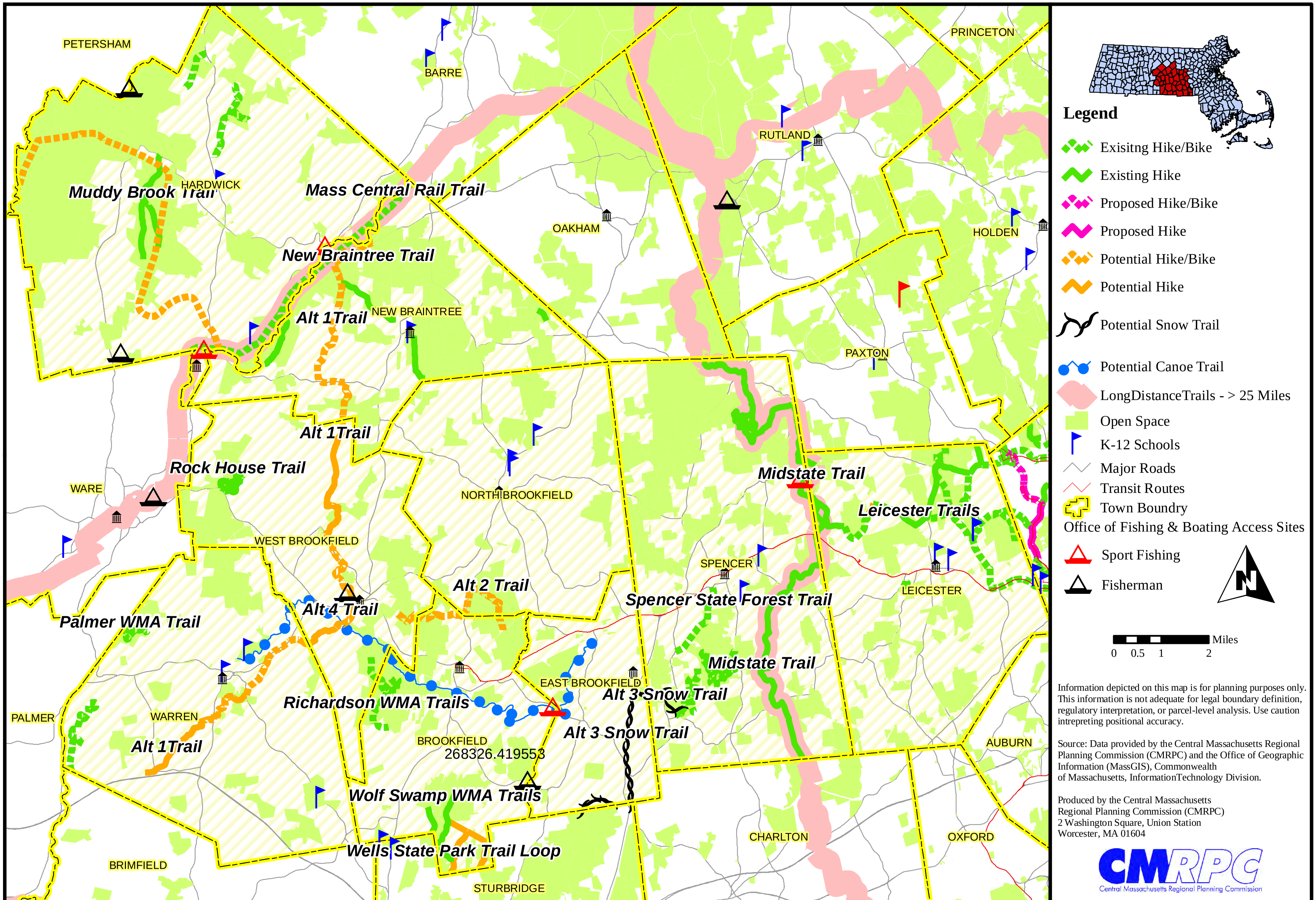


Figure III-39 The West Sub Region Trails

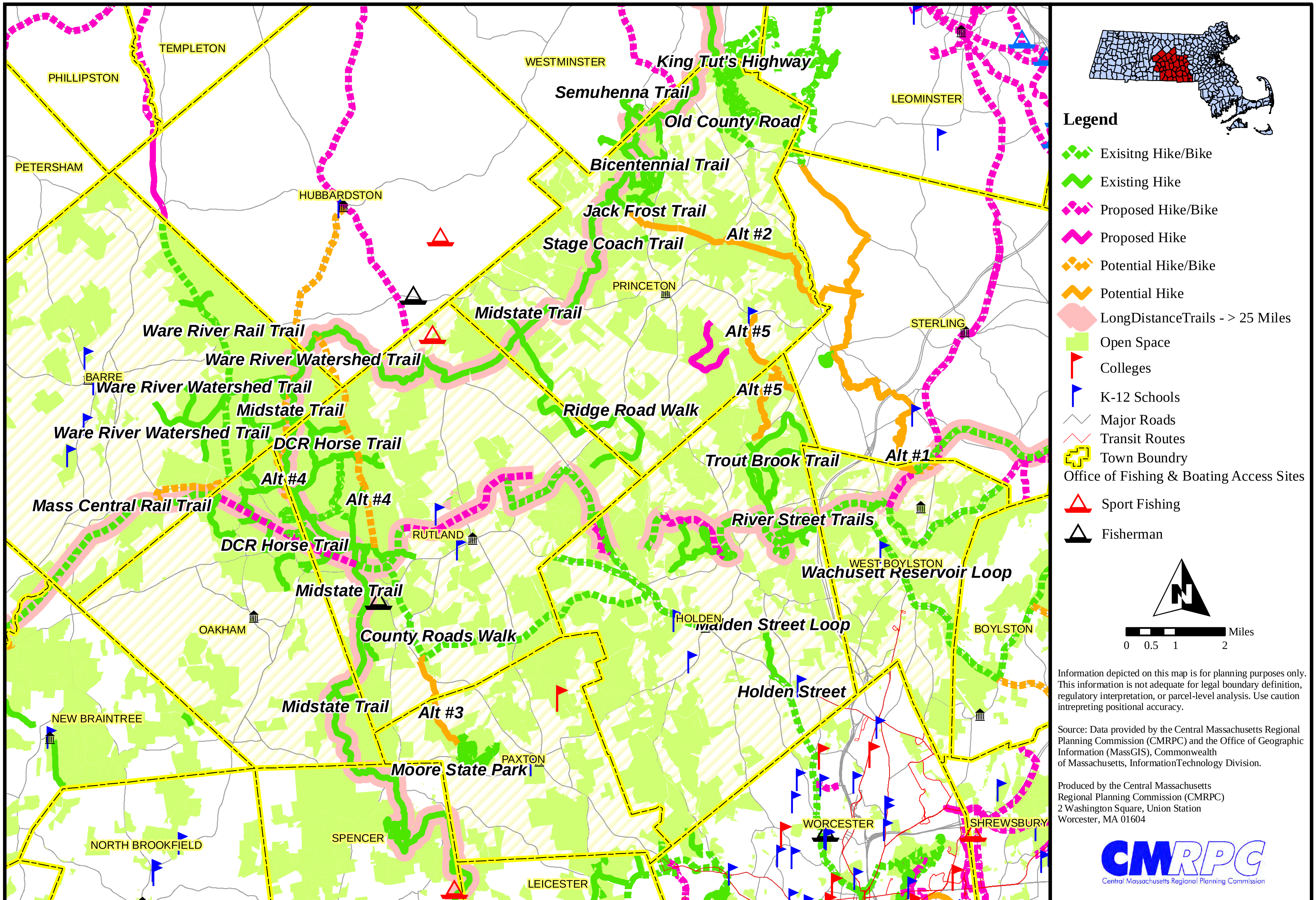


Figure III-40 The North Sub Region Trails be a paved surface with asphalt for 2.5 miles and will not be equestrian accessible. Construction will be completed by fall 2012.

- Segment 2 (Central Street in Millville to Millville Road (Route 122) in Uxbridge) – This section will be starting design in fall 2011 after consulting designer is chosen. Design of Segment 2 will be completed by fall 2012, however funding for construction has yet to be identified.

- Segment 3A (Millville Road (Route 122) to River Bend Farm in Uxbridge) – Like Segment 2, design for Segment 3 will likely begin in fall 2011 after consulting designer is chosen, however funding for construction has yet to be identified.

- Segments 3B, 4 and 5 (River Bend Farm to end of Segment 6 (Main Street) in Millbury) – Planning and design work for these remaining segments is currently unscheduled and the alignment passes through the most environmentally sensitive areas of the region. These sections will be designed to full greenway standards and will likely be constructed with a hardened earth surface rather than pavement. Further funding for these segments has not yet been identified for both design and construction.

- Segment 7 (from the end of Segment 6 (Blackstone River Road) in Worcester to Union Station) – Currently under design and will be 80% on-road and is expected to be built in fall 2011/spring 2012

When it was the lead agency for the project, MassDOT created the Blackstone River Bikeway Task Force, consisting of federal, state, local, non-profit and other stakeholders, to allow for monitoring of the project's progress and for regular exchange of information with, and input from, stakeholders. The Task Force met with varying degrees of regularity and success. It has not met in some time due to the change in the lead state agency for the project, however efforts are underway to revamp the Task Force and assist in the development of the greenway under DCR's direction.

In addition to the construction of the Greenway, federal funding has also been obtained for the construction of a new visitor's center in Worcester near Segment 7 that will orient residents and visitors to the history of Worcester and the region and be linked to bike paths, walking trails, boardwalks, and Blackstone River canoe access. The Worcester Blackstone Visitor Center will be a year-round destination for tourist information, education, and recreation. Key components of Worcester Blackstone Visitor Center include:

- Restoration of the Sherwood Diner, a diner with Worcester roots and history and the potential for a 5,000 square foot expansion for visitor services at the Center.
- A great lawn/playing field area allowing for passive recreational activities and events.
- A work yard allowing for environmental education programs and other recreational activities.
- A pedestrian footbridge across the Blackstone River.
- Incorporation of Blackstone Gateway Park and the Blackstone River Bikeway.

- An interpretive necklace abutting the Blackstone River and emphasizing the local, natural, and industrial history of the area.

D.2.2 Massachusetts Central Rail Trail

The Massachusetts Central Rail Trail (MCRT) is envisioned as a non-motorized multi-use trail that will follow the entire length of the 104-mile rail bed right-of-way between Boston and Northampton, passing through 25 communities. Currently over 25 miles of it has been completed, including the 10-mile Norwottuck trail that connects Amherst with Northampton in the western part of the state, and approximately 15 miles of trail in Sterling, West Boylston, Holden, Rutland and Oakham in the central part of the state, with construction of a tunnel under Route 56 in Rutland planned for 2011 and a ½ mile extension of the trail into Barre planned for 2012. This trail is considered to be the most significant rail trail in southern New England according to the publication *Northeast Greenway Solutions* and is a major component of the Bay State Greenway network in the *Massachusetts Statewide Bicycle Plan.* The development of this trail is also listed as one of seven recommendations in the report, *Commonwealth Connections –A Greenway Vision for Massachusetts,* developed by DCR in partnership with the Appalachian Mountain Club, the National Park Service and a broad group of stakeholders from across Massachusetts.

A priority listed for the Central Massachusetts region in the *Massachusetts Statewide Bicycle Plan* to support this recommendation is to “Create and extend the Massachusetts Central Rail Trail”, which stretches from Ware through Hardwick, Oakham, Rutland, Holden, ending in West Boylston. Wachusett Greenways, a grass roots organization based in Holden that has been the major proponent on this central section, has plans to complete another 15 miles of trail. The total cost of the 30-mile Central Massachusetts section is estimated at approximately $4,000,000, and to date, Wachusett Greenways has raised just under $1,600,000.

The proposed eastern segment of the MCRT, also known as the Wayside Rail Trail, will run from the town of Berlin, within the CMMPO region, east through the towns of Hudson, Sudbury, Wayland, Weston, Waltham and Belmont, which are in the Boston MPO region. There is currently a gap between the systems, due in part to the Wachusett Reservoir.

D.2.3 The Titanic Rail Trail

The Titanic Rail Trail is an approximately 80-mile designated multi-use path that is composed of seven individual multi-use paths (five in Massachusetts; two in Connecticut) between the towns of Franklin and Palmer in Massachusetts. The name was chosen in 2008 because of the history associated with the route that many of these trails follow after Charles M. Hays, President of the Grand Trunk Railways had a plan to develop a port connection in Providence, Rhode Island with the Grand Trunk's Central Vermont Railway in Palmer. In 1912, while returning home to Canada from a meeting in London with the Grand Trunk's financial backers, Hays booked passage home on the *Titanic* and was one of the passengers who perished. After his death**,** work continued on the route for a few years and the entire grade work in Massachusetts was completed, however bridges, track and ties along with the Rhode Island section were never completed.

The Titanic Rail Trail project is being spearheaded by the Grand Trunk Trailblazers, a grass roots organization based in Sturbridge that has been the major proponent, with assistance provided from the U.S. Army Corps of Engineers and local volunteers. The multiple paths are in various states of development with some portions completed and others in the process of being constructed. The following multi-use paths make up the entire Titanic Rail Trail and are identified by the towns each one passes through. For the purpose of this report, only the Massachusetts portions will be discussed in further detail below:

- <u>The Southern New England Trunkline Trail (SNETT)</u> – Franklin, Bellingham, Blackstone, Millville, Uxbridge, and Douglas, Massachusetts
- <u>Airline Trail</u> - Thompson, Connecticut
- <u>Trolley Line Trail</u> - Thompson, Connecticut
- <u>Perryville Trace (Part of the French River Greenway)</u> – Webster, Massachusetts
- <u>Quinebaug Valley Rail Trail</u> – Webster, Dudley, and Southbridge, Massachusetts and Thompson, Connecticut
- <u>Heritage Trail</u> – Southbridge, Massachusetts
- <u>Grand Trunk Trail</u> – Southbridge, Sturbridge, Brimfield, Monson and Palmer, Mass.

D.2.3.1 Southern New England Trunkline Trail

The Southern New England Trunkline Trail (SNETT), a former rail line, is a designated *National Recreation Trail*. Acquired by the Commonwealth in 1984, SNETT is a 21-mile long, multiple use trail that starts at Franklin State Forest in Franklin and passes through Bellingham and the CMMPO communities of Uxbridge, Millville and Blackstone before ending at the Douglas State Park. It connects to other trails that provide links to Rhode Island and Connecticut. The trail's surface is crushed stone and ballast. It is owned by DCR.

Within the towns of Blackstone and Millville, the DCR right-of-way generally follows the course of the Blackstone River. This section of the SNETT corridor has the potential to be incorporated into the Blackstone River Bikeway as well to become a linear component of the Blackstone River and Canal State Park.

D.2.3.2 Quinebaug Valley Rail Trail

In 2004, the state of Massachusetts purchased an 11-mile stretch of the Providence & Worcester (P&W) Railroad's abandoned right-of-way to be used as a recreational trail. This purchase was preceded by many years of public support led by the Grand Trunk Trail Blazers, a local bicycling

club that was organized in 1992 for the sole purpose of advocating the idea of converting the railway into a bike path. The proposed Quinebaug Valley Rail Trail uses the abandoned rail corridor that stretches from Webster's business district, briefly enters Thompson, Connecticut, then passes through Dudley and into Southbridge. Since that time, an advisory committee made up of local and state representatives has been working to develop a plan.
In October 2010, two sections of the trail were opened to the public through the efforts of that committee and volunteer labor. In Southbridge, 1,700 feet of the town's three-mile section was opened while work continues on the completion of an additional mile to the Dudley town Line. In Dudley, a 2.7-mile portion of the trail was opened to the public with a ribbon-cutting ceremony. The next phase of the project in Dudley will involve removal of railroad ties, trail grading and construction of a second parking lot on the remaining 4.6 miles to the Southbridge town line. The only remaining connection between the Massachusetts communities is the section of right-of-way in Thompson. The P&W is willing to sell that section of right-of-way; however, the state of Connecticut has yet to show interest in purchasing it.

D.2.3.3 French River Greenway Trail

This trail is proposed as a seven-mile multi-use trail which would start at the Quinebaug Rail Trail in East Dudley and extend north to Hodges Village Dam in Oxford. It would also connect to the Midstate Trail in Oxford. The *French River Connection* is a local advocacy group formed in the spring of 2005 to upgrade, protect and increase public awareness of the 26-mile French River that flows through the communities of Leicester, Auburn, Oxford, and Dudley, and joins the Quinebaug River in Thompson, Connecticut. This group feels that the section of the waterway in Dudley, Webster, and Oxford is particularly degraded, and needs to be cleaned up and protected so that it can be enjoyed.

Funding in the amount of $250,000 was released to the French River Connection for trail design as part of the Acts of 2006 in the Massachusetts Community Investment Capital Program. The Connection has also received both donations from private corporations and local non-profits to complete clean-up projects along the proposed trail, as well as to work with landowners to obtain right-of-way permissions for the other portions of the trail. On July 12, 2008, the Perryville Trace portion of the trail was formally opened to the public, and on October 24, 2009, the Leovich Landing paddling access point in Dudley was opened to the public. Finally, a Community Development Block Grant (CDBG) was awarded for the creation of the French River Park in Webster, which will anchor the Webster Riverwalk with the greenway trail.

D.2.3.4 Grand Trunk Trail

This trail, planned as a facility to provide a cross town trail through the Towns of Sturbridge, Brimfield, Monson and Palmer starts at the U.S. Army Corps of Engineers' Westville Lake area on the Sturbridge/Southbridge town line and runs westward along the abandoned Grand Trunk Railway right-of-

way, ending near the center of Palmer. Currently, a 2.25-mile segment is open to the public now from Westville Dam to the Ed Calcutt Bridge. In January 2011, a $51,795 contract was awarded to CME Engineering of East Hartford, Connecticut to provide engineering design and permitting for a ¾ mile portion of the Titanic Rail Trail, Grand Trunk Trail section from the Ed Calcutt Bridge to River Road. Of the $51,795 contract, $41,440 is being paid from a part of the larger Transportation Enhancements Act (TEA) grant awarded by MassDOT to the town, and the remaining $10,355 is appropriation from the Betterment Fund.

With the completion of this section of the Grand Trunk Trail, ½ of the approximately 6-mile route will be completed through Sturbridge. The Sturbridge Trail Committee is actively working on several other sections including engineering and design of the 1.2-mile River Lands portion, a grant from The Last Green Valley to complete a ¼ mile section of the Fiskdale portion, known as the Trolley Trail, and has applied for grants to complete the remaining ¼ mile section out to the East Brimfield Lake Dam. Also planned for the future is three miles of eastward expansion that would reach approximately one mile into Southbridge, resulting in a total trail length of 12 miles. This segment would link to the Quinebaug Valley Rail Trail in Southbridge. Portions of the trail in Brimfield, Monson and Palmer have been constructed, however these trails do not connect as a continuously improved segment.

The Towns of Sturbridge and Southbridge, the Opacum Land Trust (OLT) and the Army Corps of Engineers are the major champions of this trail. OLT is a Sturbridge based non-profit organization operated by volunteers. The Grand Trunk Trail Blazers, a non-profit group that promotes bike trails and events in the Sturbridge and Southbridge area, has also been an integral part of establishing this trail.

D.3 Planned Multi-Use Trails in Central Massachusetts

D.3.1 Quinsigamond Village Bikeway Spur

This project consists of constructing a new 0.7 mile off-road multi-use path, connecting the northern end of Segment 6 of the Blackstone River Greenway to McKeon Road Extension in Worcester. The work will include a 10 foot wide paved surface with paved shoulders and a chain link fence to separate users from the river embankment. The path will be adjacent to the Blackstone River between the new Wal-Mart Supercenter parking lot and the river embankment for the southern portion. The path will cross the Blackstone River on an existing bridge structure as an independent path, separated from traffic by concrete barriers, and then continue to McKeon Road Extension. The project is expected to be completed in 2011 at a cost of $1.25 million.

D.4 Other Trails in the Region

D.4.1 Mid-State Trail

The Mid-State Trail is a long-distance (92-mile) hiking trail that starts in the Montachusett Region on Route 119 at the base of Mount Watatic in Ashburnham. Here the trail connects with

the 20-mile long Wapack Trail in New Hampshire. The Mid-State Trail enters the CMMPO region in Princeton and continues into Hubbardston, which is in the Montachusett MPO region. The trail then reenters the CMMPO region and continues through the towns of Barre, Rutland, Oakham, Spencer, Charlton, and Oxford, ending in Douglas in the Douglas State Forest. This trail currently serves as the central trail spine in the region with much potential for connecting to local and interstate trail networks. Unfortunately only 50% of its land is permanently protected.

The route of the Mid-State Trail links some of the most scenic open space and state parks in Central Massachusetts, providing a greenbelt between public and semi-public properties. It is close to large population centers, yet it is remarkably wild and scenic. The existence of the trail was initially documented around 1926 when maps were published of a 22-mile footpath from Mount Watatic to Mount Wachusett. By the 1950's, the trail had become neglected and overgrown. In 1972, however, the Worcester County Commissioners established an advisory committee on trails with the goal of linking as many properties owned by the State and private organizations as possible. This resulted in the rejuvenation of the Mid-State Trail and in September 1985, the blazing of 85 miles of the Mid-State Trail was completed.

This trail can be enjoyed as a series of day hikes or as a backpacking excursion, as overnight opportunities exist along the trail. Within the CMMPO region, open-faced Adirondack shelters exist at the Rutland State Forest, Moose Hill in Paxton, Buck Hill in Spencer, and at the trail's southern terminus in the Douglas State Forest. Users of the trail are advised to respect the private landowners who have granted permission for hikers to cross their property. The trail is maintained and managed by the Midstate Trail Committee under the guidance of the Worcester chapter of the Appalachian Club.

D.4.2 Ware River Rail Trail

The Ware River Rail Trail follows 15 miles of a former rail corridor that passes through the Montachusett communities of Winchendon, Templeton, Phillipston, Hubbardston and the CMMPO community of Barre. Owned by DCR, this railroad right-of-way has much potential because of two right-of-ways that extend from it into New Hampshire, making it a key link between communities in the northern part of the CMMPO region to southern New Hampshire. Currently an unpaved portion of this right of way is open on an informal basis to the public through the Montachusett towns of Winchendon and Templeton only. DCR hopes to obtain future funding that would be used for surface and intersection treatments, bridge decking and trail signage. According to DCR, local support for this project has grown as more area residents become aware of the trail's potential.

The transformation of another section of rail corridor that follows the course of the Ware River is being planned for a 3.2 mile section that stretches from Ware to Hardwick and New Braintree. This is also part of the course of the overall Massachusetts Central Rail Trail. The major proponent of this recreational trail section, the East Quabbin Land Trust, has a vision that it will strengthen regional identity, preserve history, and enhance economic opportunities. A corporation, that was created to purchase and hold rail trail lands until local entities can raise sufficient funds, has purchased the 3.5 mile right-of way. The East Quabbin Land Trust is currently raising funds for the estimated acquisition cost of $80,000.

D.4.3 City of Worcester Trails

In addition to the multi-community, multi-use trails described above, many communities in the region have trail systems that serve as local recreational areas and are primarily located on conservation lands. For ease of reference, communities outside of Worcester have been grouped by subregion.

Through a partnership of the Massachusetts Audubon Society's Broad Meadow Brook Sanctuary, the Greater Worcester Land Trust, and the Regional Environmental Council, with the City of Worcester's Department of Public Works and Parks and Conservation Commission, a network of hiking and walking trails have been developed within the Worcester city limits over the last decade. These trails pass through and connect a number of scenic parklands that feature abundant wildlife, pristine water bodies, and historic sites.

The Cascades, an assemblage of parks and conservation lands (including Cascades Park, Boynton Park, and Cascades West, Cascades East, and Cascading Waters), encompasses over 350 acres of open space that stretches across the city line into the adjacent communities of Paxton and Holden. This area features three miles of walking trails that loop around the cascade falls that give name to the area, vernal pool kettle ponds and a stone amphitheater. The Tetasset Hills Regional Trail, Worcester’s largest and wildest network of trails, connects the Cascades Parklands with the Parson’s Cider Mill Park, the location of a home that was once part of the Underground Railroad.

The 3.5-mile East Side Trail begins at Cristoforo Colombo Park on Shrewsbury Street, and passes through Bell Park, Green Hill Park, and the Coal Mine Brook conservation holdings, which includes the historic 19th century coal mine.

There are several other trails in Worcester, including the five-mile trail on the Broad Meadow Brook Wildlife Sanctuary and various other parklands. All existing trails in the City of Worcester and adjacent communities are documented on maps in the trail guide “Out-of-Doors in Worcester”. It is available online at www.recworcester.org and a hard copy is available at the Broad Meadow Brook Wildlife Sanctuary, the Ben Franklin Antiquarian Bookstore across from the Public Library, and the Greater Worcester Land Trust, all located in the City of Worcester.

D.4.4 North Subregion Community Trails

D.4.4.1 Barre

The Department of Conservation and Recreation (DCR) owns a substantial amount of land in Barre's eastern corner and many of the properties have existing trails. The Midstate Trail extends through Barre's eastern corner in a north-to-south direction, just east of Harding Hill. The Mass Central Rail Trail does have the potential to extend through South Barre in an east-to-west direction along the old railroad grade near the Ware River, however plans for this portion of the trail have yet to be defined.

D.4.4.2 Holden

There is an existing interior trail system within the Trout Brook Reservation (managed by the Town of Holden) in the town's northern corner. There is also an existing trail loop on the nearby White Oak property, managed by the Massachusetts Division of Fisheries and Wildlife (DFW). The Mass Central Rail Trail extends through the northern half of Holden in an east-to-west direction and there are several trail systems on DCR lands located just south of the Rail Trail. The following roads in Holden have wide shoulders that are suitable for bicycle use: Main Street (Route 122A) south of its intersection with Shrewsbury Street, Route 122A west of Holden Center, and Broad Street (Route 68) from its intersection with Main Street to the Rutland town line.

D.4.4.3 Oakham

There is an extensive trail network within the DCR lands located in the north (near Coldbrook Springs) and the Mass Central Rail Trail extends through this area as well. The Midstate Trail passes through the southeast corner of Oakham, providing access to the Oakham State Forest.

D.4.4.4 Paxton

There is an extensive trail system within Moore State Park, and there are two Conservation Commission properties (the Smith Land and Clarkson Land) that have small trail systems associated with them. Boynton Park in the town's southeast corner also contains a short trail. The Midstate Trail, as currently situated, straddles a section of the Paxton/Spencer town line south of Marshall Street, providing access to the Moose Hill Wildlife Management Area.

D.4.4.5 Princeton

Extensive trail systems can be found within Leominster State Park and Wachusett Mountain State Reservation, and the Midstate Trail provides access to both of these areas. There is a short trail within the Minns Wildlife Sanctuary at Little Wachusett Mountain. There is also a trail that starts at the end of Bigelow Road, crosses the Midstate Trail and extends southeast to Dowd Lane, Ridge Road in Rutland, before eventually reaching the protected lands (City of Worcester) around the Quinapoxet Reservoir. The Wachusett Greenways Guide has designated this on-road trail system as the "Ridge Road Walk." The Town has plans to create a trail through some DCR property between Route 31 and Coalkiln Road that will eventually link to the existing Thomas Prince School nature trails.

D.4.4.6 Rutland

The Mass Central Rail Trail extends through Rutland in an east-to-west direction. The Midstate Trail extends through North Rutland in an east-to-west direction, providing a link to the extensive DCR landholdings and eventually the trail system within Rutland State Park. The following local roads provide a link from Rutland State Park to the protected lands (City of Worcester) around Pine Hill Reservoir in the town's southeast corner: Ware Road, Prospect Street, Irish Land and Emerald Road. The Wachusett Greenways Guide has designated this on-road trail system as the "Country Roads Walk."

D.4.4.7 West Boylston

The Mass Central Rail Trail extends through the northwest corner of West Boylston. This section of the Rail Trail is one of the most scenic segments and is extensively used by the public. It should be noted that the abandoned portion of Pleasant Street (west of Route 140) will eventually become part of the Rail Trail once the Town completes the necessary site work. Route 140 has recently been widened to include wide paved shoulders suitable for bicycle use. Route 110 also has wide paved shoulders that can accommodate bicycles.

D.4.5 Northeast Subregion Community Trails

D.4.5.1 Berlin

There is an off-road trail that goes around the perimeter of Gates Pond (the land is owned by the Town of Holden). There is a trail system that traverses several properties in the northern corner of town, including: Garfield Woods (owned by the Sudbury Valley Trustees), the Forty Caves property, and the Musche Woods property (both are Berlin Town Conservation Land). Other off-road trails can be found within the Mount Pisgah Conservation Area; the Douglas Conservation Area near North Brook: and the Tyler Conservation Area and Brewer Brook site located off of Pleasant Street.

D.4.5.2 Boylston

Although DCR does have numerous landholdings in Boylston, there are currently no official off-road trail systems in town. There are several access roads on DCR lands that can be used to gain access to the Wachusett Reservoir, however DCR does not publicize their availability to the general public. It should be noted that Routes 70 and 140 through Boylston both have wide paved shoulders suitable for bicycle use.

D.4.5.3 Northborough

There is an off-road trail network associated with the State-owned Northborough Forest area in the northwestern corner of town. This trail network extends through several Town-owned conservation properties and eventually links up with the Mount Pisgah trails in Berlin. There are also some trails on the State-owned Cold Harbor Brook Dam property, as well as the Town-owned Edmond Hill property and Algonquin Regional High School. An extensive trail system can be found in the southeastern corner of town in the vicinity of Cedar Hill. This trail system is located on several State-owned parcels (DCR and DFW) and a few properties owned by the Sudbury Valley Trustees. This particular trail system extends into Westborough at no less than three locations.

D.4.5.4 Shrewsbury

Although the Town owns a number of permanently protected open space parcels, the only existing off-road trail in Shrewsbury is associated with Dean Park located near the intersection of Main Street and School Street.

D.4.5.5 Westborough

There are numerous hiking trails scattered throughout Westborough at the following locations: the Westborough Reservoir and Conservation Land property; the DCR-owned land just below the Suasco Reservoir; the Westborough Country Club property adjacent to the Suasco Reservoir; the DCR-owned Cedar Swamp property; and the Walkup Reservation owned by the Sudbury Valley Trustees. An extensive trail network can be found on the DFW-owned property to the west and south of Chauncy Lake (with an extension into Northborough), the DCR-owned and DFW-owned properties in the vicinity of Crane Swamp (once again with an extension into Northborough), and the Sawink Farm property in the northeastern corner of town owned by the Sudbury Valley Trustees (yet another extension into Northborough).

D.4.6 Southeast Subregion Community Trails

D.4.6.1 Blackstone

A portion of the Southern New England Trunkline Trail (SNETT) extends through the south of Blackstone in a west-to-east direction, traversing the center of town. There is also a small trail spur that begins in the center of town along the Blackstone River that extends into North Smithfield, Rhode Island.

D.4.6.2 Douglas

There is an extensive trail system throughout the interior of Douglas State Forest and the Douglas Woods, part of which constitutes a section of the Midstate Trail. The Midstate extends through the length of Douglas State forest in a north-to-south direction. A portion of the Southern New England Trunkline Trail (SNETT) can also be found in Douglas, beginning in Douglas State Forest and extending through the town in a west-to-east direction. The SNETT and the Midstate do connect within Douglas State Forest. Part of the SNETT parallels the Titanic Rail Trail idea being investigated by this study.

D.4.6.3 Grafton

Several properties managed by the Grafton Land Trust have trail systems within them, most notably the Brigham Hill Wildlife Area and the Gummere Wood and Marsters Preserve. There are some trails associated with the Grafton Conservation Area at Merriam Road. There is also an off-road trail that links Salisbury Street with Fargo Street in south Grafton, traversing through what is known as the Parker/Macomber Land.

D.4.6.4 Hopedale

There is an existing trail system within the town-owned Parklands conservation area, however the full extent of the trail system has never been mapped.

D.4.6.5 Mendon

There is a trail network within the Quisset Wildlife Management Area that straddles the Mendon/Blackstone town boundary however its full extent has never been mapped. There may be some interior trail systems associated with the Mendon Town Forest in the Chestnut Hill area, but once again they have never been mapped.

D.4.6.6 Millbury

There is a trail system within the Martha Deering Wildlife Management Area (WMA) on the Millbury/Grafton town line. Another trail system can be found within the protected backland of the Elmwood Street School. Trail networks can also be found in the vicinity of the Davidson Bird Sanctuary and the Stowe Meadows Conservation Area in the western part of town, and a small trail system can also be found in the vicinity of Brierly Pond. There are a few trail networks located on private unprotected land, specifically within the area between Park Hill and Howe Reservoir. The Town is currently working on creating the Millbury Branch Rail Trail that will begin along Canal Street in the center of town and extend north until stopping just shy of the Mass Turnpike (this rail-trail will also provide a connection to the trail system within the Martha Deering WMA). The Blackstone Valley Bikeway will extend through Millbury in a north-to-south direction once construction is complete. The Town hopes to forge a link between the Blackstone Valley Bikeway and the Millbury Branch Rail Trail in the future.

D.4.6.7 Millville

The SNETT extends through Millville in a west-to-east direction. There are plans to create a trail spur from the Blackstone River & Canal Heritage State Park that will link to the SNETT. There may be some interior trail networks within the Town Forest, the Elementary School, the abutting King Property and the Iyons Preserve, but they have never been mapped.

D.4.6.8 Northbridge

The Shining Rock Trail network is located in the northeast corner of town, extending out of the town-owned Shining Rocks Conservation Area. There are trails throughout the Upton State

Forest parcels located in the eastern corner of town; however, they have never been fully documented. The Town is planning to create the Northbridge Bike Route that will traverse the western corner of town with an anticipated link to the Blackstone Valley Bikeway at its southern end and a link to the Lake Manchaug Greenway & Wildlife Corridor in Sutton at its northern end. The Blackstone Valley Bikeway will extend through Northbridge in a north-to-south direction once construction is complete.

D.4.6.9 Sutton

Sutton can be seen as the fulcrum that will eventually tie together many of the region's premier trail projects. The largely completed Lake Manchaug Greenway & Wildlife Corridor begins in the vicinity of Purgatory Chasm and Sutton State Forest. The trail extends west, forging a connection with the Midstate Trail. The Midstate in turn connects to the SNETT in Douglas, that will in turn connect to the Blackstone Valley Bikeway in Uxbridge, that will in turn connect to the planned Northbridge Bike Route that will eventually connect back to the Lake Manchaug Greenway, thus completing the loop. A small section of the Blackstone Valley Bikeway extends through the northeast corner of town before extending south into Grafton and Northbridge.

D.4.6.10 Upton

Upton has an extensive series of off-road hiking trails located throughout Upton State Forest which consists of large tracts of protected land scattered throughout town. There is a small off-road trail associated with the municipally-owned Peppercorn Hill property, located north of East Street.

D.4.6.11 Uxbridge

There are several existing and planned trails within the Blackstone River & Canal Heritage State Park in the north of town. The Blackstone Valley Bikeway extends through Uxbridge in a north-to-south direction before linking to the SNETT near the southeast corner of town. The SNETT extends through Uxbridge in a west-to-east direction. There may be trails associated with the Town Forest, Hale Swamp, Legg Farm and Pout Pond, but they have never been documented.

D.4.7 Southwest Subregion Community Trails

D.4.7.1 Auburn

Although the Town contains over 716 acres of permanently protected land (town, state and federal lands), there is only one formal trail system existing on the ground in Auburn. The Conservation Commission manages the 80-acre Gilbert Stockwell property on the eastside of Town, off of Barnes Street. A trail runs through the property, part of which is a former gravel pit. Cross-country skiers have been known to make use of Packachoag Meadows and the Packachoag Park Golf Course, however, no formal trails exist at these sites.

D.4.7.2 Charlton

The Midstate Trail passes through Charlton in a north-to-southeast direction. Much of Charlton's portion of the Midstate consists of off-road trails, although several local roads are also used. An extensive trail system can be found all around the Buffumville Reservoir recreation area. The U.S. Army Corps of Engineers (ACOE) manages the 488 acres of the Buffumville Reservoir, and its trail network is extensively used for a variety of recreational activities. There is also an interior trail system within the Capen Hill Nature Sanctuary (managed by a non-profit), although the system has never been mapped.

D.4.7.3 Dudley

The Town contains roughly 1,800 acres of permanently protected open space, however most of this is farmland protected under the State's Agricultural Preservation Restriction (APR) Program and is not available for recreational purposes. There is an extensive trail system within Ardlock Acres, a 94-acre property south of Indian Road managed by the Dudley Conservation Commission. The Ardlock Acres trail system represents the Town's most extensive trail system open to the general public.

D.4.7.4 Oxford

The Midstate Trail passes through Oxford in a west-to-east direction, primarily along local roads. The Midstate Trail travels the length of Worcester County from Ashburnham near the New Hampshire line to its southern terminus at the Douglas State Forest/Rhode Island border. The Midstate Trail Committee manages the Trail and annually organizes volunteers to keep the trail clean and well marked. There is also an extensive trail system within the Hodges Village Dam property in the center of Town. The U.S. Army Corps of Engineers (ACOE) manages the 874-acre property and its trail network is used extensively for a variety of recreational activities.

D.4.7.5 Southbridge

The Town's primary trail network lies within the Westville Dam Recreation Area, a 93-acre flood control project managed by the U.S. Army Corps of Engineers. The Titanic Rail Trail is the primary trail on this property, and it extends into neighboring Sturbridge on the northern side of the Quinebaug River. The U.S. Department of the Interior designated the Titanic Rail Trail part of the National Trails Network in 2001. The Town has also completed a section of the planned Quinebaug River Heritage Nature Trail south of the Quinebaug River. This portion of the trail links downtown Southbridge with the Westville Lake Recreation Area. Plans are in the works for connecting the Grand Trunk Trail and the Heritage Nature Trail via a footbridge over the Quinebaug River in Sturbridge.

D.4.7.6 Sturbridge

As mentioned above, plans are in the works for connecting the Grand Trunk Trail (north of the River) and the Heritage Nature Trail (south of the River) via a footbridge over the Quinebaug River, just off River Road in Sturbridge. There is an extensive trail network within Wells State

Park, a 1,470-acre nature area managed by the Department of Environmental Management (DEM). There are also trails within the Streeter Point Recreation Area, located at the southern end of Long Pond. The dirt road that encircles Alum Pond is also used as a trail. There are trails within the Breakneck Brook Wildlife Management Area (managed by the Division of Fisheries & Wildlife), however, they have never been formally mapped.

D.4.7.7 Webster

Although the Town owns a number of permanently protected open space parcels, the only existing trails in Webster are associated with the Memorial Beach property at Webster Lake. The Town's Recreation Department manages the trails at this site.

D.4.8 West Subregion Community Trails

D.4.8.1 Brookfield

There are two formal trail systems in town open to the general public. The first is associated with the Quaboag Wildlife Management Area (WMA) that fronts along the Quaboag River and contains a long stretch of Burr Brook. Located in the western part of town along the boundary with West Brookfield, the WMA can be accessed from Long Hill Road. The second trail system is associated with the Wolf Swamp WMA in the south of town.

D.4.8.2 East Brookfield

Informal trail systems exist throughout East Brookfield's rural landscape to the south of Route 9 and the town center area, particularly in the vicinity of Carpenter Hill, Stone Hill, Wheelock Hill and Teneriffe Hill. Unfortunately, these informal trail systems have never been mapped.

D.4.8.3 Hardwick

An off-road trail system has been mapped within the Muddy Brook WMA, and the protected lands associated with the Quabbin Reservoir District most certainly contain trails, although they have never been mapped. A portion of Melon Road between its intersections with Breen Road and Route 32A is also used informally as a local trail, as is a long stretch of Charity Road. Hardwick's premier trail project is the yet to be constructed Central Ware River Valley Rail Trail that will make use of the former Boston & Maine Railroad bed located along the town's eastern boundary. This rail trail idea would make use of a ten-mile abandoned rail corridor between the towns of Ware and Hardwick. A feasibility study was prepared for the Hardwick portion in September 2000, and the Town is now in process of securing funds for an engineering study. Engineering work has already begun along the Ware portion of the trail. It will be a bit more difficult to get started in Hardwick, as there are several sections under private ownership, including a right-of-way owned by National Grid. Outright purchase of the trail path or easement agreements will be required before the Town can move forward with construction.

D.4.8.4 Leicester

A section of the regional Midstate Trail dips into the northwest corner of Town and there are numerous trails (mostly little-used dirt roads) located within the protected watershed lands in the northeast section of Town. The City of Worcester's Water Department owns and manages the watershed properties. Sylvester Street forms a portion of the Tatnuck Bike Trail that extends into Worcester just south of the airport. There is also a dirt road extending off of Watson Street and continuing south of Shaw Pond that is used informally as a local trail.

D.4.8.5 New Braintree

There is an informally used dirt road that extends from Davis Road, continues west crossing McKay Road, concluding at its intersection with West Road. There is another informally used dirt (more of a path at this point) road that extends south from Old Common Road until it connects with the intersection of Webb Road and Murphy Road. Another informally used dirt road extends north from Sibley Road, crosses the Ware River along Creamery Road, and eventually links to the former Boston and Maine Railroad just north of Gilbertville Village in Hardwick. There is also an abandoned railbed extending off of the former Boston and Maine Railroad (located in the northwest corner of town) that is also used informally as a trail.

D.4.8.6 North Brookfield

Informal trail systems exist throughout North Brookfield, particularly in the vicinity of the Five Mile River near the Town's eastern boundary. Unfortunately, these informal trail systems have never been mapped. There are several dirt roads within the Audubon properties located in the south of Town.

D.4.8.7 Spencer

A large stretch of the regional Midstate Trail extends through Spencer in a north-to-south direction, and there is an interior trail system associated with Spencer State Forest. However, the Town's premier trail planning project is the Depot Road/Town Center Trail, currently in progress. This trail makes use of abandoned railroad right-of-way located south of Route 9 and the downtown area. Once complete, the trail will connect O'Gara Park with Depot Road and South Spencer Road. Roughly two miles in length, the trail passes north of Spencer State Forest property and a formal connection to the Forest may be established at some point. Originally under the sponsorship of the Spencer Conservation Commission, advocates for this trail have established a non-profit entity, known as Spencer Trailways Inc., to manage this project. Remaining work includes grading in places and placement of stone dust.

D.4.8.8 Warren

Informal trail systems exist throughout the rural areas of Warren, however, the bulk of them have never been mapped. There is an interior trail system associated with the Palmer WMA, located in the northwest section of Town. There is also a series of informally used trails in the vicinity of Devil's Peak in the southwest corner of town.

D.4.8.9 West Brookfield

There is an extensive interior trail system associated with some properties under the ownership of the Trustees of Reservations (a non-profit land trust). These properties are located in the northwest corner of town, between West Main Street (Route 9) and Lyon Road. Additionally, there is a trail system associated with the Quaboag WMA in the south of Town, just south of the Quaboag River. West Brookfield also contains many dirt roads that are informally used as local trails.

E. CONNECTIONS WITH TRANSIT

The ability to connect walking and bicycling with transit service is ideal because these modes can work together in providing additional mode choice in getting to a destination without the use of an automobile. Most transit services, whether bus, rail or subway, in major eastern U.S. cities were developed around locations where walking was prevalent and development densities were high. As many of these older systems (and newer systems that have been developed in newer urban areas of the Southwestern and Western U.S.) stretched out of urban cores and into suburban areas, the ability to close distances with walking or bicycling facilities has become a focus again.

In the Central Massachusetts region, the Worcester Regional Transit Authority (WRTA) provides fixed route and paratransit bus service, and the Massachusetts Bay Transportation Authority (MBTA) provides commuter rail service between Boston and Worcester. Additionally, Peter Pan Bus Lines and Greyhound Bus Lines provide intercity bus service to many destinations throughout New England and New York, and Amtrak provides intercity rail service between Boston and Chicago through Worcester. All but the WRTA provides service to and from Union Station; however, the WRTA provides service to Union Station with seven bus routes.

E.1 WRTA

All WRTA fixed-route buses are equipped with bicycle racks that can accommodate up to two bicycles. All WRTA drivers are trained to operate the rack and provide customer service for new bus riders who may also want to use the bicycle rack. Bicycles are not allowed inside of the bus at any time.

Within the City of Worcester, the WRTA operates in densely developed neighborhoods and allows for easy walking access to Union Station from its bus stop on Foster Street. Many of the city’s neighborhoods have sidewalks that provide easy walking access to the bus routes; however, some sidewalks are in poor condition. Outside of Worcester, sidewalks are less prevalent, particularly along some of the community routes in the Brookfields, Leicester and Oxford.

E.2 MBTA

Bicycles are allowed on MBTA commuter rail trains at all days and times except for weekday rush hours (morning inbound/evening outbound). Folding bicycles are allowed on trains at any time of the day. All patrons who bring their bicycles onto a commuter rail train must follow instructions by the conductor and stow their bicycles as far away from the central aisles as possible. The MBTA is currently examining a relaxation of peak hour restrictions for bicycles on commuter rail on less crowded lines. In summer 2010, the MBTA provided a bicycle coach car on its Newburyport/Rockport line and saw over 2,800 daily bike boardings.

While some commuter rail stations are located in town centers, most newer stations are located in areas designed as "park and ride" stations. In the CMRPC region, Grafton and Westborough are two examples of park and ride commuter rail stations; however, they include bicycle parking that is frequently used (see photo). These stations do have limited ability to walk or bike to them and, while they are equipped with bicycle racks, are usually too far away from residences to encourage regular commuting by bicycle. They are also not served by bus routes, making driving a car the only option to get to them. Other stations, such as Union Station, are located in downtown areas or town centers and can be accessed by either walking, bicycling or taking transit.

E.3 Peter Pan/Greyhound

Peter Pan and Greyhound Bus Lines provide intercity bus service from Union Station throughout the six New England states and make connections with other carriers in places like New York City and Washington, DC. Pedestrian access to the bus depot of Union Station is the same as to the train platform. Bicycles are allowed on Peter Pan and Greyhound buses, unpackaged or packaged, as part of the Free Baggage Allowance, however if the number of bags with the bicycle exceeds the allowance, the customer is charged for each item exceeding the allowance at current carrier rates.

Unpackaged bicycles are only to be transported in an empty cargo bin on a space-available basis. If an empty bin is not available, the customer must wait and try the next available schedule, or purchase a bicycle box to take the current schedule. Bicycle boxes can be purchased at most Peter Pan Bus stations for $15.00. Storage charges are waived for customers who have already paid for excess, oversize, overweight baggage or a bicycle box.

E.4 Amtrak

Amtrak provides intercity rail service from Boston through Worcester to Chicago daily with a stop at Union Station on the *Lake Shore Limited* train. Amtrak has a number of options for transporting bicycles depending upon the train service provided in the area. Options include bicycles being stored onboard in bike racks, as checked baggage in a box or other secure container, as checked baggage secured by tie-down equipment (not in a box), or folding bicycles brought onboard as carry-on baggage.

Within this area, the *Lake Shore Limited* only allows standard bicycles as checked baggage in a box or other secure container. Patrons may either bring their own container specifically designed for transporting bicycles with handles or purchase a bicycle box at the Amtrak ticket window at Union Station for $15 per box. An additional fee for checking a bike as baggage is $5 and patrons must check their bicycle at least an hour before departure.

III-F. INTERMODAL FREIGHT OPERATIONS

A. INTRODUCTION

Since 1980, with the passage of the *Staggers Rail Act*, rail freight has received a major boost from the growth of *intermodal shipping*, an approach that emphasizes the efficient movement of goods regardless of the transportation mode. The operation is called *intermodal* because more than one mode is utilized. Specially designed intermodal containers enable cargo to be transferred easily from one mode to another. For example, an intermodal container packed with goods may arrive by ship, be transferred onto a train for another leg of the journey and eventually reach its final destination by truck. A significant amount of freight imported and exported by the United States is transported in intermodal containers. The many advantages of container shipping include cost efficiency, energy savings, and flexibility. Nationally, the number of intermodal rail shipments has been increasing, rebounding from the economic downturn in 2008.

When intermodal containers are shipped by rail, they are most often “double-stacked”, one on top of another. Specially designed railcars, 300 feet in length (articulated in four places to handle curves in the track), are typically used to carry double stacked containers of varying lengths: 20’, 40’, 45’, 48’ and the maximum 53’. Double stacked railcars usually ride more smoothly than conventional railcars, resulting in less damage to the cargo. High cube container heights of 9’-6”, when double stacked, require a vertical clearance of 20’-8”. This clearance requirement has necessitated millions of dollars in railroad infrastructure improvements, particularly in the Northeast, funded in large part by private sources and, in some cases, public-private partnerships.

On a cross-country or “long-haul” basis, proponents indicate that double stack railcars are four times as efficient as tractor-trailers and often just as fast. A container pulled by a tractor-trailer across the entire country will consume approximately 600 gallons of fuel as compared to 150 gallons per container when double stacked on a train. Often, a container typically takes six to seven days by rail, compared to four days by truck with a team of two drivers. However, often times, only a single driver completes the trip, which usually increases trip duration to a comparable six days.

Aerial images of the region’s major intermodal freight facilities, shown in Figure III-41, have been placed on a map showing the greater region’s railroad network, the designated roadways of the NHS and established NHS Connectors. As can be seen from the graphic, not all of the region’s intermodal yards are located on the NHS. Each aerial image has been numbered to correspond to the site listing below, which also summaries the various features of each intermodal facility.

The images, produced using the Pictometry software package, have been used as part of an overall effort to display visualization materials that show the location and extent of each intermodal facility, highlighting the importance of each to freight movement and the economic vibrancy of the greater region. *When displayed at public outreach meetings, it has been observed that many participants had previously been unaware of the extent and critical importance of the region's intermodal freight transload facilities.*

B. ESTABLISHED INTERMODAL SITES

B.1 Town of Barre

Wildwood Reload (served by the MassCentral Railroad) - Major features of the South Barre site, now known as the Phoenix Plaza industrial park, include expansive unloading and outdoor storage areas, on-site break bulk and warehousing, and local "last mile" delivery services. A large salt shed recently constructed by American Rock Salt is on-site.

B.2 Towns of East Brookfield & Spencer

New England Automotive Gateway (NEAG) (served by the East Brookfield-Spencer Railroad adjacent to the CSX Boston line) - Major features of the NEAG site include expansive unloading and outdoor storage areas, a gated and secure perimeter, sound attenuation walls and vegetation, railcar storage tracks and an outdoor railcar repair area.

B.3 Town of Grafton

North Grafton Freight Facility (served by the Grafton & Upton Railroad adjacent to CSX Boston Line) - Major features of the G&U site include a cross-dock freight transfer building, railcar sidings and highway trailer storage. Efforts are ongoing to fully revitalize and expand the operations of the G&U.

B.4 Town of Hopedale

Grafton & Upton Railroad revitalization effort now underway; includes modernized intermodal freight facilities. Major features of the revitalized Hopedale intermodal facility include:

- Rail served warehouse facility
- Sites ideal for light industry
- Future potential for MBTA Commuter Rail extension being explored by G&U ownership
- Located near former Draper Mill complex redevelopment site, a potential Transit Oriented Development (TOD) candidate

B.5 Town of Upton

Grafton & Upton Railroad revitalization effort now underway; includes modernized intermodal freight facilities. Major features of the revitalized West Upton site include:

- Dormant rail yard being reconstructed
- Highway access to nearby Routes 122, 140, 146, I-495 and MassPike (I-90)
- Potential COFC transloading operations
- Materials storage and distribution

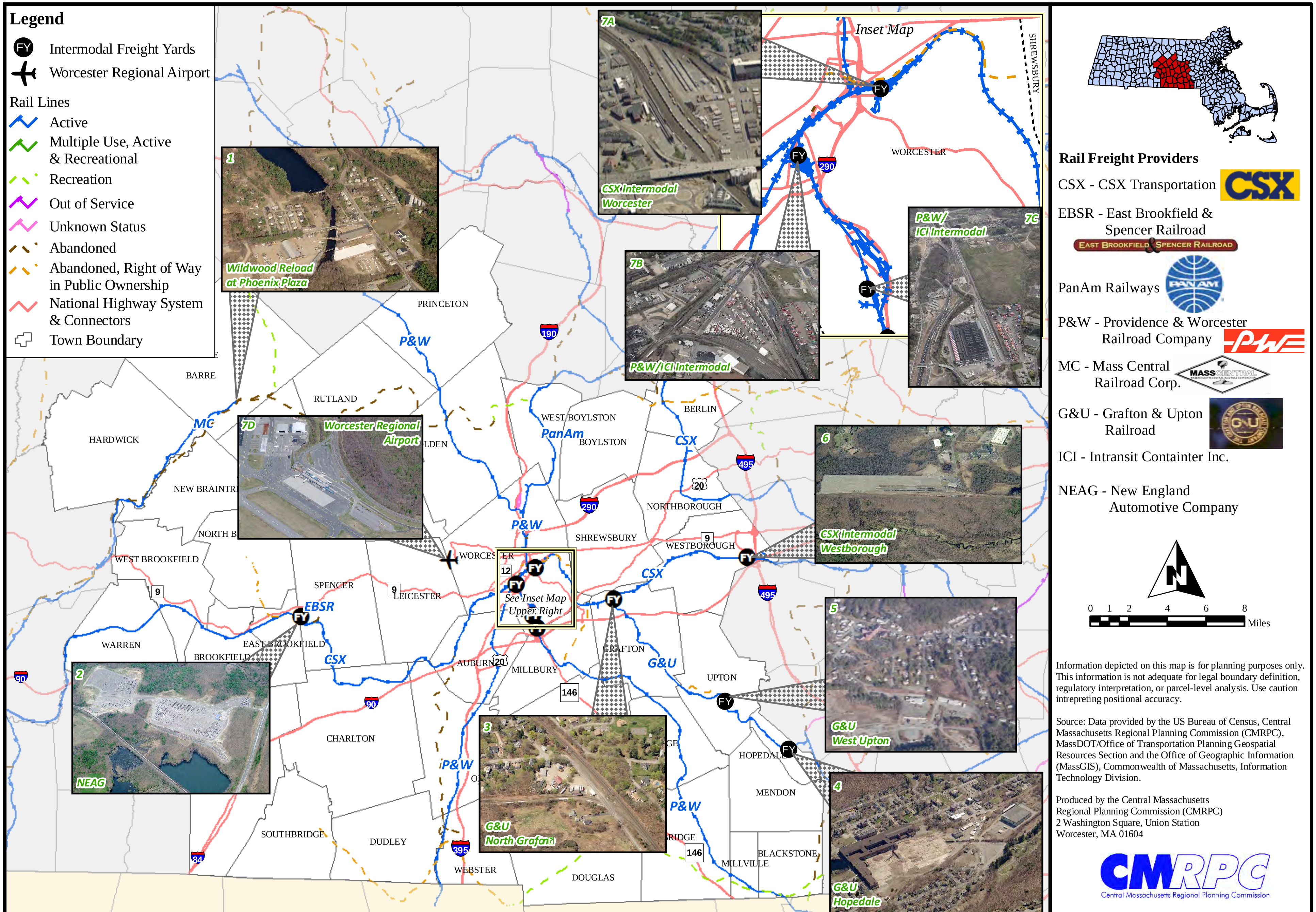


Figure III-41 Central Massachusetts Regional Freight Network Intermodal Facilities

B.6 Town of Westborough

CSX Westborough Yard - Major features of this CSX site, now poised for reconstruction, include a Tate & Lyle bulk transfer station for food products including grains, syrups and oils. Although former automotive transload operations at this site are dormant, under agreement with the state, CSX will reconstruct the Westborough site and establish a modern bulk materials transloading facility. Materials currently handled elsewhere, such as Worcester and Allston-Brighton, will be handled at the Westborough site.

B.7 City of Worcester

B.7.1 CSX East Worcester Yard

Major features of this site, now undergoing a massive expansion effort, include COFC and TOFC handling facilities, bulk materials transloading, chassis storage, a railcar repair area and the ability to accommodate oversized rail freight loads. CSX officials have noted approximately 100,000 annual lifts at this major 24x7x365 facility. Major customers include:

UPS
Schneider National
J.B. Hunt
YRC Worldwide
CSX container and chassis pool

Just east of Worcester's Union Station Intermodal Transportation Center (ITC) for passengers, a multi-track MBTA passenger train layover and light maintenance facility is located adjacent to the CSX intermodal yard. Notably, the front entrance of Union Station is located directly on the Washington Square modern roundabout, part of the NHS.

B.7.2 P&W Railroad - Intransit Southbridge Street Yard

Major features of the P&W site include:

- The railroad's administrative headquarters
- Freight classification yard
- Regional locomotive repair facility (with drop table and custom wheel grinding capabilities)
- Enclosed transload facility for the shipping of hazardous materials such as contaminated soils
- Public scale facilities for tractor trailers

It should be noted that the COFC operations of Intransit Container Inc. at the Southbridge Street Yard have been consolidated to the Wiser Avenue Yard due to the economic downturn. Excess ICI truck chassis are stored at this location. In late 2009, a rock salt storage and distribution facility began operations at the Southbridge Street Yard.

B.7.3 Intransit Container Wiser Avenue Yard (served by P&W Railroad)

Major features of the Intransit site include:

- Efficient COFC transloading
- Excellent access to state numbered Route 146, nearby U.S. Route 20, I-290 and the MassPike (I-90)
- Container and chassis storage

All COFC operations of Intransit Container Inc. have been consolidated to the Wiser Avenue Yard due to the economic downturn. Operations at P&W's Southbridge Street Yard have ceased for the time being. In late 2009, a rock salt storage and distribution facility began operations at the Southbridge Street Yard where COFC transloading and storage formerly occurred. Excess ICI truck chassis are currently stored at the Southbridge Street location.

B.7.4 Worcester Regional Airport

Major features of the MassPort owned and operated airport facility include:

- 7000' main runway available for commercial aircraft up to Boeing 757
- ILS Category I
- Limited commercial passenger airline service provided by Direct Air
- Limited air freight services
- Aircraft hangers and aviation fuel services
- Private aircraft tie downs
- Parking; *currently far underutilized*
- Automobile rental

C. INTRANSIT CONTAINER INCORPORATED (ICI)

C.1 Background

In 1987, Intransit Container Incorporated (ICI), in partnership with the Providence & Worcester Railroad Company (P&W), established a 12-acre double stack intermodal "Container Freight Station" (CFS) or "container yard" on the railroad's property adjacent to Southbridge Street in the city of Worcester. Two years later in 1989, when the partnership outgrew the Southbridge Street Yard, ICI and P&W together invested approximately $5 million to develop and establish a second and larger (20-acre) double stack intermodal CFS on ICI owned property located off Wiser Avenue (Greenwood Yard) in South Worcester. P&W provides the rail freight transportation and independent operators ICI perform the loading, transfer and distribution of the intermodal containers between the trains and trucks. Both terminals have heavy lift capacity of 90,000 pounds as well as truck chassis pools. The location of these two facilities in relation to the region's major rail lines can be viewed on the inset map previously shown on Figure III-26. An aerial view of ICI's Wiser Avenue facility is shown in Figure III-42.

The information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

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Figure III-42
Intransit Container Inc. Wiser Avenue Intermodal Facility & Nearby P&W Transload Facilities Aerial View with Major Features

CMRPC
Central Massachusetts Regional Planning Commission

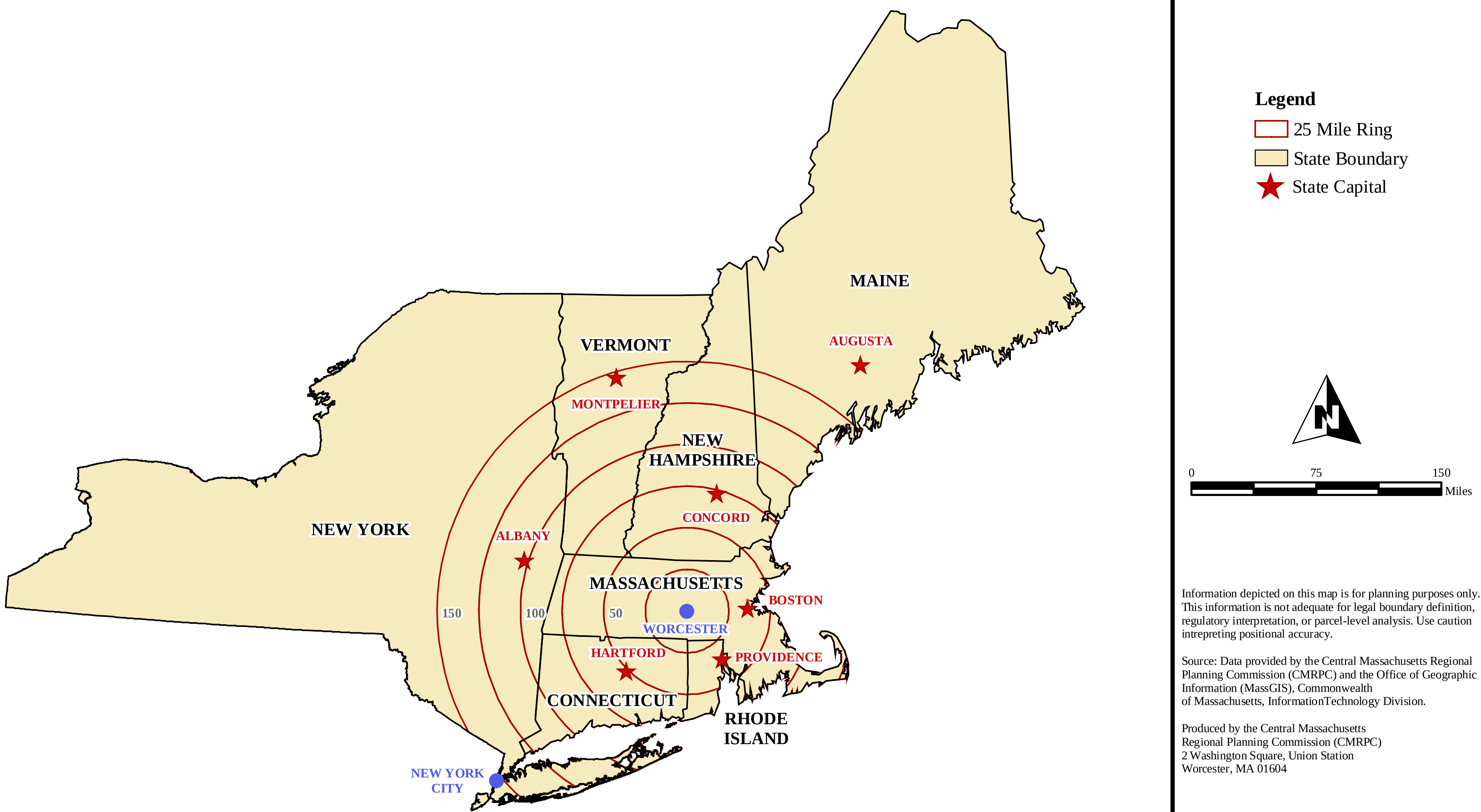
C.2 Intermodal Container Yards

P&W owns and ICI operates two intermodal container yards in Worcester, the “Southbridge Street Yard” and the Wiser Avenue “Greenwood Yard”. ICI notes that Worcester has the status of an *Inland Port*, as both of the P&W/ICI facilities are “customs bonded”. This means that U.S. Customs officials based in Worcester are able to collect duties and other levies on cargo that arrives at the “The Port of Worcester” from such “true” seaports as Los Angeles or Seattle. *At this time, ICI operations at the Southbridge Street intermodal yard are dormant, with the notable exception of chassis storage. ICI consolidated operations to the Wiser Avenue facility due to the economic downturn of 2008.*

According to ICI officials, the partnership’s Worcester facilities are the largest and most modern double stack intermodal rail terminals in New England, offering excellent access to the major markets in the entire six state region. In many cases, shippers prefer Worcester to Boston. Boston’s congested traffic conditions can lead to problems in meeting tight delivery deadlines. They also find the region well suited for distribution and warehousing activities. Both of the ICI/P&W terminals are strategically located in respect to the regional highway system. Interstates 190, 290, 395, the Mass Pike (I-90), as well as State Route 9 and U. S. Route 20, all radiate from Worcester’s central location. Container freight arriving in Worcester can be distributed with relative ease to anywhere in New England, resulting in notable savings on drayage charges for those shipping the containers. Worcester’s strategic location in relation to major New England markets can be seen in Figure III-43.

C.3 Existing Operations

Most intermodal containers arriving at ICI’s Worcester Yards carry goods from the Pacific Rim. The containers arrive, double stacked, in Worcester by train from the West Coast and are subsequently transported by truck to their final destinations throughout New England. ICI’s steamship line customers utilize the Worcester facilities for Mini-Land Bridge (MLB) moves that formerly terminated in Boston. Intermodal container service has established Worcester as a major transportation hub for the entire New England area and Massachusetts in particular. As the nation recovers from the economic downturn, ICI has the capacity to accommodate nearly 1/3 of the Commonwealth’s projected container traffic. The Worcester Yards operate 24/7. ICI offers state of the art computerized container tracking and information systems, utilizing some of the best in-house computer software programs in the industry. These programs allow ICI to provide timely, personalized service to their customers.



Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC) and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

Produced by the Central Massachusetts Regional Planning Commission (CMRPC)
2 Washington Square, Union Station
Worcester, MA 01604

Figure III-43 Worcester: The Intermodal Hub of New England

C.4 Current Issues

Empty Return Containers
When intermodal containers are returned to their point of origin, for example, the Pacific Rim, ideally they should be loaded with “domestic traffic”. Domestic traffic consists of locally produced raw materials or manufactured products. However, the New England region as a whole consumes far more than it produces for export. *(Maine is the only New England state where exports outweigh imports, attributable to the forest product industry.)* As such, empty return intermodal containers have been an ongoing challenge. For ICI, the ratio between empty containers to loaded containers being shipped out of the region range between 2:1 and 3:1. As such, ICI/P&W’s search for “backhaul” opportunities is ongoing. Hardwood logs and scrap paper are examples of commodities that ICI exports to Canada for their customers, reducing the number of empty containers leaving the region.

C.5 Future Projections

C.5.1 Intermodal Plans

Prior to the economic downturn in 2008, in order to relieve capacity constraints due to a steadily increasing number of handled containers, P&W and ICI were exploring prospects to expand their intermodal facilities and operations in the city of Worcester. Landlocked, there exists minimal opportunity for expansion at either the Southbridge Street Yard or the Greenwood Yard. Adequate storage space for both intermodal containers and truck chassis is critical for expanding operations. The possibility of using capped property at the former Worcester Landfill for expansion, up to 50 acres, was explored in the past. Although the landfill site has contiguous access to Route 20, it presents many challenges. Due to a recapping effort and ongoing environmental testing by the city, as well as the reduction in the number of containers handled, expansion efforts now hold a lower priority.

C.5.2 Improving the Climate for Business

An inherent, direct connection exists between freight movement and manufacturing. ICI officials have indicated that government, various transportation industries and manufacturers should collectively work to improve the region’s business climate and publicize the freight moving advantages available to perspective corporate residents. The region offers the rail and trucking services that are necessary to accommodate the “just-in-time” delivery standard. Manufacturers are looking to trucking companies to store, consolidate and move their goods. Notably, Worcester and Shrewsbury, especially along Route 20, host one of the largest concentrations of trucking and trucking-related activities in the Commonwealth.

D. NEW ENGLAND AUTOMOTIVE GATEWAY (NEAG)

D.1 Overview

The New England Automotive Gateway (NEAG) is an intermodal facility that transloads manufactured vehicles, trucks and cars, from railcars to auto carrier trucks for delivery to automotive dealerships throughout southern central New England. The NEAG is located on the East Brookfield/Spencer town line with a site drive on Route 49 just south of Route 9. The location of this facility in relation to the region's major rail lines can be seen on previously shown Figure III-26. An aerial view of the NEAG site is shown in Figure III-44. The 60-acre intermodal facility is sited on a 217-acre parcel. Site operator George W. Bell, II planned and constructed the NEAG, beginning in the early 1990's. Presently, the site is owned by CSX and leased to the operator. The railcar switching services for the NEAG are performed by the East Brookfield & Spencer Railroad (EBSR), as detailed previously. Privately owned by Mr. Bell, the EBSR interchanges railcars exclusively with CSX.

Modern and efficient, the automotive yard has the capacity to process approximately 200,000 vehicles on an annual basis. The NEAG intermodal facility is equipped with the latest inventory management and security systems. Due to its strategic location in relation to all of New England's largest cities, the NEAG terminal has resulted in decreased delivery costs for the shippers using the facility.

Vehicle repair and customization services are also provided by the site operator. Should vehicles be damaged during transit and delivery to the NEAG, repairs can be made locally prior to delivery to area automotive dealers. Further, special equipment can also be added to customize vehicles delivered to the NEAG. The site operator maintains a warehouse of automotive parts in nearby Sturbridge.

D.1.1 Intermodal Facility Features

The NEAG site is buffered from Route 49 by a natural berm with large trees. Both natural landscape buffer areas and constructed earthen berms attempt to minimize the visual impact of the facility to abutters. Noise attenuation barriers were installed adjacent to the lead track on the yard siding in order to buffer the noise and view of EBSR switching operations.

Wetlands adjacent to the intermodal operation are actively protected through a series of retention ponds that filter all site runoff prior to recharge. An 8-foot chain link fence surrounds the entire site and security cameras record various transloading activities. A guardhouse controls the access road into the automotive yard. The high-tech lighting within the facility uses "dark sky" technology. Lampposts in East Brookfield are 60 feet tall while they are 100 feet tall in Spencer. Further, several large snow removal vehicles are on-site at the ready. A number of permanent buildings have also been constructed on the site.

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2 Washington Square, 2nd Floor, Worcester, MA 01604-4016

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Figure III-44
New England Automotive Gateway Intermodal Facility
Served by CSX Transportation and East Brookfield & Spencer Railroad
Aerial View with Major Features

CMRPC
Central Massachusetts Regional Planning Commission

EBSR provides switching services and performs mechanical repairs for an annual anticipated volume of approximately 23,000 multi-level automotive carrier railcars, interchanged exclusively with CSX. EBSR leases and operates approximately 4 miles of rail line from CSX consisting of a portion of CSX passing track along with approximately 270 feet of lead track on the yard siding. The siding has six yard tracks that have a total capacity of 30 railcars. Within the NEAG site there are over 3 miles of railroad track for the storage of empty or damaged railcars.

D.1.2 NEAG Work Environment

The NEAG is recognized by CSX as one of the leading intermodal automotive facilities on the railroad's vast system. As indicated by NEAG and EBSR operator Bell, "people make the facility run". As such, on-site safety is a paramount concern. A number of cameras monitor the site for both safety and security purposes. Security cameras record all railcar-switching activities on the yard's six tracks. Further, random drug tests are routinely administered. Drug tests are also administered following any safety-related incident deemed significant.

D.2 Existing Operations

D.2.1 Rail to Truck Intermodal

CSX drops off autorack trains in the range of 80 to 100 railcars in length on a nearly daily basis. After the railcars are switched into the NEAG site by the EBSR, unionized "Vehicle Handlers" (that officially work for Northeast Vehicle Services) systematically unload autos and trucks from the railcars to the inventory controlled parking areas. Nearly 35 acres in size, the paved parking areas accommodate the off-loaded vehicles and the car carrier trucks that provide final distribution to dealerships throughout the greater New England region. Bar-code ID tags are used to identify each vehicle that is processed through the facility. Ultimately, EBSR crews and the Vehicle Handlers attempt to move each railcar and delivered vehicle as little as possible to reduce noise and activity levels. Although the Vehicle Handlers attempt to complete most offloading operations during the daylight hours, nighttime work is often necessary due to delayed train arrivals and the time of year.

D.2.2 Vehicle Repair & Customization

The NEAG operator also leases an automotive body shop in the town of Spencer. Earlier plans had called for an on-site operation. The evolution of this arrangement allowed an existing local business to thrive while avoiding on-site duplication. When repairs are needed to vehicles delivered to the site, they are simply brought to the auto body shop in the community where they receive a high priority. The balance of business, leveling the ebb and flow, serves the general public. Further, the shop also adds optional equipment to some vehicles and performs vehicle customizations.

D.3 Operational Challenges

D.3.1 Host Community Relations

It is the intent of the NEAG operator to be a good neighbor to the host communities of East Brookfield and Spencer and is committed to working with local officials to resolve any facility related challenges or issues. Public relations are considered an ongoing effort, this being the case since the NEAG was in the planning, permitting and construction stage in the 1990's.

The NEAG operator has addressed a number of local concerns including noise and light spillover. Vegetation has been preserved within and around the site in order to protect the host environment and buffer the noise from railroad switching and intermodal transloading activities. In other areas, an earthen berm was constructed along the perimeter of the site, again to minimize the noise and visual impacts of the NEAG. The site's vehicle handlers have been instructed to make a conscious attempt to minimize the noise generated by transloading operations

D.3.2 Facility Management & Preservation

An expansive intermodal facility where much has been invested, there is the ongoing need for maintenance and preservation efforts. Pavement and drainage structures need to be repaired and maintained. Recently, exit gate improvements were implemented with the installation of an improved concrete apron for the car carrier trucks serving the NEAG. Further, there is the ongoing need to maintain environmental safeguards to protect the site's host ecosystems. Mindful of protecting the surrounding environment, storm water system testing and improvements were recently completed at the NEAG.

D.4 Future Vision

The NEAG operator has indicated an ongoing commitment to working with the host communities of East Brookfield and Spencer. As operations at the site continue, identified impacts will be addressed as appropriate. Future on-site improvements could include additional trackage that would allow for more railcars to be unloaded simultaneously. Increased track capacity would provide further storage to reduce the backlog of railcars waiting to be unloaded. Other aspects of the facility master plan potentially include new buildings for automotive-related industry uses, such as an on-site processing building for adding accessories to vehicles. Also envisioned is the construction of a building to allow EBSR crews to repair damaged railcars indoors.

REGIONAL ENVIRONMENTAL OVERVIEW

IV

IV. REGIONAL ENVIRONMENTAL OVERVIEW

A. ENERGY

A.1 Resources and Consumption

Massachusetts is one of the most densely populated states in the nation. However, per capita energy consumption is low, and the Massachusetts economy is one of the least energy-intensive in the nation. The transportation and residential sectors lead state energy consumption. Massachusetts has no fossil fuel reserves but does possess substantial renewable energy resources. The state's Atlantic coast in the east and the Berkshire Mountains in the west offer considerable wind power potential, as do some other locations in the Central area. Much of the State is covered in dense forest, offering potential fuel wood resources.

A.2 Petroleum

Petroleum products are shipped into Massachusetts by barge, primarily to the Boston Harbor. In addition, two small-capacity product pipelines run from ports in Connecticut and Rhode Island to Springfield. Massachusetts is one of a handful of States that require the statewide use of reformulated motor gasoline blended with ethanol. Along with much of the U.S. northeast, the state is vulnerable to distillate fuel oil shortages and price spikes during winter months due to high demand for home heating. Nearly two-fifths of Massachusetts households use fuel oil as their primary energy source for home heating. In January and February 2000, distillate fuel oil prices in the Northeast rose sharply when extreme winter weather increased demand unexpectedly and hindered the delivery of new supply, as frozen rivers and high winds slowed the docking and unloading of barges and tankers. In July 2000, in order to reduce the risk of future shortages, the President directed the U.S. Department of Energy to establish the Northeast Heating Oil Reserve. The Reserve gives Northeast consumers adequate supplies for about 10 days, the time required for ships to carry heating oil from the Gulf of Mexico to New York Harbor. The Reserve's storage terminals are located in Perth Amboy, New Jersey, and Groton and New Haven, Connecticut.

A.3 Natural Gas

Electric power generators and the residential sector are the leading consumers of natural gas in Massachusetts. More than two-fifths of Massachusetts households use natural gas as their primary energy source for home heating. The state's natural gas is supplied by pipeline from production areas in the U.S. Gulf Coast and Canada, from natural gas storage sites in the Appalachian Basin region, which includes parts of New York, Pennsylvania, and Ohio, and from other international sources, including Trinidad. The gas is supplied by pipelines entering the State from New York, Rhode Island, and New Hampshire. Like other New England states, Massachusetts has no natural gas storage sites and must rely on the Appalachian Basin storage capacity to supply peak demand in winter. Massachusetts also imports some of its natural gas from overseas via liquefied natural gas (LNG) import terminals near Boston. The onshore Everett facility and two offshore facilities are 3 of 10 existing LNG import terminals in the United States.

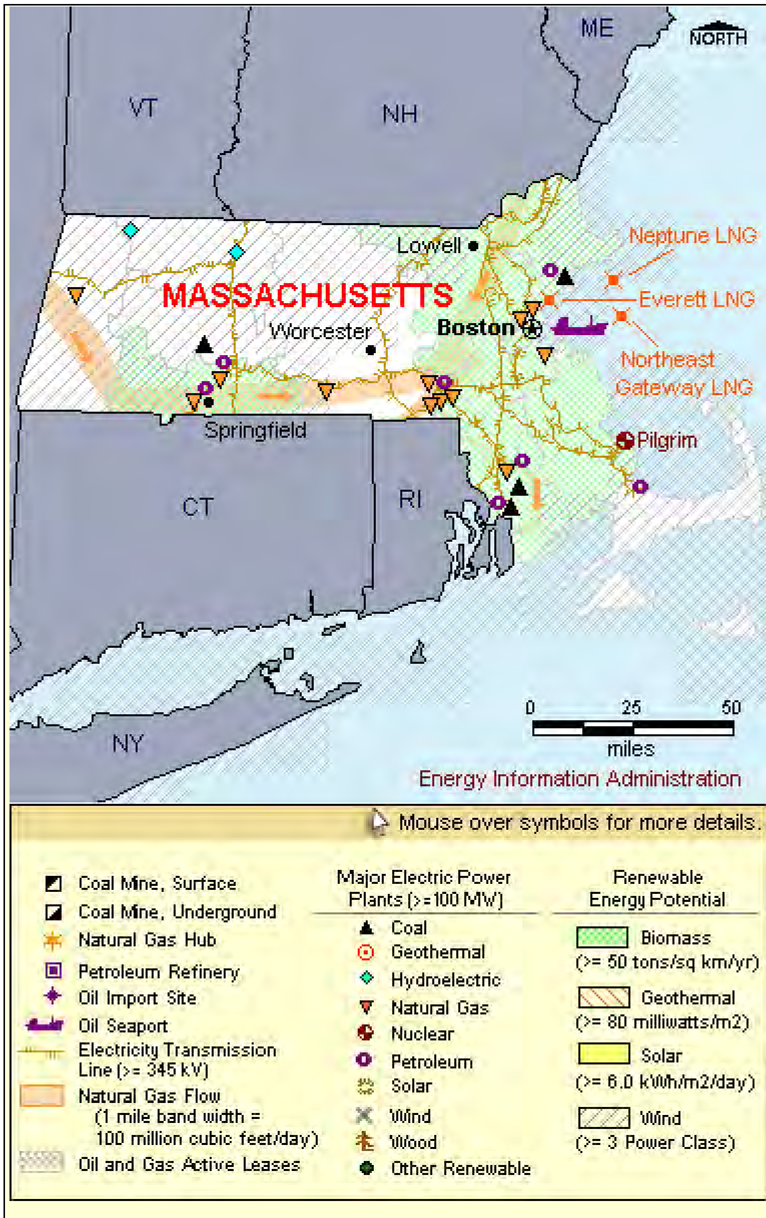
A.4 Coal, Electricity, and Renewables

Before the mid-1990s, petroleum-fired power plants led electricity production in Massachusetts. However, this source has declined steadily since 1991, as State power producers have reduced use of petroleum in favor of cleaner-burning natural gas. As in other New England states, this switch has been driven by the benefits of the lower emission levels of natural gas compared with other fossil fuels and the ease of siting new natural gas-fired power plants. Today, natural gas-fired power plants are the state's leading power producers, accounting for over half of net generation. Coal, transported largely from Colorado and West Virginia, is the State's second leading generation fuel, typically accounting for about one-fourth of net electricity production. The Pilgrim nuclear power plant located in Plymouth on Cape Cod Bay also contributes to the Massachusetts grid.

Residential electricity use is lower in Massachusetts than the national average, in part because demand for air-conditioning is minimal during the mild summer months, and because few households use electricity as their primary energy source for home heating.

Although renewable energy makes only a small contribution to net electricity generation, Massachusetts has several hydroelectric facilities and is one of the Nation's major producers of electricity from landfill gas and municipal solid waste. In July 2008, Massachusetts adopted a renewable portfolio standard requiring renewable energy to account for 15 percent of total electricity generation by 2020 and 25 percent by 2030. Regulations covering the leasing, siting, permitting, and building of wind turbines and other renewable energy sources in Federal waters could allow a proposed 420-megawatt wind power project, to be built in Nantucket Sound, to become the nation's first offshore wind farm. However, the high-profile project faces significant opposition from area landowners. In May 2009, the U.S. Department of Energy awarded Massachusetts $25 million in funding to accelerate development of the State's Wind Technology Testing Center that will test commercial-sized wind turbine blades to help reduce cost, improve technical advancements, and speed deployment of the next generation of wind turbine blades into the marketplace. This center will be the first commercial large-blade test facility in the United States able to test blades longer than 50 meters.

The state has also put into place the Green Communities Act, a comprehensive reform of the state's energy marketplace. It promotes a dramatic expansion in energy efficiency, supports the development of renewable energy resources, creates a new greener state building code, removes barriers to renewable energy installations, stimulates technology innovation, and helps consumers reduce electric bills. It also created the Green Communities Program, providing all cities and towns with energy efficiency and renewable energy opportunities.



Massachusetts Quick Facts

- With the start-up of a second offshore liquefied natural gas (LNG) import facility in March 2010, Massachusetts now has three LNG import terminals that serve markets in the Northeast. The third terminal is an onshore facility located in Everett.
- Massachusetts is one of the few States that require the statewide use of reformulated motor gasoline blended with ethanol.
- Massachusetts is a leading source of electricity generated from landfill gas and municipal solid waste.
- Massachusetts is the only New England State that relies significantly on coal-fired power plants, with coal accounting for one-fourth of electricity generation.
- A proposed 420-megawatt wind power project in Nantucket Sound could become the Nation's first offshore wind farm.
- Massachusetts received $25 million in 2009 from the U.S. Department of Energy for the development of the Nation's first large commercial-scale Wind Technology Testing Center, which will be able to test blades longer than 50 meters.

B. AIR QUALITY

B.1 Overall Status

Ozone is the only pollutant for which Massachusetts monitors indicate violations of a National Ambient Air Quality Status. Massachusetts is in attainment for the other criteria pollutants, including carbon monoxide, lead, nitrogen dioxide, sulfur dioxide, and particulate matter (including PM10 and PM2.5).

In 1997, the Environmental Protection Agency (EPA) promulgated a new 8-hour ozone standard that was designed to be more representative of exposure over time, rather than just a maximum concentration. The 8-hour standard was revised in 2008 to 0.075 parts per million (ppm). In March 2009, Massachusetts recommended to the EPA that the entire state be designated as nonattainment with the 2008 standard. The 2008 standard was challenged in Court and remanded to EPA. In January 2010, EPA proposed to revise the primary 8-hour ozone standard to a level with the range of 0.060 to 0.070 ppm and proposed a distinct cumulative, seasonal secondary standard with the range of 7-15 ppm-hours. Although today's eight-hour EPA standard for ozone took effect only in 1997, MassDEP has used this stricter limit to ascertain and tabulate the number of times that observed levels exceed standards, dating back ten years earlier, to provide a consistent basis for comparison over time.

While measured concentrations of ozone are still too high in Massachusetts, they nevertheless confirm that we're breathing cleaner air now than we did years ago, thanks in large measure to tougher government regulation and voluntary steps by industry aimed at reducing pollution from vehicles, power plants, factories and consumer products.

B.2 Greenhouse Gases

Greenhouse gases occur widely in the atmosphere in Massachusetts as well as over the nation and the globe. They are now considered to be detrimental to overall air quality due to their long-term effects, as opposed to the more direct effects of the pollutants discussed above. There is broad scientific consensus that our climate is likely changing both regionally and globally. While not universally accepted, there is growing concern that this may largely be due to the combustion of fossil fuels and other human activities that increase atmospheric concentrations of greenhouses gases, generally considered to include the following:

- Carbon dioxide (CO2)
- Methane (CH4)
- Nitrous oxide (N2O)
- Other heat-trapping gases

C. CLIMATE CHANGE

C.1 Overview

Greenhouse gases as noted above form a "blanket" of pollution that traps heat in the atmosphere that may cause climate instability characterized by severe weather events such as storms, droughts, floods, heat waves and rising sea levels. Climate change is a worldwide concern because if it continues, there will be significant impacts on people, natural resources and economic conditions around the globe. While the magnitude of these potential changes is difficult to predict, there is growing recognition that these climate changes will dramatically affect many aspects of our daily lives.

The transportation system is the second-largest contributor to GHG emissions in the United States, and the majority—approximately 72 percent—of the transportation sector's emissions are generated by road transportation, including both passenger and freight travel. The large and increasing GHG emissions from road transportation present a major policy challenge.

Additionally, research studies have identified the serious impacts climate change poses for transportation. Increases in very hot days will increase the frequency of wildfires, compromise pavement integrity, and deform rail lines; increased flooding of coastal areas will inundate roads, bridges, and rail lines. Heavier rainfall may require redesign and replacement of local drainage structures; and more frequent and more severe hurricanes will disrupt service in affected areas and require devoting more resources to evacuations. Assessing the potential harm related to these climate effects allows highway planners to identify and address vulnerabilities. Because future climate change is projected to transcend the bounds of historic experience, it is likely to expose additional vulnerabilities as well.

As the second-largest contributor to GHG emissions, responsibility falls on the transportation sector to contribute its share towards the solution of the problem. Strategies and improvement projects that target climate change are also essential to the long term performance of the transportation system itself. Issues to be considered include VMT growth, congestion, changing development and land use patterns, sea level rise, accelerated aging of infrastructure from climate change, and rapidly changing fuel and vehicle technologies. Most demand management and system management strategies reduce GHG emissions, though not nearly to a significant extent.

Regardless of targeted actions, performance measures can assess whether or not objectives related to climate change are met. Performance measures can be unique to climate change and energy efficiency goals (for example, GHG emissions per capita, petroleum use per VMT, percent of alternative fuel vehicles) or relate to traditional transportation planning goals such as congestion or air quality (for example, transit mode share, average vehicle occupancy). Performance measures can be used to evaluate the existing system, compare and select alternatives, and measure the progress of the plan throughout its implementation. In addition, performance measures could assist in prioritizing projects for programming in the TIP.

C.2 Opportunities to Incorporate Climate Change in Transportation Planning

Opportunities to incorporate climate change in an ongoing way, throughout the transportation planning process, include the following:

C.2.1 Coordination

Many of the agencies and stakeholders that already work with the CMMPO as interested parties may have particular interests in climate change or environmental issues. Particularly, stakeholders involved in climate action planning at the state or metropolitan level can help coordinate transportation planning with those efforts.

C.2.2 Integration with Land Use

The promotion of compact and transit-oriented development patterns is potentially one of the most effective strategies to reduce GHG emissions from transportation in the long term, but it also requires a great degree of collaboration among agencies and among plans. While transportation planning has long considered future land use patterns in the development of travel demand forecasts, there has been less success in ensuring that transportation investment decisions support a regional vision for growth. Transportation planning can consider cross-linkages with land use plans and involve agencies with jurisdiction over land use plans. An example of this is in the Town of Westborough. The Town has designated a transit-oriented development (TOD) district across the street from the Westborough commuter rail station in its Zoning Bylaws. The parcel is fairly large and, when developed, would require the mixed-use development to be designed around transit with amenities and a limited number of parking spaces. By creating such a district, non-auto access would be provided to the commuter rail station and transit could be expanded to other areas of town.

C.2.3 Existing Policies

Existing policies that support the reduction of GHG include the state Global Warming Solutions Act (GWSA), making Massachusetts one of the first states in the nation to move forward with a comprehensive regulatory program to address climate change. The GWSA requires the Executive Office of Energy and Environmental Affairs (EOEEA), in consultation with other state agencies and the public, to set economy-wide greenhouse gas (GHG) emission reduction goals for Massachusetts that will achieve reductions of between 10 percent and 25 percent below statewide 1990 GHG emission levels by 2020, and 80 percent below statewide 1990 GHG emission levels by 2050. To ensure that these goals will be met, the Global Warming Solutions Act requires the Commonwealth to:

- Establish regulations requiring reporting of greenhouse gas emissions by the Commonwealth's largest sources
- Establish a baseline assessment of statewide GHG emissions in 1990, which will be used to measure progress toward meeting the emission reduction goals of the Act
- Develop a projection of the likely statewide GHG emissions for 2020 under a "business as usual" scenario that assumes that no targeted efforts to reduce emissions are implemented
- Establish target emission reductions that must be achieved by 2020, and a plan for achieving them. The GWSA requires that these must be established by January 1, 2011.

MassDOT, using its statewide travel demand model, has provided the Central Massachusetts MPO with statewide estimates of CO_2 emissions resulting from the collective list of all recommended projects in all the Massachusetts RTPs combined. Emissions are estimated in the same way as the criteria pollutants (volatile organic compounds, nitrogen oxides, and carbon monoxide) whose emissions are required for the air quality conformity determination (for further description, see Chapter VIII). However, the CO_2 emissions shown here are part of an effort separate from the conformity analysis and are not part of those federal standards and reporting requirements. The estimates of the modeled CO_2 emissions are provided below:

TABLE IV-1
Massachusetts Statewide CO2 Emissions Estimates
(all emissions in tons per summer day)

Year	CO2 Action Emissions	CO2 Base Emissions	Difference (Action – Base)
2010	101,514.4	101,514.4	n/a
2020	105,747.5	105,856.4	-108.9
2035	115,034.1	115,028.0	6.1

As shown above, collectively, all the projects in the RTPs in the 2020 Action scenario provide a statewide reduction of nearly 109 tons of CO_2 per day compared to the base case. However, the 2035 Action scenario estimates an increase of about 6 tons of CO_2 emissions compared to the base case. It should be noted that this current analysis measures only projects that are included in the travel demand model. Many other types of projects that cannot be accounted for in the model (such as bicycle and pedestrian facilities, shuttle services, intersection improvements, etc.) will be further analyzed for CO_2 reductions in the next Transportation Improvement Program development cycle. This information will be updated and reported at that time.

The majority of the State's GHG creation is not a result of transportation activity, and it is seen that other areas will likely have easier, more practical ways to produce near-term reductions. Still, the transportation sector will be expected to contribute to the effort as well. Working closely with MassDOT, the Central Massachusetts MPO will continue to report on its actions to comply with the GWSA and to help meet the GHG reductions targets. As part of this activity, the MPO will provide further public information on the topic and will advocate for steps needed to accomplish the MPO's and state's goals for greenhouse gas reductions.

Regionally, in June 2008, Massachusetts Governor Deval Patrick sent a letter to the governors of all 10 member states of the Regional Greenhouse Gas Initiative (RGGI) inviting them to work with Massachusetts on developing a Low Carbon Fuel Standard that would apply to the entire region, creating a larger market for cleaner fuels, reducing emissions associated with global climate change, and supporting the development of clean energy technologies. The Commonwealth's Clean Energy Biofuels Act, signed in July 2008, also required Massachusetts to seek an agreement with its fellow RGGI member states to implement a LCFS on a regional basis. Based on Letters of Intent signed in December 2008 by state environmental commissioners, the participating states - the 10 RGGI states plus Pennsylvania - have been doing preliminary work toward designing a regional LCFS program. A Memorandum of Understanding has established a process to develop a regional framework by 2011, and examine the economic impacts of a LCFS program. Eleven states have committed to including strong business, energy and environmental stakeholder involvement in the process by providing opportunities for input and review of any proposed LCFS program.

Action on the national level continues to be considered and debated. Strong activity on actionable items such as vehicle and fuel standards as well as alternatives that would encourage reduction in VMT would be very useful to the cause.

C.2.4 Intelligent Transportation Systems (ITS) Technologies

Some examples of the strategies and ITS technologies that alleviate congestion, while in turn reducing harmful emissions and providing fuel savings, include coordinated traffic-signal timing; electronic tolling systems; emergency and incident management; improved traveler information; speed harmonization via active traffic management; access management; integrated corridor management; and work-zone management. Examples of some of the environmental benefits of these strategies are described below.

- *Traffic-Signal Timing*
  The "2007 National Traffic Signal Report Card" found that improving traffic-signal timing has a 40-to-1 or better return on investment, as state and local agencies that invested in signal timing found that every $1 spent on technologies like synchronized and adaptive traffic signals returns $40 or more to the public in time and fuel savings, while emissions are reduced by up to 22%. When combined with transit-priority systems, smart signals can reduce fuel use for transit buses by up to 19% and reduce bus emissions by up to 30%.

- *Electronic Tolling*
  Reports on the E-Z Pass system show that electronic tolling reduces congestion, emissions and fuel use, with E-Z Pass reducing U.S. fuel consumption by almost 30 million gal and eliminating nearly 265,000 metric tons of emissions in 2007. Baltimore cut harmful emissions by 16% to 63% at upgraded toll plazas that implemented electronic toll systems. ITS systems like PrePass, which electronically verifies the safety, credentials and weight of trucks, reduced delays in 2008 by over 4.6 million hours, eliminated nearly 111,000 metric tons of emissions, conserved more than 11 million gal of fuel and saved U.S. truckers an estimated $486 million.

- *Incident Management and Traveler Information*
  In Georgia, the NaviGAtor incident-management program reduced annual fuel consumption by 6.83 million gal and contributed to decreased emissions, as carbon monoxide emissions fell by 2,457 tons, hydrocarbon emissions declined by 186 tons and nitrous-oxide emissions decreased by 262 tons. Integrating traveler information with traffic- and incident-management systems could further reduce emissions by up to 3% and improve fuel economy by about 1.5%.

D. LIVABILITY

D.1 What Is It?

America's transportation industry has built one of the world's largest and best highway networks, connecting people, businesses, and communities across the country, linked with extensive public transportation systems in major metro areas. However, we have not yet put the same effort into completing a system that works as well for walking, biking, or taking transit in most communities. While nearly four-fifths of Federal transportation funding goes to highway projects, almost 85 percent of people and jobs are in metropolitan areas, which offer the potential for significant improvements in multimodal travel choices. Since metropolitan regions are also where most trade, industry, and congestion occur—and where aging infrastructure requires significant reinvestment—a balanced approach can help maximize the effectiveness of existing transportation investments. The same is true for towns and villages in rural areas, which are struggling to remain economically competitive while preserving community character and maintaining viable mobility options. By targeting transportation funding to support reinvestment in existing communities, we can build more choice, convenience, and cost-effectiveness into the transportation system. Developing complete street networks that provide accessibility for all modes is a good place to start. As changing demographics and evolving markets increase demand for compact, walkable neighborhoods with a range of housing choices, transportation planning, programming, management and operations can help ensure that walking, biking, and transit are safe, convenient, and realistic choices for more people, making transportation systems more accessible, efficient, sustainable and equitable… that is to say, more "livable".

By incorporating livability principles into transportation plans and programs, communities can maximize the efficiency of existing transportation investments while providing better access within and between activity centers. Livability approaches can also be a catalyst for reinvesting in aging suburban corridors, restoring complete streets and networks, and revitalizing rural small towns. A transportation system that provides reliable, safe access to jobs, education, health care and goods and services is every bit as important to rural communities as it is to urban areas. Rural communities present unique mobility challenges, and the types of transportation options needed in rural areas can be different in order to ensure access for older citizens to services and activities, and to improve connections and service between communities. Linking transportation investments to compact development and revitalization strategies can preserve natural and cultural resources, while better preparing communities to mitigate and adapt to the impacts of climate change. Making sure that people of all ages have real choices to walk and wheel in the course of daily living, and making communities age-friendly, can support active living, and help improve health and quality of life.

Incorporating livability into transportation planning, programs, and projects is not a new concept. Communities, developers, advocacy groups, businesses, and neighborhood residents have been working for generations to make places more livable through transportation initiatives with varying degrees of support from local, regional, State, and Federal agencies. These initiatives have used a range of names to describe an overlapping set of objectives and strategies—livability, sustainability, smart growth, walkable communities, new urbanism, healthy neighborhoods, active living, transit-oriented development (TOD), complete streets, and many others. While advocates for each approach or "brand name" might find differences, most transportation industry practitioners understand the common element is that transportation planning is no longer a stand-alone exercise. Increasingly, transportation planning and project development are being more fully integrated with broader community goals, addressing a wider range of needs and leveraging the effectiveness of other programs.

D.2 Livability and Sustainability in Transportation

Livability in transportation is about using the quality, location, and type of transportation facilities and services available to help achieve broader community goals such as access to good jobs, affordable housing, quality schools, and safe streets. This includes addressing road safety and capacity issues through better planning and design, maximizing and expanding new technologies such as intelligent transportation systems (ITS) and quiet pavements, and using travel demand management (TDM) approaches in system planning and operations. It also includes developing high quality public transportation to foster economic development, and community design that offers residents and workers the full range of transportation choices. And, it involves strategically connecting the modal pieces—bikeways, pedestrian facilities, transit services, and roadways—into a truly intermodal, interconnected system.

Sustainable transportation provides exceptional mobility and access to meet development needs without compromising the quality of life of future generations. A sustainable transportation system is safe, healthy, and affordable, while limiting emissions and use of new and nonrenewable resources. It meets the needs of the present without depleting resources or harming the environment. It also considers the long-term economic health and equity—or social fairness—of a community. "Smart growth**"** focuses growth in existing communities to avoid sprawl; and advocates compact, transit-oriented, walkable, bicycle-friendly land use, including neighborhood schools, complete streets, and mixed-use development with a range of housing choices. Its goals are to achieve a unique sense of community and place; expand the range of transportation, employment, and housing choices; and to equitably distribute the costs.

In 2009 the U.S. Department of Housing and Urban Development (HUD) and U.S. Department of Transportation (DOT) announced an unprecedented agreement to implement joint housing and transportation initiatives. With the U.S. Environmental Protection Agency (EPA) joining the partnership later in the year, the three agencies agreed to work together to ensure that the goals of gaining better access to affordable housing, more transportation options, and lower transportation costs are met while simultaneously protecting the environment, promoting equitable development, and helping to address the challenges of climate change. DOT, HUD and EPA have created a high-level interagency partnership to better coordinate federal transportation, environmental protection, and housing investments and to identify strategies that promote and put into action the following Livability Principles:

- ***Provide more transportation choices.*** Develop safe, reliable, and economical transportation choices to decrease household transportation costs, reduce our nation's dependence on foreign oil, improve air quality, reduce greenhouse gas emissions, and promote public health.
- ***Promote equitable, affordable housing***. Expand location-and energy-efficient housing choices for people of all ages, incomes, races, and ethnicities to increase mobility and lower the combined cost of housing and transportation.

- ***Enhance economic competitiveness***. Improve economic competitiveness through reliable and timely access to employment centers, educational opportunities, services, and other basic needs by workers, as well as expanded business access to markets.
- ***Support existing communities.*** Target Federal funding toward existing communities—through strategies like transit oriented, mixed-use development, and land recycling—to increase community revitalization and the efficiency of public works investments and safeguard rural landscapes.
- ***Coordinate and leverage Federal policies and investment.*** Align Federal policies and funding to remove barriers to collaboration, leverage funding, and increase the accountability and effectiveness of all levels of government to plan for future growth, including making smart energy choices such as locally generated renewable energy.
- ***Value communities and neighborhoods***. Enhance the unique characteristics of all communities by investing in healthy, safe, and walkable neighborhoods.

The partnership promised to:

- ***Enhance integrated planning and investment.*** The partnership will seek to make planning grants available to metropolitan areas, and create mechanisms to ensure those plans are carried through to localities.
- ***Provide a vision for sustainable growth.*** This effort will help communities set a vision for sustainable growth and apply federal transportation, water infrastructure, housing and other investments in an integrated approach. Coordinating planning efforts in housing, transportation, air quality and water will make more effective use of federal housing and transportation dollars.
- ***Redefine housing affordability and make it transparent.*** The partnership will develop federal housing affordability measures that include housing and transportation costs and other expenses that are affected by location choices. Affordability will be redefined to reflect those costs, improve the consideration of the cost of utilities and provide consumers with enhanced information to help them make housing decisions.
- ***Redevelop underutilized sites.*** The partnership will work to achieve critical environmental justice goals and other environmental goals by targeting development to locations that already have infrastructure and offer transportation choices.
- ***Develop livability measures and tools.*** The partnership will research, evaluate and recommend measures and provide analytical tools that indicate the livability of communities, neighborhoods and metropolitan areas. These measures could be adopted in subsequent integrated planning efforts to benchmark existing conditions, measure progress toward achieving community visions and increase accountability. Incentives will be developed to encourage communities to implement, use and publicize the measures.
- ***Align HUD, DOT and EPA programs.*** HUD, DOT and EPA will work to assure that their programs maximize the benefits of their combined investments in our communities for livability, affordability, environmental excellence, and the promotion of green jobs of the future.
- ***Undertake joint research, data collection and outreach.*** HUD, DOT and EPA will engage in joint research, data collection, and outreach efforts with stakeholders, and identify best practices.

A similar effort is underway in the state itself under the auspices of the Massachusetts Healthy Transportation compact. While more directly pointed toward "health" concerns, its objectives are quite similar to, and resonate with, the themes and purposes of "livability" initiatives. The compact's goal is to "Adopt best practices to increase efficiency to achieve positive health outcomes through the coordination of land use, transportation and public health policy." It is a key requirement of the landmark state transportation reform legislation signed into law in June 2009. Co-chaired by the Secretary of Transportation and the Secretary of Health and Human Services and including the Secretary of Energy and Environmental Affairs, MassDOT Highway Administrator, MassDOT Transit Administrator, and Commissioner of Public Health, this inter-agency initiative is designed to facilitate transportation decisions that balance the needs of all transportation users, expand mobility, improve public health, support a cleaner environment and create stronger communities.

The compact is charged with:

- Promoting inter-agency cooperation to implement state and federal policies and programs that support healthy transportation.
- Reducing greenhouse gas emissions, improving access to services for persons with mobility limitations and increasing opportunities for physical activities.
- Increasing bicycle and pedestrian travel and facilitating implementation of the Bay State Greenway Network.
- Working with the Massachusetts Bicycle and Pedestrian Advisory Board (MABPAB) to effectively implement a policy of complete streets for all users, consistent with the current edition of the Project Development and Design Guide.
- Implementing health impact assessments to for use by planners, transportation administrators, public health administrators and developers.
- Expanding service offerings for the Safe Routes to Schools program.
- Initiating public-private partnerships that support healthy transportation with private and nonprofit institutions.
- Establishing an advisory council with private and nonprofit advocacy.
- Developing goals for the Compact and measuring progress toward these goals.

E. CHALLENGES

Despite the clear and forthright progress made in recent years in fully extending the consideration of environmental effects in the state to all types of transportation (and other) activity and to all time frames - long as well as short - many major challenges remain in further defining and implementing action to achieve necessary goals.

E.1 Coordination and Integration of Planning Activities

In particular, how do we effectively link land use planning and transportation planning, while keeping responsibilities in line with allocated authority? As noted above, integration with land use planning takes a concerted coordinated effort with appropriate prioritization and funding. Common goals must be established and pursued cooperatively while individual responsibilities are met concurrently.

E.2 Societal Decisions on Environmental Progress Tradeoffs

Many more easily implementable strategies to reduce GHG will have impacts that have costs in the form of pure dollars or cost of living tradeoffs. For example, sustainable energy generation units are infrastructure investments that must be made with real dollars that cannot then otherwise be used. Additionally, many suggested solutions are perhaps of lower dollar costs but extract an investment in other ways, such as by longer travel times due to congestion or required use of alternative modes. More time spent travelling is largely less time available to use doing something else.

E.3 "Livability" is Not Enough

Studies have shown relatively minor changes to GHG levels from making denser transit-orientated areas a reality. "Non-sprawl" activities, even if palatable and socially acceptable, are not enough. What can be done that would be more directly effective? For transportation, these choices perhaps boil down to

- Introducing low-carbon fuels;
- Increasing vehicle fuel economy;
- Improving transportation system efficiency; and
- Reducing carbon-intensive travel activity.

Transportation system efficiency is within the purview of transportation planners and the CMMPO, and perhaps so is influencing carbon-intensive activity reduction. However, transportation fuel and vehicle fuel economy requirements and standards are matters that can only effectively be influenced and changed on a larger scale, through national leadership and legislation as necessary. We have seen bold and strong action along these lines in the past when it was deemed appropriate. Perhaps we can find the inspiration to follow in those footsteps now despite troubled economic times.

E.4 Transportation is Not Enough

Greenhouse gases generated by the transportation sector amount to less than 30% of the total. Progress is needed (and is seen to be very possible) in other areas such as power generation, manufacturing and agricultural activities.

F. REGIONAL EFFORTS, ACTIVITIES AND PLANS

While many of the long-term answers to the challenges above require national and global planning and resolve, there are still many small steps that can be taken regionally and locally. These measures can also help to expose the public to environmental problems and their possible solutions via smaller, more palatable "bites". It is indeed one of the CMMPO's adopted goals to "*Promote livable communities and improved air quality through context-sensitive design and reduced traffic congestion*", and by extension, through any other planning means consistent with overarching goals and purposes.

F.1 Previous Regional Efforts

Projects and undertakings that pertain to dealing with climate change are not new to central Massachusetts. We note that the city of Worcester has achieved Commonwealth "Green Community" status. CMRPC has partnered with MassRides and the WRTA, a CMMPO partner, to coordinate promotion of alternative modes of travel via efforts to reach large employers, and has worked with the WRTA to replace its aging fleet of vehicles with new clean-diesel and hybrid buses. CMRPC has also worked towards development of a multi-use hub at the Union Station intermodal center and helped to plan the replacement of an environmentally unsafe maintenance and operations facility. In addition to a vehicle idling education program, the CMMPO staff has been seeking ways to encourage implementation of better traveler information techniques that are responsive to changes in peak period congestion along I-290, in order to avoid the spread of congestion and its air quality effects. And, in recognition of the fact that global warming would have severe consequences to infrastructure, efforts to map flood-prone areas have begun, in order to support an analysis of the vulnerability of critical transportation infrastructure.

Considering livability aspects, broad-based initiatives to work with state, local, and regional groups to encourage healthy living, including assessment of healthy transportation policies, walkability assessments, and employer transit forums have been part of recent MPO staff activity. Groundwork for the 2010 Bicycle and Pedestrian plan included walkability assessments of town centers and walkability workshops for the interested and the uninitiated. Access Management Toolkits have been developed to provide community land use planners with tools for managing internal and external multimodal access. Targeted Jobs Access Reverse Commute funding activities helped outline and display transit access potentials between urban core and suburban job opportunities. Work continued with the WRTA to encourage large employers to promote employee use of transit as a "green" effort and to save money. CMRPC has provided geo-coding of employee addresses and matched them with bus route schedules for impact locations and employers. In addition, materials have been produced that are tailored to individual employer needs, such as consolidated schedules and personalized mapping.

Developing transportation projects are always monitored to see that the spirit of Complete Streets design carries forward; examples include the walkability of the new Worcester/Shrewsbury Route 9 bridge over Lake Quinsigamond as well as the inclusion of appropriate transit and pedestrian facilities for the planned improvement of the joint section of Routes 12/20 in Auburn.

In land use coordination, whenever possible, large local/regional development plans have been reviewed for traffic impact and alternative mode accommodations. The Scenic Byway Corridor Management Plan along Route 122 from Paxton to Petersham was assisted and promoted as well. Through currently programmed state enhancement funding, badly needed drainage improvements will soon be made adjacent to the Wachusett Reservoir on Route 70 in Boylston and Clinton, including the elimination five existing stormwater drainage discharges that direct runoff and accidental release materials to the water body. The work will include modification to the existing drainage system, and the installation of new structures and piping, in addition to necessary roadway work.

F.2 Plans to Continue the Momentum

The CMMPO and its staff will continue to monitor Global Warming Solutions Act activities and other federal/state compacts and initiatives related to reducing greenhouse gases, and will consistently and diligently look for opportunities to integrate local transit promotion, Travel Demand Management (TDM) and congestion reduction into these initiatives. The analysis of vulnerability of critical transportation infrastructure, based on the mapping of flood prone and poor drainage areas, will be completed and recommendations for addressing vulnerable transportation infrastructure, including review of all TIP projects for potential design changes, will be provided.

Efforts will continue with the WRTA to replace the existing bus fleet with fuel-efficient, low emissions vehicles. Additionally, work will continue on broad-based community initiatives with the WRTA, MassinMotion, Common Pathways and other groups to promote availability of alternative modes of travel. This will include the expected development of Health Impact Assessments and the review and evaluation of an implementation of Ozone Action day strategies.

CMMPO staff will continue efforts with local MassDOT-Highway Division staff to investigate traveler information techniques that are responsive to changes in peak period congestion along I-290, as recognized in the Worcester regional Mobility Study. In the continuing vein of public information access and education, a CMMPO web page presence is planned to begin promoting the consideration of environmental problems and solutions.

Coordination of transportation planning and strategies with local housing and development policies is a difficult but worthy aim. CMMPO staff intends to establish mechanisms to review all TIP projects and major economic/housing development projects to see that there is an inclusion of features that allow better access to alternative transportation modes and their connectivity, and to work with local officials to grow a consistent consideration of such features in all local roadway projects. Access Management Toolkits that assist in thinking about managing internal and external multimodal access are also useful “starter tools” in helping local planners to consider the linkages between land use and transportation. Perhaps once some minor early successes are achieved, inherent and continued interest in more substantial local contributions to ecological problem solving will evolve.

The City of Worcester, through its Energy Efficiency and Conservation Program, aggressively pursued the State's designation as a "Green Community" as part of its Climate Action Plan initiatives. Perhaps other communities in the region can be inspired to participate as well.

Finally, the CMMPO has partnered with a regional organization, the Institute for Energy and Sustainability (IES), housed at Clark University, to apply for HUD/DOT/EPA grants to develop regional initiatives for sustainability. The IES is a partnership of universities, local governments, and regional groups that are committed to developing a more sustainable manner of growth.

F.3 Ongoing Regional Environmental Mitigation

The SAFETEA-LU law and its implementing regulations include provisions intended to enhance the consideration of environmental issues and impacts within the transportation planning process. These provisions encourage the continued evolution of the metropolitan planning process by means of "discussion of types of potential environmental mitigation activities [at the plan level]", which shall be developed "in consultation with federal, tribal, wildlife, land management and regulatory agencies".

As this evolutionary process continues for the CMMPO, steps have been taken to meet with environmental stakeholders, identify and share key GIS mapping data, to map both projects that are nearer to implementation as well as projects that are part of corridor-level planning studies, and to share this information with community officials and implementing agencies. The resource mapping efforts, explained in Chapter II (Regional Characteristics), have produced valuable early identification of sensitive areas, and have led to avoidance and minimization strategies as well as mitigation activities during the project implementation phase.

Future CMMPO efforts will include environmental mapping of major infrastructure projects identified in this plan. In addition, efforts will include the development of mitigation strategies, at the plan level, in consultation with a broad group of environmental stakeholders.

The above materials are based largely upon information made available, both generally and specifically, from the following organizations:

- U.S. Energy Information Administration
- Massachusetts Department of Environmental Protection
- Federal Highway Administration
- American Association of State Highway And Transportation Officials *(Primer on Transportation and Climate Change)*
- United States Department of Transportation *(Transportation's Role in Reducing US Greenhouse Gas Emissions; Livability in Transportation Guidebook)*

TRANSPORTATION SAFETY PROGRAM

V

V. TRANSPORTATION SAFETY PROGRAM

A. INTRODUCTION

The Central Massachusetts Metropolitan Planning Organization (CMMPO) recognizes the importance of transportation safety planning for all agencies and users of the regional transportation system. The organization's transportation safety plan employs a multi-modal strategy, encompassing roadway, transit, bicycle, pedestrian and rail travel throughout the central Massachusetts region.

SAFETEA-LU EMPHASIS ON SAFETY: The Safe, Accountable, Flexible, Efficient Transportation Equity Act (SAFETEA-LU) authorized a new core federal-aid funding program beginning in FY 2006 to achieve a significant reduction in traffic fatalities and serious injuries on all public roads. It created a positive agenda for increased safety on our highways by almost doubling the funds for infrastructure safety and requiring strategic highway safety planning, focusing on results. By October 2007, States were required to have a Strategic Highway Safety Plan that identified safety problems and opportunities in order to use Highway Safety Improvement Program (HSIP) funds for new eligible activities under 23 USC 148.

In order to comply with SAFETEA-LU legislation, the Federal Transit Administration sought to establish safety standards and coordination mechanisms between public transportation agencies and the Departments of Homeland Security and Transportation to increase safety and security in the public transportation network. Capital funding was also expanded to include crime prevention to increase safety for both transit employees and riders.

In Massachusetts, lane departure crashes represent 19% of all crashes, cause 25% of all vehicle crash injuries, and produce 46% of all vehicle crash fatalities[1]. In Central Massachusetts, MassDOT research noted that the percentage of lane departure crashes resulting in incapacitating injuries that took place on icy, snowy, or slushy roads was higher than Massachusetts as a whole (19% vs. 12%).

CMRPC, acting as staff to the CMMPO, partnered with MassDOT to communicate with local police departments, fire departments, and town officials to verify accident information and develop strategies to improve safety. As part of this effort, in November 2006 MassDOT led a forum to solicit information regarding lane departure crash locations, contributing factors, and feasible improvements. This was followed by a CMRPC survey to help select potential sites for road safety-audits in locations with a high number of lane-departure crashes. Based on the survey, MassDOT agreed to perform road safety audit studies on Interstate 290 in Worcester and the undivided segment of Route 49 in Charlton/Sturbridge. As a result engineering and policy efforts will be undertaken to prevent vehicle crashes and/or minimize injuries and fatalities at these locations.

[1] MassDOT, *Massachusetts Lane Departure Crash Data Analysis (2002-2004),* January, 2006.

B. PUBLIC TRANSIT SAFETY

The CMMPO and the Worcester Regional Transit Authority (WRTA) recognize that a safe and efficient public transportation system is an integral component of the urban fabric. In addition to operational efficiency of the bus routes, passenger safety, comfort, and convenience are all considerations in the planning activities that support the fixed-route bus service. The WRTA has established an extensive safety program that is intended to provide a safe environment for its employees and customers and to protect its assets from the threat of loss, damage or abuse.

B.1 Safety Improvements to Policy & Procedures

Through its fixed route operations the transit authority has instituted a variety of policies and procedures to improve overall safety in the system. To ensure the comprehensiveness of the program, all policies and procedures are covered in the training of newly hired employees and through periodic retraining of all employees. They include:

- Personnel Selection
- Accidents and Incidents Procedures
- Driver Training
- Maintenance Plan
- Drug & Alcohol Testing Program
- Safety Data Acquisition/Analysis
- Safety Committee

B.2 Safety at Region's Top Bus Stops

Bus stop location data was collected in 2007 and 2008. This was a joint effort between CMRPC and WRTA. The data contained the location of the bus stop, type of stop, condition of stop, condition of sidewalk and many other pertinent data. This data was mapped using GIS software. CMRPC also maintains a database containing WRTA ridership sample data by bus route. This data was analyzed along with the bus stop location and a map of high boarding and alighting locations was determined. Using the crash data from MassDOT, the bus-stop locations with highest Bicycle & Pedestrian crash clusters and also crashes at high ridership locations were identified.

A collaborative effort was undertaken between the CMMPO and the WRTA to identify existing bus stops using Geographic Positioning Systems (GPS) technology. The information was then downloaded to a GIS platform to spatially locate the bus stops for improved management. Bus stop data collected in 2007 and 2008 was mapped using GIS software. The database containing WRTA ridership sample data by bus route was also mapped. Using the crash data from MassDOT, the bus-stop locations with highest Bicycle & Pedestrian crash clusters were identified. This integrated effort identified the need to evaluate safety, security, and accessibility at City of Worcester bus stops as follows.

BUS STOP SIGNAGE: The safest location of bus stops for pick-up or discharge of passengers is decided in a collaborative effort between the Worcester City Council, Worcester Department of Public Works (DPW), and the WRTA. Due to periodic changes to the fixed route service, bus stop signage also requires frequently updates. An active list of these locations must be maintained by both the Worcester DPW which is responsible for the signs, and the WRTA which monitors bus service. It is becoming increasingly apparent that maintaining an updated list of all bus stops poses a challenge for both agencies.

BUS STOP SAFETY AUDIT: In order to assist the WRTA meet its mission to provide convenient, comfortable, safe, reliable, cost-effective mobility services for the region it is necessary to evaluate the efficacy of designated bus stops. To advance this effort, the FHWA has advocated the use of Road Safety Audits (RSA). Such an audit will be performed by an independent interdisciplinary team of 3-5 persons consisting of community members and professionals to examine the design of designated high frequency bus stops in order to reduce both verified and potential hazards at these locations using the following methodology:

- Generate a checklist of criteria for evaluating safety and accessibility at bus stops
- Classify the designated bus stops consistent with the checklist
- Develop a bus stop rating system to evaluate safety and accessibility
- Utilize bus stop ratings to evaluate and improve safety on public transit routes

C. RAIL SAFETY

Massachusetts had one of the best rail safety records in the nation from 2008- 2010. Worcester County suffered 40 injuries and 5 fatalities in the same period[2]. As, the U.S. Department of Transportation is advocating substantial increases in passenger, light-rail, and freight over the next three decades, the region is looking to participate in improving rail safety. All levels of government and private stakeholder, are expected to work together to meet these safety challenges. *Operation Lifesaver*, a rail safety education partner is helping to raise awareness to improve public safety at highway-rail grade crossings and tracks through public awareness using education, enforcement and engineering, making communities with tracks and railroad property safer, reducing collision incidents and decreasing the likelihood of injuries and fatalities. The region concurs with *Operation Lifesaver* and advocates the use of safe engineering practices for at-grade railroad crossings where two or more modes of transportation intersect to include the following devices to improve rail safety in the central Massachusetts.

- *Traffic control devices* at highway-rail grade crossings such as signs, signals, pavement markings, or other warning devices designed to help manage traffic flow and reduce risk.
- *Apply established standards* for signage at highway-rail grade crossings.

[2] *Federal Railroad Administration, Office of Safety Analysis, Annual Casualties By State, Railroad or Type*

- *Designate Quiet Zones* with flashing light signals with gates, constant warning time train detection circuitry and power-off indicators visible to the train crew.
- *Gates with channelization* or medians, four-quadrant gates, one-way streets, and crossing closures.
- *Wayside horn* mounted at the crossing and activated simultaneously with flashing lights
- *Emergency Notification Sign (ENS)* posted at highway-rail grade crossing, with telephone number to notify the railroad of device malfunction.
- *Warning signs* informing pedestrians and bicyclists that they are trespassing on private property and could be fined, seriously injured or killed.

D. PEDESTRIAN AND BICYCLIST SAFETY

Within the CMMPO region, there are a total of 107 individual pedestrian crash locations with six (6) of those locations within the Top 5% of all pedestrian crash locations in the region. For bicycles, there were 36 individual bicycle crash locations with two (2) of those locations within the Top 5% of all bicycle crash locations in the region. The Bicycle and Pedestrian plan recommends prioritizing locations with high bike and pedestrian crashes for future improvements.

E. HIGHWAY SAFETY

E.1 Funding Safety Projects

Starting in October 1, 2007, States were required to have a Strategic Highway Safety Program (SHSP) that identified and analyzed safety problems and opportunities in order to use Highway Safety Improvement Program (HSIP) funds for new eligible activities under 23 USC 148. The Emphasis areas from the SHSP were reviewed and crash data systems will be created and driver behavior will be analyzed as part of ongoing CMRPC safety planning efforts in the upcoming year. The HSIP is a “core funding” program administered by Federal Highway Administration, which apportions funds to States under Section 104(b) (5) for a range of eligible activities focused primarily on infrastructure-related safety improvements. The purpose of the HSIP is to achieve a significant reduction in traffic fatalities and serious injuries on public roads.

E.2 HSIP Selection Criteria

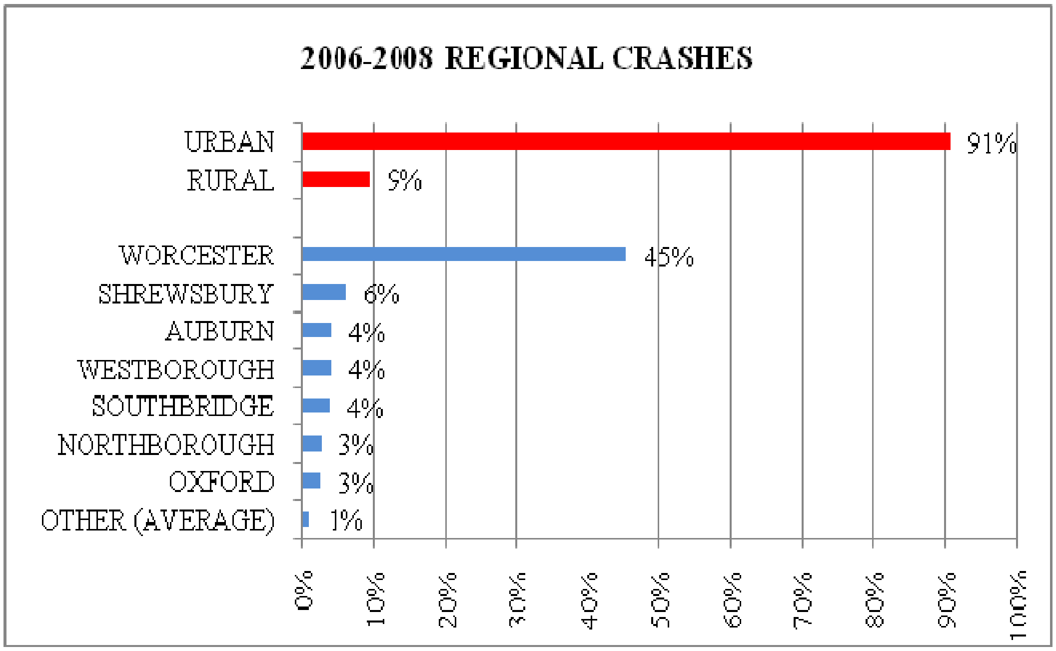
Projects using Federal HSIP funding are required to be selected by a data driven process. To satisfy this requirement the Massachusetts Department of Transportation (MassDOT) obtains crash data from local police reports collected by the Registry of Motor Vehicles (RMV) Crash Records Section. With the assistance of a consulting agency Geonetics, they developed an automated procedure for processing, standardizing, matching and aggregating the crash data by geographical location using Geographic Information System (GIS) tools and procedures. The information was grouped into crash clusters, bike clusters and pedestrian clusters. For the CMRPC region, automobiles crashes from 2006

-2008 and pedestrian and bicycle crashes from 2002-2008 were extracted from the MassDOT statewide dataset.

- The top 5% of automobile crash clusters are listed in Table V-1. They are derived from all crash clusters identified by MassDOT on local roads (excluding interstate highways).
- The top 5% of pedestrian and bicycle crash clusters are listed in Table V-2. They are derived from all pedestrian / bicycle crash clusters identified by MassDOT.
- The top crash corridors are listed in Table V-3. They were identified on road segments where the top 5% of combined automobile pedestrian and bicycle crash clusters occurred.
- HSIP eligible funding categories include,
  - Intersection safety improvements;
  - Pavement and shoulder widening (including addition of a passing lane);
  - Installation of rumble strips or other warning devices as long as they don't affect the mobility of bicyclists; pedestrians and the disabled;
  - Installing skid-resistant surfaces at high-crash locations;
  - An improvement for bicycles or pedestrian safety or the safety of the disabled;
  - Elimination of hazards at railroad grade crossings (including grade separations);
  - Construction of a rail-highway grade crossing feature (including the installation of protective devices);
  - Traffic enforcement activity at a rail-highway grade crossing;
  - Construction of traffic calming features;
  - Elimination of a roadside obstacle;
  - Improvement of highway signage or pavement markings;
  - Installation of a priority control system at signalized intersections for emergency vehicles;
  - Installation of traffic control or other warning devices at high-crash locations;
  - Safety conscious planning;
  - Improvements in the collection and analysis of crash data;
  - Planning emergency communications;
  - Work zone operational improvements or traffic enforcement activities;
  - Guardrail installation;
  - Barriers and crash attenuators;
  - Structures or other measures to eliminate or reduce accidents involving wildlife;
  - Installation and maintenance of signs at pedestrian/bicycle crossings and in school zones;
  - Signage and construction of pedestrian/bicycle crossings and at school zones;
  - Construction and operational improvements on high-risk rural roads; and
  - Improvement projects on any public roadway or publicly owned bike or pedestrian pathway or trail[3]

[3] Cambridge Systematics, Inc., "Guiding Principles for the Massachusetts Strategic Highway Safety Plan"

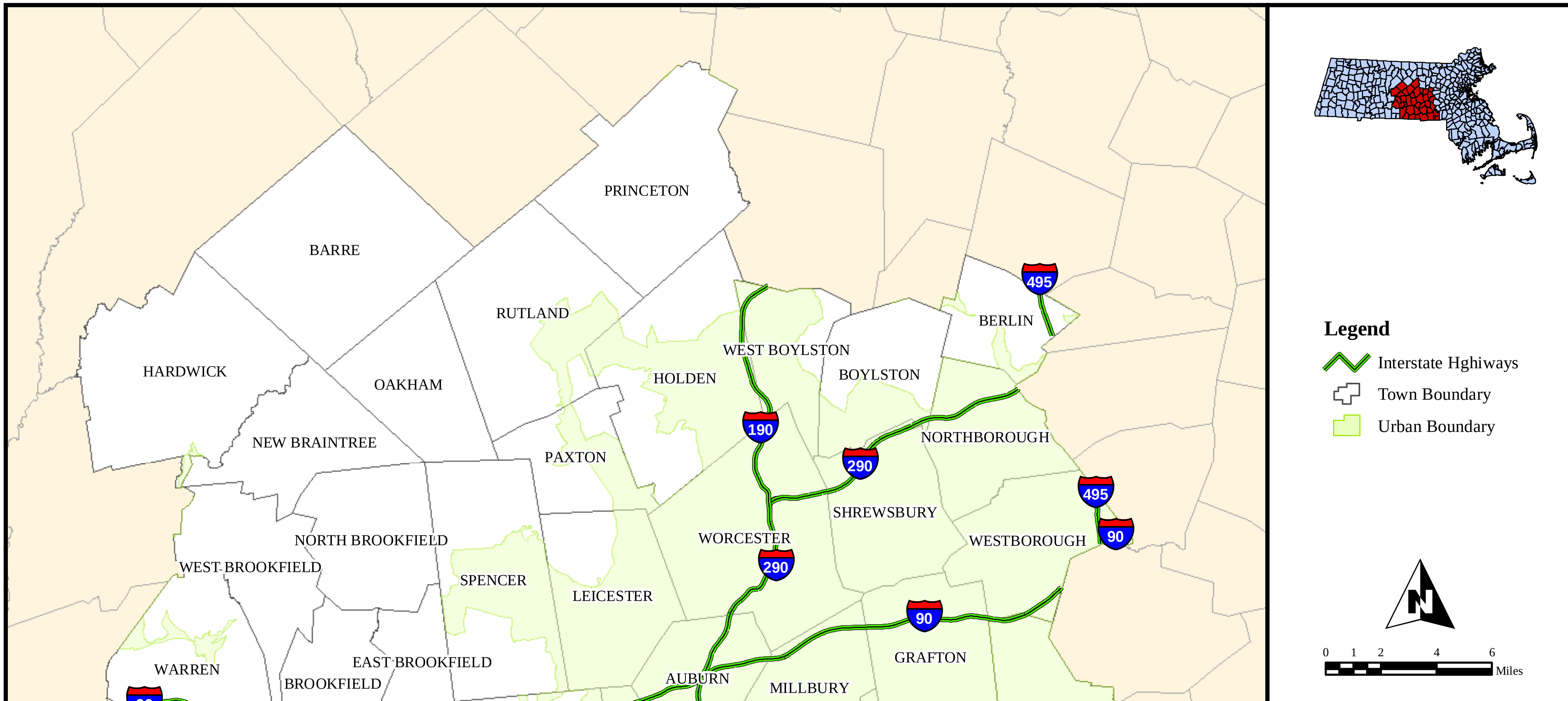
The Central Massachusetts Regional Planning Commission consists of 39 towns surrounding the City of Worcester (Figure V-1). Major transportation routes include east/west bound traffic served by interstates 90 and 290, while interstates 290,190, 84, 395 and 495 serve north/south bound traffic. From 2006-2008 there were over 30,000 crashes in the region. 45% of all crashes were in the City of Worcester and 91% of all crashes were in the urbanized area.



E.3 Some HSIP Funded Projects in the Region

- City of Worcester - The FY2011 Transportation Improvement Program (TIP) included $5.1M in HSIP funds for the Belmont Street East resurfacing project[4].
- City of Worcester – The FY2012 State Transportation Improvement Program (STIP) approved $1.0 M HSIP funds for intersection & signal design improvements at Lincoln Street, Highland Street, Pleasant Street corridor[5].

[4] CMMPO Minutes of December 2, 2009 Meeting
[5] http://www.eot.state.ma.us/downloads/stip/2009/2012_highway_0210.pdf



Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC) and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

Produced by the Central Massachusetts Regional Planning Commission (CMRPC)
2 Washington Square, Union Station
Worcester, MA 01604

CMRPC
Central Massachusetts Regional Planning Commission

Figure V-1 Central Massachusetts Regional Planning Commission

E.4 Methodology for Selecting HSIP Eligible Projects

Each year MassDOT identifies a list of Top 200 Crash Locations derived from crash data obtained during the past three years. They use two important criteria to compare crashes. One is the '*Equivalent Property Damage Only (EPDO)*' and the other is the '*Crash Cluster*', both of which are briefly described below.

E.4.1 Equivalent Property Damage Only (EPDO)

Equivalent Property Damage Only (EPDO) crashes are weighted by fatal crashes assigned a value of 10, injury crashes a value of 5, and property damage only or non-reported a value of 1. This weighting system helps us to compare crash impact.

E.4.2 Crash Clusters

The crash clusters method locates clusters by merging adjacent crash locations into clusters. It finds nearby crashes then creates an imaginary buffer of 25 meter radius for automobiles (100 meter radius for pedestrian / bicycle) crashes. The resulting polygons are merged, resulting in crash clusters. Note that clusters are only applied to crash locations where there is no grade separation.

E.4.3 Geocoded & Ungeocoded Crashes

During the period 2006 – 2008 almost 37,000 crashes occurred in Central Massachusetts. MassDOT and CMRPC staff have successfully located nearly 90% of these crashes using a method known as geocoding to identify the geographic location of each crash. Crashes which occur at roads with similar names, intersections with multiple roads or incorrect data entry from police crash reports are difficult to geocode. This year the match rate improved from 80% to 90% from the previous period.

E.4.4 Statewide Top 200 Crash Cluster Locations

MassDOT releases a list of the top 200 high crash intersections throughout the Commonwealth during a three year period. There are 39 intersections in CMRPC listed on the statewide top 200 list for the period 2006-2008. By far the largest number of the top 200 intersections occurs in the City of Worcester which has 34. The Town of Shrewsbury has 2 and the Towns of Mendon / Spencer / Westborough all have 1 each. Figure V-2 below illustrates the towns with top 200 intersections in the region. For more details on the exact location see Table V-1 for automobiles clusters, Table V-2 and Table V-5 for pedestrian and bicycle clusters (Tables located at the end of this chapter).

State Route 9 has several automobile crash clusters. 50% of the 34 intersections in the City of Worcester are located on State Route 9 from Lake Avenue to the intersection at Maywood Street.

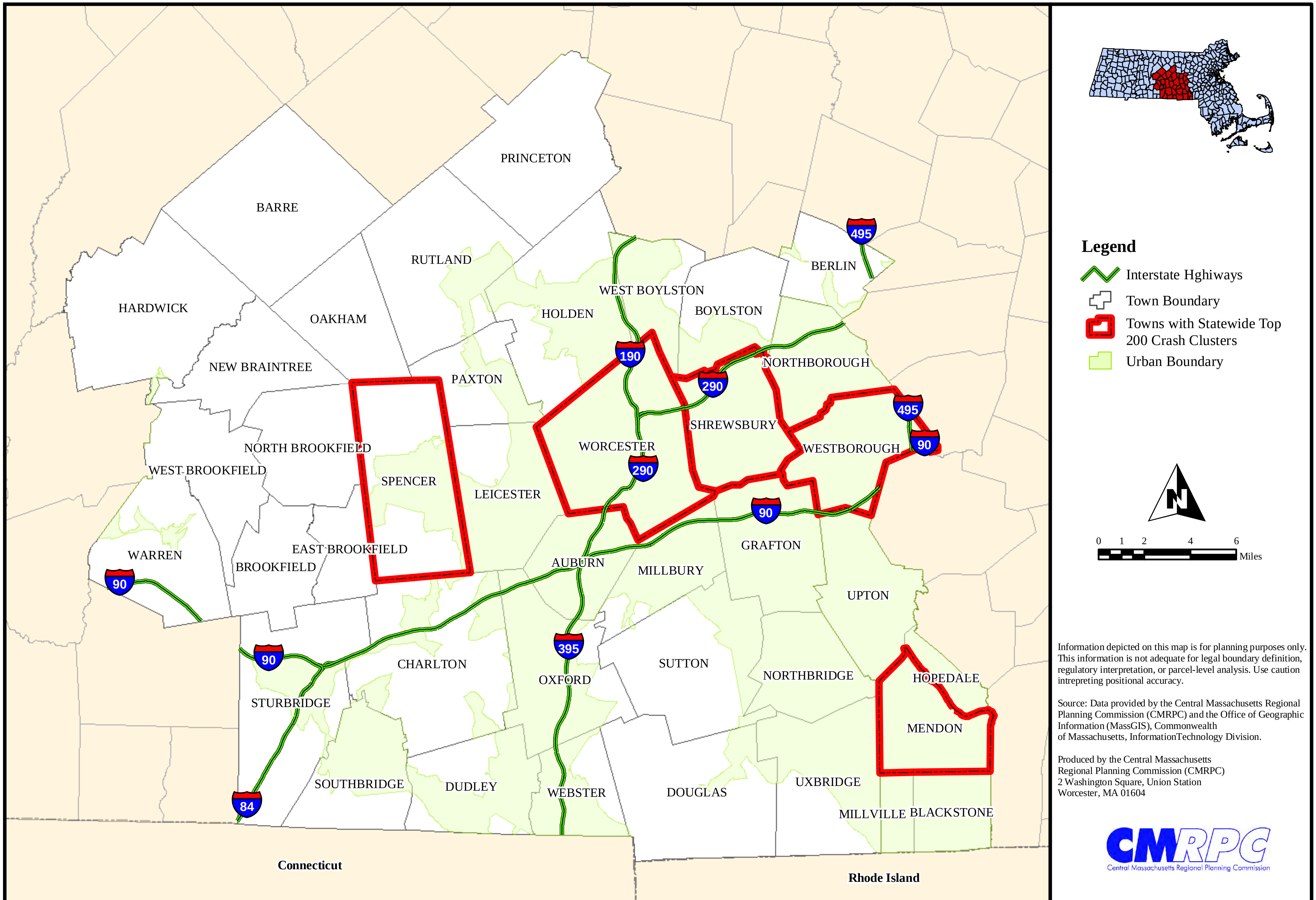


Figure V-2 CMRPC Towns with Statewide Top 200 Crash Clusters

E.4.5 The Region's Highest Ranked Crash Clusters

The regions highest ranked clusters all occur in the City of Worcester shown in the yellow circle in Figure V-3.

- AUTOMOBILE CLUSTERS
  - **RANK 1-** Lincoln Square / Main Street / Major Taylor Boulevard
  - **RANK 2-** Belmont Street / Oak Avenue

- PEDESTRIAN CLUSTERS
  - **RANK 1-** Main Street / Austin Street / Chandler Street
  - **RANK 2-** Main Street / Murray Avenue

- BICYCLE CLUSTERS
  - **RANK 1-** Interstate 290 / Belmont Street
  - **RANK 2-** Main Street / King Street

E.5 High Priority Safety Locations in the Region

As described earlier in the introduction, the top 5% of clusters in the region for each category (automobile/ pedestrian / bicycle) are eligible for HSIP funding. A list of HSIP eligible projects for CMRPC was generated by selecting the top 5% of each type of crash cluster (ranked by EPDO). 204 automobile, 7 pedestrian and 4 bicycle clusters were found eligible for HSIP funding. Communities that wish to pursue this method of funding to improve safety at these locations may need to perform a Road Safety Audit (RSA) which is described later in this document. Communities may wish to contact CMRPC for futher assistance.

Tables at the end of this chapter identify locations where safety improvement projects may be eligible for HSIP funding.

Region's Top 5% Automobile Crash Clusters (Table V-1) (see end of chapter)

Region's Top 5% Bicycle & Pedestrian Clusters (Table V-2)

Region's Top Crash Corridors (Table V-3)

E.5.1 Top 5% Automobile Crash Clusters

Among automobile crash clusters, 75 % are on State Routes and 25% on local roads. 60% are located in the City of Worcester, 23% are on Route 9, 12 % on Route 20. Remarkably the two highest ranked crash clusters are located on either side of interstate 290 along Belmont Street (Route 9). Clusters at this location include:

- Rank 1- crash cluster at Lincoln Square / Major Taylor Boulevard
- Rank 2- crash cluster at Belmont Street /Oak Avenue is located near the UMass Memorial
- Rank 5 – crash cluster at Belmont / Goldsberry Street is flanked by Rank 1 and Rank 2 crash clusters.
- Overlapping clusters Rank 1- bike cluster, Rank 2 - crash cluster and Rank 3- pedestrian cluster are all located at Belmont Street /Oak Avenue.
- In 2009, the traffic-tracking agency INRIX, which culls information nationwide, found that the one mile section of I-290 westbound, which includes the Route 9/Exit 17 and Route 70/Exit 18 ranked among the top 100 bottlenecks nationwide with 9 hours of weekly congestion with travel speeds slowing down to 21 mph during peak periods. [6]

High congestion also leads to increased carbon emissions resulting in lower air quality. The traffic problems here will continue to grow as population is expected to increase over the next decade. Given the confluence of automobile, bicycle, and pedestrian clusters along Belmont Street / I-290 intersection, coupled with the most congested road segment in the region it would be prudent to examine alternative proposals that increase safety, decrease congestion, improve air quality and increase the efficiency of the transportation links at this location. The City of Worcester may be able to combine funding sources from the Highway Safety Improvement Program, Intelligent Transportation System and Congestion Mitigation and Air Quality to improve safety and congestion.

[6] http://scorecard.inrix.com/scorecard/pdf/NTSC0920Full%20Report.pdf

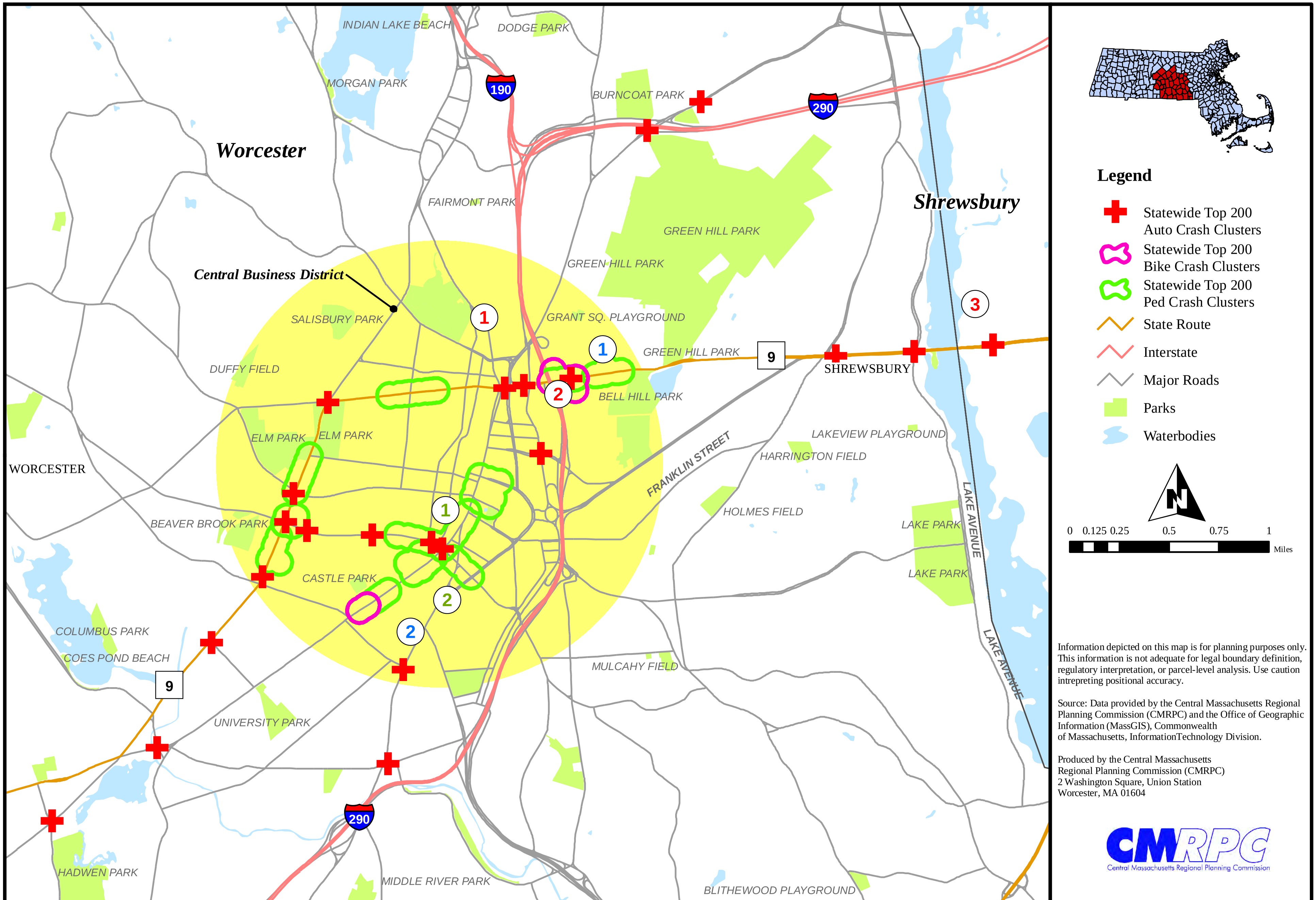


Figure V-3 CMRPC Highest Ranked Crash Clusters

E.5.2 Top 5% Bicycle and Pedestrian Clusters

Bike and pedestrian in the top 5% are listed in Table V-2. Nine of ten HSIP eligible bike and pedestrian clusters in the region are located in the City of Worcester and one is located in the Town of Spencer.

E.5.3 Top Crash Corridors

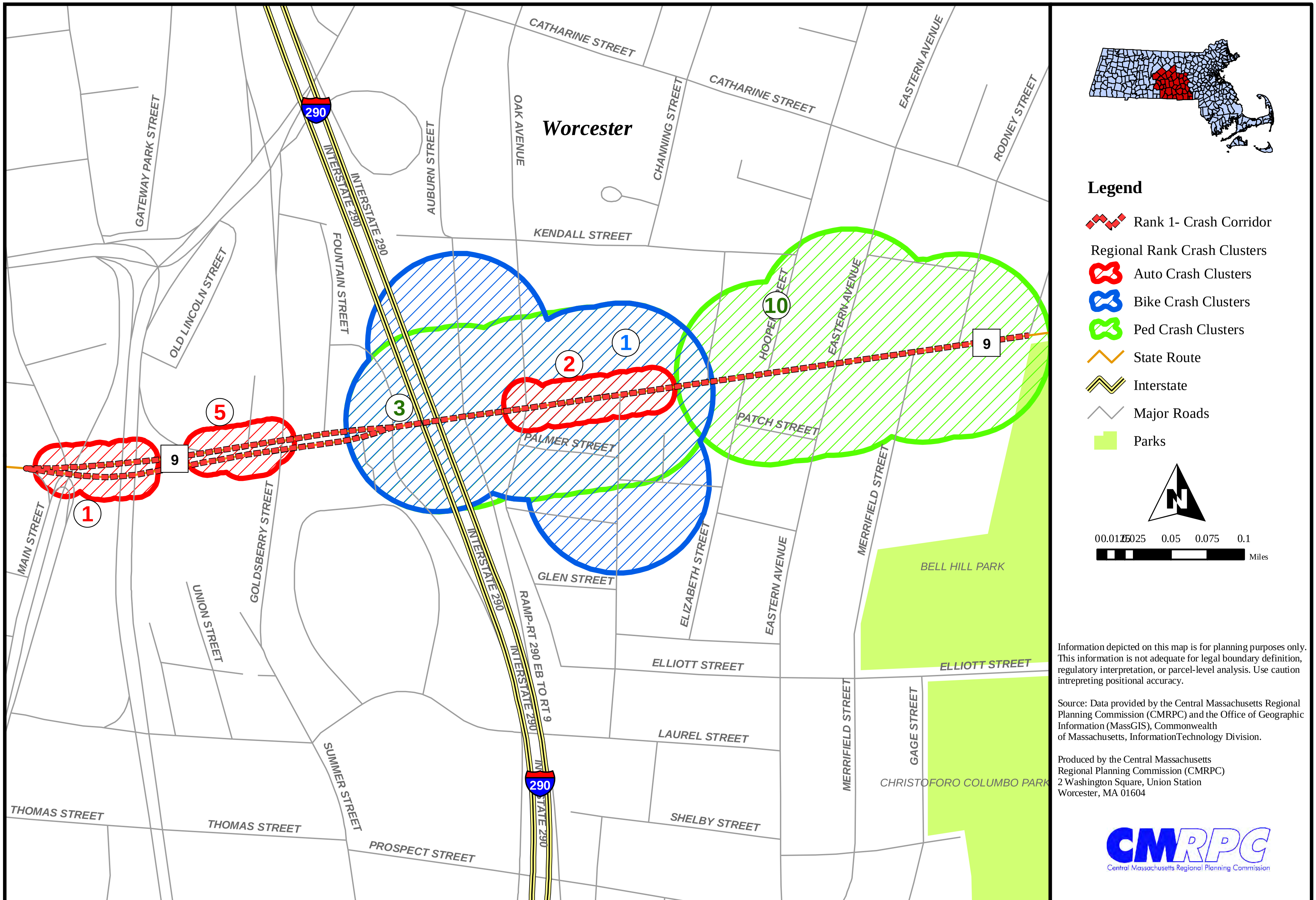
35 of the region's top 5% automobile, bicycle and pedestrian clusters are located in the City of Worcester (Table V-1 & Table V-2). The locations where multi modal crashes occurred were in close proximity to each other along Route 9, Route 122 and Main Street in the central business district. The geographic distribution showed that combined clusters occurred along specific road segments. These safety issues could be addressed more efficiently if they were studied in conjunction with each other rather than separately. The regions highest ranked automobile, pedestrian and bicycle clusters including several of the statewide top 200 clusters are located along the following corridors in the City of Worcester.

- RANK 1 Crash Corridor -Belmont Street From Everard Street To Main Street (Figure V-4)
- RANK 2 Crash Corridor -Chandler Street / Madison Street From Piedmont Street to Gold Street (Figure V-5)
- RANK 3 Crash Corridor -Park Avenue From Elm Street To May Street (Figure V-6)
- RANK 4 Crash Corridor -Main Street From May Street To Madison Street (Figure V-5)

E.5.4 Other Crash Locations – Not Eligible for HSIP Funding

Several communities in the region did not have high priority crash clusters eligible for HSIP funding. Here, intersections with high Equivalent Property Damage (EPDO) were selected to generate a list of crash locations important to each community. Communities are encouraged to explore funding sources from other infrastructure funding sources such as local funds or public private partnership programs.

- Other Automobile Crash Clusters (Table V-4)
- Other Pedestrian Clusters (Table V-5)
- Other Bicycle Clusters (Table V-5)



Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC) and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

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Worcester, MA 01604

CMRPC Central Massachusetts Regional Planning Commission

Figure V-4 Rank 1 Crash Corridor with Crash Clusters

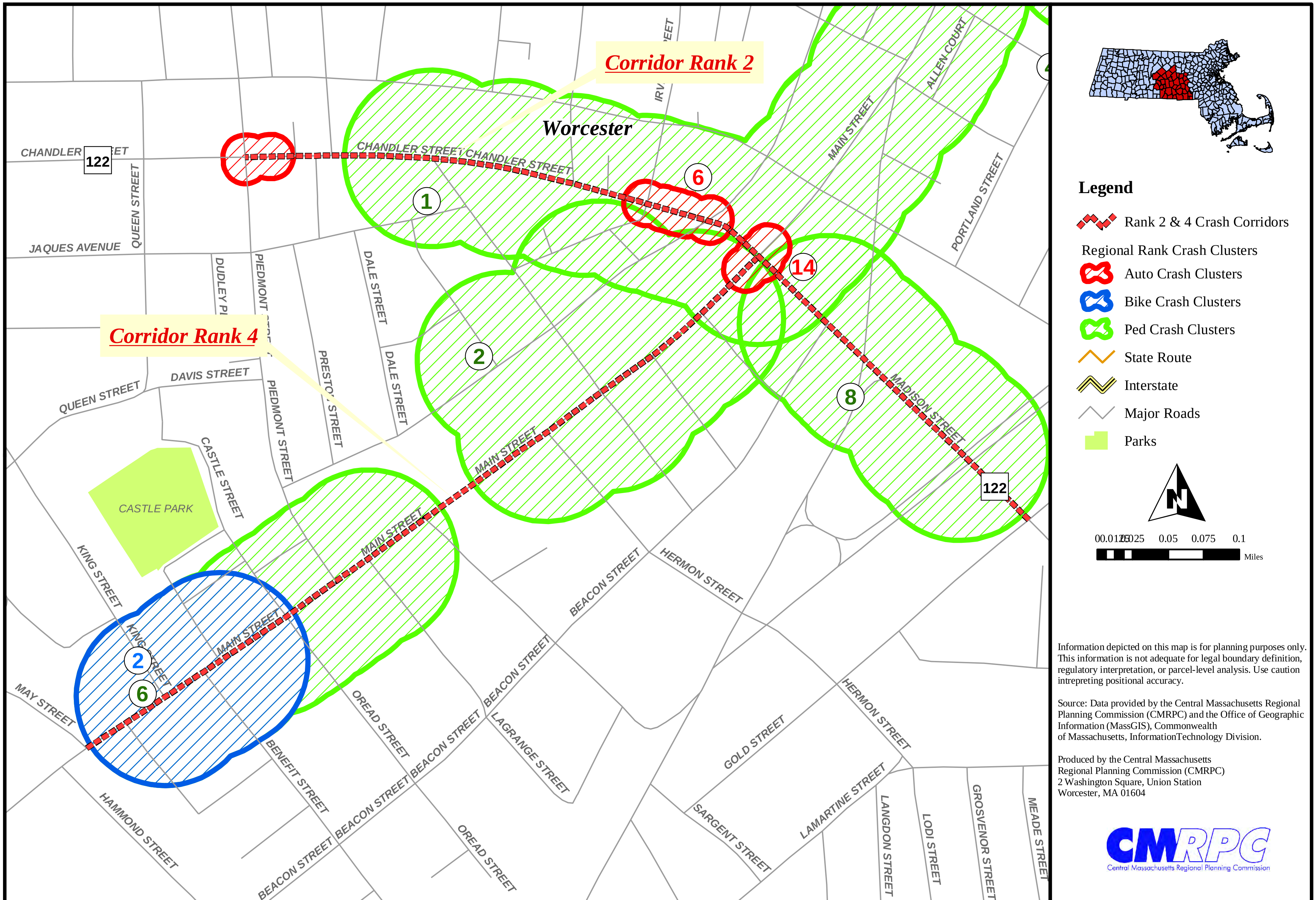

Figure V-5 Rank 2 & 4 Crash Corridors with Crash Clusters

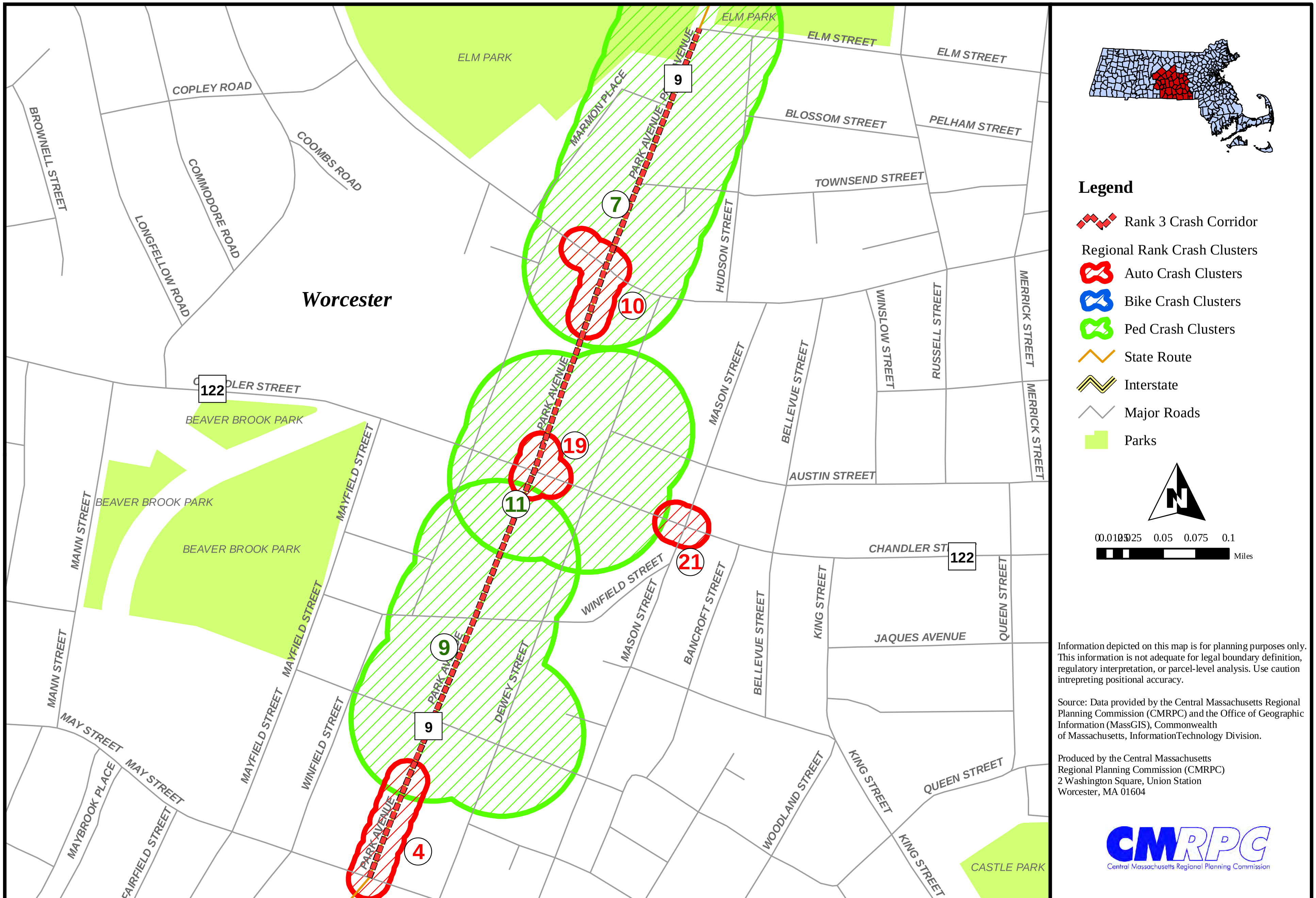

Figure V-6 Rank 3 Crash Corridor with Crash Clusters

F. CONCLUSION

The Highway Safety Improvement Program (HSIP) hopes to reduce the number of fatal and injury crashes by targeting improvements at high crash locations. Cities and towns in the region can utilize the lists provided in this document to consider safety improvements at specific intersections. Specifically, HSIP funding can be used for designing, planning and implementing of intersection improvements at those intersections listed in Table V-1 through Table V-4.

Where intersections are not HSIP eligible but show a high number of crashes, communities may be able to seek assistance from alternate funding sources to make similar improvements. Also, municipalities may want to consider making traffic safety improvements using low-cost, ready-to-use methods that enhance safety at those crash clusters listed in Table V-4 and Table V-5. Specific areas of highway safety include identifying roadside hazards with appropriate signage, markings, and lighting; appropriate use of traffic control devices such as traffic signals; and a variety of other low-cost safety improvements.

F.1 Traffic Safety Toolbox

Traffic Safety Toolbox developed by MassDOT also provides a resource for municipal practitioners. The following topics can be explored at http://www.mhd.state.ma.us/safetytoolbox/ :

- Advanced Warning Signs
- Crosswalks
- Low Cost Intersection Safety Fixes
- Low Cost Non-Intersection Safety Fixes
- Pavement Markings – Center lines & Edge lines
- Pavement Markings - Other
- Retro reflectivity
- Sight Distance
- Speed Limits & Speed Limit Setting
- Stop Sign Installation
- Work Zones
- Roadway Safety Audits

F.2 Roadway Safety Audits

Roadway Safety Audits (RSA) can be used to assist in assessing conditions at selected crash locations. The RSA is a formal safety performance examination of crash intersections conducted by an independent audit team.

- A safety audit uses a 3-5 person interdisciplinary team.
- The safety audit team should consist of community members and professionals.
- A field review is a mandatory component of the safety audit.
- Safety audits use checklists and field reviews to examine all design features.

Such an RSA can detect potential safety problems and identify various improvements that could alleviate safety problems. The costs and benefits of each countermeasure proposed by the team must be individually evaluated to select those that are most suitable for the specific community.

F.3 Integration of Safety with Other Ongoing Efforts

Linking high crash location data with ongoing multimodal efforts will be one of the focuses moving forward with safety planning program in the region. The following activities are envisioned:

F.3.1 Walkability Workshop Integrated with Roadway Safety Audits

As part of the pedestrian mobility improvements efforts, walkability workshops have been performed in different communities, including field data collection of sidewalk condition. Since, the high pedestrian crash locations in the region have been identified; roadway safety audits will be performed alongside walkability surveys to recommend safety as well as mobility improvements.

F.3.2 Roadway Safety Audit at High Transit Ridership Locations

Bus-stop locations with high crashes as well as high ridership locations have been identified. Roadway safety audits at these locations will be performed to improve safety for both pedestrians and transit riders.

Table V-1

Region's Top 5% Automobile Crash Clusters

Excludes Interstate Highways

Crash Cluster : Locates crashes using a 25 meter radius and merges areas into clusters.

Ranked on EPDO

Source : Mass DOT Highway

Id	State Top 200	[3] HSIP Eligible	TOWN	† LOCATION	ROUTE	2006 - 2008 Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
A1	Yes	Yes	WORCESTER	LINCOLN SQUARE / MAIN ST / MAJOR TAYLOR BLVD	SR9 EB / SR70 NB	124	0	26	98	228
A2	Yes	Yes	WORCESTER	BELMONT ST / OAK AV	SR9 EB	99	0	26	73	203
A3	Yes	Yes	SHREWSBURY	BOSTON TURNPIKE / SOUTH QUINSIGAMOND AV	SR9 EB	109	0	20	89	189
A4	Yes	Yes	WORCESTER	PARK AV / MAY ST	SR9 EB	98	0	22	76	186
A5	Yes	Yes	WORCESTER	BELMONT ST / GOLDSBERRY ST / LINCOLN ST	SR9 EB	90	0	22	68	178
A6		Yes	NORTHBOROUGH	BELMONT ST / SOUTHWEST CONNECTOR	SR9 EB / US20 EB	81	0	24	57	177
A7		Yes	WESTBOROUGH	BOSTON WORCESTER TURNPIKE / EAST MAIN ST	SR9 EB / SR30 EB	105	0	18	87	177
A8	Yes	Yes	WORCESTER	CHANDLER ST / MURRAY AV	SR122 NB	73	0	24	49	169
A9	Yes	Yes	WORCESTER	SOUTHBRIDGE ST / HAMMOND ST		66	0	25	41	166
A10	Yes	Yes	SHREWSBURY	BOSTON TURNPIKE / SOUTH ST	SR9 EB	80	0	20	60	160
A11	Yes	Yes	WORCESTER	BELMONT ST / PLANTATION ST	SR9 EB	71	0	21	50	155
A12	Yes	Yes	WESTBOROUGH	BOSTON WORCESTER TURNPIKE / LYMAN ST	SR9 EB	84	0	16	68	148
A13	Yes	Yes	WORCESTER	PARK AV / PLEASANT ST	SR9 EB	72	0	19	53	148
A14	Yes	Yes	WORCESTER	LINCOLN ST / MELROSE ST / RAMP-RT 70 TO RT 290 EB	SR70 NB	50	1	20	29	139
A15	Yes	Yes	WORCESTER	LINCOLN ST / MARSH AV	SR70 NB	74	0	16	58	138
A16	Yes	Yes	WORCESTER	PARK AV / HIGHLAND ST	SR12 NB / SR9 EB	71	0	16	55	135
A17	Yes	Yes	WORCESTER	CHANDLER ST / PIEDMONT ST	SR122 NB	43	0	22	21	131
A18	Yes	Yes	WORCESTER	MAIN ST / CHANDLER ST / MADISON ST	SR122 NB	63	0	17	46	131
A19	Yes	Yes	WORCESTER	MAIN ST / MILL ST / CAMBRIDGE ST		65	0	16	49	129
A20	Yes	Yes	WORCESTER	STAFFORD ST / CURTIS PKWY		57	0	18	39	129
A21	Yes	Yes	MENDON	MILFORD RD / MAIN ST / HASTINGS ST	SR16 EB / SR16 EB	56	0	18	38	128
A22		Yes	WESTBOROUGH	MAIN ST ROTARY / WEST MAIN ST	SR30 EB / SR30 EB	83	0	11	72	127
A23		Yes	WESTBOROUGH	BOSTON WORCESTER TURNPIKE / MILK ST	SR9 EB / SR135 EB	73	0	13	60	125
A24	Yes	Yes	WORCESTER	BELMONT ST / LAKE AV NORTH	SR9 EB	56	0	16	40	120
A25	Yes	Yes	WORCESTER	CAMBRIDGE ST / SOUTHBRIDGE ST		63	0	14	49	119
A26	Yes	Yes	WORCESTER	PARK AV / CHANDLER ST	SR9 EB / SR122 NB	58	0	14	44	114
A27	Yes	Yes	WORCESTER	MAYWOOD ST / PARK AV	SR9 EB	43	0	17	26	111
A28	Yes	Yes	WORCESTER	CHANDLER ST / MASON ST	SR122 NB	45	0	16	29	109
A29	Yes	Yes	WORCESTER	EAST CENTRAL ST / SUMMER ST / CENTRAL ST		53	0	14	39	109

[1] PDO - Property Damage Only

[2] EPDO - Equivalent Property Damage Only weighted by fatal crashes = 10, injury crashes = 5, PDO =1

[3] HSIP- Hiway Safety Improvement Program

† Excluding Interstate Highways

Region's Top 5% Automobile Crash Clusters

Excludes Interstate Highways

Crash Cluster : Locates crashes using a 25 meter radius and merges areas into clusters.

Ranked on EPDO

Source : Mass DOT Highway

Id	State Top 200	[3] HSIP Eligible	TOWN	† LOCATION	ROUTE	2006 - 2008 Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
A30		Yes	WESTBOROUGH	BOSTON WORCESTER TURNPIKE / OTIS ST	SR9 EB	54	0	13	41	106
A31		Yes	WORCESTER	HIGHLAND ST / NORTH ASHLAND ST	SR9 EB	54	0	13	41	106
A32		Yes	WORCESTER	MAIN ST / STAFFORD ST / PARK AV	SR9 EB	46	0	15	31	106
A33		Yes	WORCESTER	HARDING ST / HARRISON ST	SR122 NB	41	0	16	25	105
A34		Yes	WORCESTER	LINCOLN ST / COUNTRY CLUB BLVD	SR70 NB	37	0	17	20	105
A35		Yes	WORCESTER	HIGHLAND ST / HARVARD ST	SR9 EB	61	0	11	50	105
A36		Yes	OXFORD	SOUTHBRIDGE RD / LEICESTER RD	US20 EB / SR56 NB	48	0	14	34	104
A37		Yes	SHREWSBURY	BOSTON TURNPIKE / HARRINGTON AV	SR9 EB	64	0	10	54	104
A38		Yes	WORCESTER	SOUTHWEST CUTOFF / GREENWOOD ST	US20 EB	52	0	13	39	104
A39		Yes	WORCESTER	GRAFTON ST / MENDON ST	SR122 NB	46	0	14	32	102
A40		Yes	WORCESTER	PROVIDENCE ST / MILLBURY ST	SR122A NB	48	0	13	35	100
A41		Yes	SUTTON	WORCESTER PROVIDENCE TURNPIKE / BOSTON RD	SR146 NB	46	0	13	33	98
A42		Yes	SHREWSBURY	BOSTON TURNPIKE / LAKE ST	SR9 EB	35	2	11	22	97
A43		Yes	WORCESTER	BELMONT ST / EASTERN AV	SR9 EB	56	0	10	46	96
A44		Yes	CHARLTON	STURBRIDGE RD / MASONIC HOME RD	US20 EB / SR31 NB	51	0	11	40	95
A45		Yes	WORCESTER	MAIN ST / MAYWOOD ST		35	0	15	20	95
A46		Yes	MILLBURY	ROUTE 20 / PURPLE HEART HIGHWAY	SR146 NB / US20 EB	42	0	13	29	94
A47		Yes	WORCESTER	HIGHLAND ST / LANCASTER ST	SR9 EB	40	0	13	27	92
A48		Yes	OXFORD	MAIN ST / SUTTON AV	SR12 NB	67	0	6	61	91
A49		Yes	WORCESTER	VERNON ST / MADISON ST	SR122A NB / SR122 NI	51	0	10	41	91
A50		Yes	AUBURN	SOUTHBRIDGE ST / HILL ST	US20 EB	37	0	13	24	89
A51		Yes	SHREWSBURY	MAIN ST / CHURCH RD / BOYLSTON ST	SR140 NB	53	0	9	44	89
A52		Yes	WORCESTER	HARDING ST / WINTER ST	SR122 NB	36	0	13	23	88
A53		Yes	WORCESTER	LINCOLN ST / PLANTATION ST		39	0	12	27	87
A54		Yes	WORCESTER	SOUTHBRIDGE ST / MADISON ST	SR122 NB	38	0	12	26	86
A55		Yes	WORCESTER	MILL ST / PARK AV	SR9 EB / SR12 NB	42	0	11	31	86
A56		Yes	SHREWSBURY	BOSTON TURNPIKE / OAK ST	SR9 EB	49	0	9	40	85
A57		Yes	WORCESTER	LINCOLN ST / TRINITY AV	SR70 NB	32	0	13	19	84
A58		Yes	WORCESTER	WEST BOYLSTON ST / MOUNTAIN ST WEST	SR12 NB	43	0	10	33	83
A59		Yes	HOLDEN	MAIN ST / RESERVOIR ST	SR122A NB / SR31 NB	38	0	11	27	82
A60		Yes	WORCESTER	MAIN ST / AUSTIN ST / MYRTLE ST		34	0	12	22	82
A61		Yes	WORCESTER	MAY ST / MAIN ST		34	0	12	22	82

[1] PDO - Property Damage Only
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[3] HSIP- Hiway Safety Improvement Program
† Excluding Interstate Highways

Region's Top 5% Automobile Crash Clusters

Excludes Interstate Highways

Crash Cluster : Locates crashes using a 25 meter radius and merges areas into clusters.

Ranked on EPDO

Source : Mass DOT Highway

Id	State Top 200	[3] HSIP Eligible	TOWN	† LOCATION	ROUTE	2006 - 2008 Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
A62		Yes	WORCESTER	LINCOLN ST / TYLER PRENTICE RD	SR70 NB	36	0	11	25	80
A63		Yes	WORCESTER	MAIN ST / HAMMOND ST		39	0	10	29	79
A64		Yes	AUBURN	WASHINGTON ST / PROSPECT ST	US20 EB	33	1	9	23	78
A65		Yes	WORCESTER	VERNON ST / DORCHESTER ST	SR122A NB	38	0	10	28	78
A66		Yes	SHREWSBURY	HARTFORD TURNPIKE / GRAFTON ST	US20 EB	41	0	9	32	77
A67		Yes	WORCESTER	BELMONT ST / SHREWSBURY ST	SR9 EB	36	0	10	26	76
A68		Yes	AUBURN	AUBURN ST / SOUTHBRIDGE ST	SR12 NB	34	0	10	24	74
A69		Yes	WORCESTER	I 190 / GOLD STAR BLVD	I190 NB / SR12 NB	29	1	9	19	74
A70		Yes	WORCESTER	MILL ST / JUNE ST		26	0	12	14	74
A71		Yes	CHARLTON	STURBRIDGE RD / SOUTHBRIDGE RD	US20 EB	28	0	11	17	72
A72		Yes	WORCESTER	SOUTHWEST CUTOFF / SUNDERLAND RD	US20 EB	36	0	9	27	72
A73		Yes	WORCESTER	GRAFTON ST / HAMILTON ST	SR122 NB	31	0	10	21	71
A74		Yes	WORCESTER	MAIN ST / CURTIS PKWY	SR9 EB	35	0	9	26	71
A75		Yes	WORCESTER	BELMONT ST / FRANK ST	SR9 EB	38	0	8	30	70
A76		Yes	WORCESTER	MOUNTAIN ST WEST / BROOKS ST / I 190 SB CD RD		38	0	8	30	70
A77		Yes	NORTHBOROUGH	MAIN ST / PATTY LANE / HUDSON ST	US20 EB	37	0	8	29	69
A78		Yes	NORTHBRIDGE	PROVIDENCE RD / SUTTON ST	SR122 NB	37	0	8	29	69
A79		Yes	WORCESTER	PARK AV / CHARLOTTE ST	SR9 EB	25	0	11	14	69
A80		Yes	UXBRIDGE	MENDON ST / SOUTH MAIN ST	SR16 EB / SR122 NB	32	0	9	23	68
A81		Yes	WORCESTER	MAIN ST / KING ST		28	0	10	18	68
A82		Yes	WORCESTER	PLEASANT ST / SEVER ST		32	0	9	23	68
A83		Yes	WORCESTER	CHANDLER ST / QUEEN ST	SR122 NB	35	0	8	27	67
A84		Yes	WORCESTER	ELM ST / WEST ST		23	0	11	12	67
A85		Yes	NORTHBOROUGH	WEST MAIN ST / CHURCH ST	US20 EB	42	0	6	36	66
A86		Yes	NORTHBRIDGE	CHURCH ST / PROVIDENCE RD	SR122 NB	38	0	7	31	66
A87		Yes	WORCESTER	MADISON ST	SR122 NB	30	0	9	21	66
A88		Yes	WORCESTER	HAMILTON ST / FAIRMONT AV		26	0	10	16	66
A89		Yes	AUBURN	APPLETON RD / WASHINGTON ST	US20 EB	21	0	11	10	65
A90		Yes	WORCESTER	PARK AV / SAGAMORE RD	SR12 NB	29	0	9	20	65
A91		Yes	WORCESTER	LOVELL ST / PARK AV / LOVELL ST	SR9 EB	29	0	9	20	65
A92		Yes	SHREWSBURY	HARTFORD TURNPIKE / LAKE ST	US20 EB	28	0	9	19	64
A93		Yes	WEST BOYLSTON	WORCESTER ST / CENTRAL ST / WEST BOYLSTON ST	SR12 NB / SR12 NB	20	0	11	9	64

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Source : Mass DOT Highway

Id	State Top 200	[3] HSIP Eligible	TOWN	† LOCATION	ROUTE	2006 - 2008 Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
A94		Yes	WORCESTER	CHANDLER ST / MILL ST	SR122 NB	36	0	7	29	64
A95		Yes	WORCESTER	MADISON ST / WASHINGTON ST	SR122 NB	28	0	9	19	64
A96		Yes	WORCESTER	LINCOLN ST / SHAFFNER ST / BURNCOAT ST	SR70 NB	32	0	8	24	64
A97		Yes	HOLDEN	MAIN ST / SALISBURY ST	SR122A NB	23	0	10	13	63
A98		Yes	SOUTHBRIDGE	MAIN ST / ELM ST	SR131 EB / SR198 NB	27	0	9	18	63
A99		Yes	WORCESTER	GRAFTON ST / PLANTATION ST	SR122 NB	27	0	9	18	63
A100		Yes	SHREWSBURY	MAIN ST / HOLDEN ST / NORTH QUINSIGAMOND AV		34	0	7	27	62
A101		Yes	WORCESTER	PARK AV	SR9 EB	26	0	9	17	62
A102		Yes	WORCESTER	MAY ST / WOODLAND ST		30	0	8	22	62
A103		Yes	WORCESTER	GOLD STAR BLVD / MILLBROOK ST	SR12 NB	25	0	9	16	61
A104		Yes	WORCESTER	CAMBRIDGE ST / FREMONT ST		29	0	8	21	61
A105		Yes	STURBRIDGE	ROUTE 20 / PODUNK PIKE	US20 EB / SR49 NB	28	0	8	20	60
A106		Yes	WORCESTER	PARK AV / SALISBURY ST	SR12 NB	36	0	6	30	60
A107		Yes	WORCESTER	BURNCOAT ST / MILLBROOK ST		28	0	8	20	60
A108		Yes	AUBURN	SOUTHBRIDGE ST / PROSPECT ST	SR12 NB	31	0	7	24	59
A109		Yes	SHREWSBURY	MEMORIAL DR / HARTFORD TURNPIKE	US20 EB / SR140 NB	27	0	8	19	59
A110		Yes	UPTON	WESTBORO RD / SCHOOL ST / HIGH ST / HOPKINTON RD		31	0	7	24	59
A111		Yes	WORCESTER	HIGHLAND ST / RUSSELL ST	SR9 EB	31	0	7	24	59
A112		Yes	SHREWSBURY	SOUTH QUINSIGAMOND AV		30	0	7	23	58
A113		Yes	SOUTHBRIDGE	MAIN ST / PLEASANT ST	SR131 EB	22	0	9	13	58
A114		Yes	WORCESTER	SOUTHWEST CUTOFF / GRAFTON ST	SR122 NB / US20 EB	21	1	7	13	58
A115		Yes	WORCESTER	GROVE ST / GOLD STAR BLVD	SR12 SB / SR12 NB	28	1	5	22	57
A116		Yes	WORCESTER	GOLD STAR BLVD	SR12 NB	29	0	7	22	57
A117		Yes	WORCESTER	PARK AV / INSTITUTE RD	SR12 NB	25	0	8	17	57
A118		Yes	WORCESTER	MAIN ST / SYLVAN ST	SR9 EB	25	0	8	17	57
A119		Yes	WORCESTER	PARK AV / PARKER ST	SR9 EB	32	1	4	27	57
A120		Yes	WORCESTER	PLEASANT ST / MOWER ST / CHANDLER ST	SR122 NB / SR122 NB	32	0	6	26	56
A121		Yes	WORCESTER	MAY ST / JUNE ST		24	0	8	16	56
A122		Yes	AUBURN	SOUTHBRIDGE ST	US20 EB	27	0	7	20	55
A123		Yes	WORCESTER	GRAFTON ST / RAMP-RT 122 TO RT 290 EB	SR122 NB	23	0	8	15	55
A124		Yes	WORCESTER	GROVE ST / GLENNIE ST		27	0	7	20	55
A125		Yes	CHARLTON	STURBRIDGE RD / CARPENTER HILL RD / STAFFORD ST	US20 EB	26	0	7	19	54

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Region's Top 5% Automobile Crash Clusters

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Ranked on EPDO

Source : Mass DOT Highway

Id	State Top 200	[3] HSIP Eligible	TOWN	† LOCATION	ROUTE	2006 - 2008 Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
A126		Yes	HOPEDALE, MENDON	HARTFORD AV EAST / CAPE RD / SOUTH MAIN ST	SR140 NB / SR140 NB	30	0	6	24	54
A127		Yes	MENDON, HOPEDALE	HARTFORD AV EAST / CAPE RD / SOUTH MAIN ST	SR140 NB / SR140 NB	30	0	6	24	54
A128		Yes	WORCESTER	CHESTER ST / GROVE ST	SR122A NB	26	0	7	19	54
A129		Yes	WORCESTER	HIGHLAND ST / WEST ST	SR9 EB	22	0	8	14	54
A130		Yes	WORCESTER	HAMILTON ST / PLANTATION ST		26	0	7	19	54
A131		Yes	WORCESTER	MAIN ST / FRONT ST		26	0	7	19	54
A132		Yes	WORCESTER	QUINSIGAMOND AV / LAFAYETTE ST		26	0	7	19	54
A133		Yes	SHREWSBURY	BOSTON TURNPIKE / GRAFTON ST	SR9 EB	29	0	6	23	53
A134		Yes	WORCESTER	BURNCOAT ST / RAMP-RT 190 TO BURNCOAT ST		21	0	8	13	53
A135		Yes	WORCESTER	MAJOR TAYLOR BLVD / EAST CENTRAL ST		17	0	9	8	53
A136		Yes	AUBURN	WASHINGTON ST / SOUTH ST	US20 EB	32	0	5	27	52
A137		Yes	SOUTHBRIDGE	WORCESTER ST / MECHANIC ST	SR169 NB / SR169 NB	28	0	6	22	52
A138		Yes	SPENCER	MAIN ST / MAPLE ST	SR9 EB / SR31 NB	28	0	6	22	52
A139		Yes	WORCESTER	PARK AV / PRATT ST	SR12 NB	20	0	8	12	52
A140		Yes	WORCESTER	MASSASOIT RD / SOUTHWEST CUTOFF	US20 EB	28	0	6	22	52
A141		Yes	WORCESTER	MAIN ST / NORWOOD ST		24	0	7	17	52
A142		Yes	OXFORD	SUTTON AV		19	0	8	11	51
A143		Yes	SHREWSBURY	MAIN ST / MAPLE AV		39	0	3	36	51
A144		Yes	SOUTHBRIDGE	CENTRAL ST / PAIGE HILL RD		27	0	6	21	51
A145		Yes	WORCESTER	CAMBRIDGE ST / EXETER ST		17	2	4	11	51
A146		Yes	WORCESTER	PROVIDENCE ST / ASTRID AV	SR122A NB	19	0	8	11	51
A147		Yes	WORCESTER	PARK AV / TOWNSEND ST	SR9 EB	31	0	5	26	51
A148		Yes	WORCESTER	FRANKLIN ST / FRONT ST		19	0	8	11	51
A149		Yes	WORCESTER	PLEASANT ST / RICHMOND AV		27	0	6	21	51
A150		Yes	DUDLEY	WEST MAIN ST / VILLAGE ST / SCHOFIELD AV	SR12 NB / SR12 NB	34	0	4	30	50
A151		Yes	WESTBOROUGH	EAST MAIN ST / FLANDERS RD	SR30 EB	18	0	8	10	50
A152		Yes	WORCESTER	GRAFTON ST / SUNDERLAND RD	SR122 NB	30	0	5	25	50
A153		Yes	WORCESTER	VERNON ST / WINTHROP ST	SR122A NB / SR122A I	26	0	6	20	50
A154		Yes	WORCESTER	SALISBURY ST / CONCORD ST		22	0	7	15	50
A155		Yes	SHREWSBURY	BOSTON TURNPIKE / DEWEY RD	SR9 EB	29	0	5	24	49
A156		Yes	WORCESTER	GRAFTON ST / DORCHESTER ST	SR122 NB	16	1	6	9	49
A157		Yes	WORCESTER	CHANDLER ST / MAY ST	SR122 NB	17	0	8	9	49

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A158		Yes	WORCESTER	BOYLSTON ST / PLANTATION ST	SR70 NB	21	0	7	14	49
A159		Yes	WORCESTER	CAMBRIDGE ST / HAYNES ST		13	0	9	4	49
A160		Yes	WORCESTER	GOLD STAR BLVD	SR12 NB	28	0	5	23	48
A161		Yes	WORCESTER	CHANDLER ST / KING ST	SR122 NB	20	0	7	13	48
A162		Yes	WORCESTER	CAMBRIDGE ST / CAMP ST		20	0	7	13	48
A163		Yes	WORCESTER	CANTERBURY ST / GARDNER ST		20	0	7	13	48
A164		Yes	WORCESTER	SOUTHBRIDGE ST / LAFAYETTE ST		24	0	6	18	48
A165		Yes	AUBURN, OXFORD	SOUTHBRIDGE RD / MAIN ST	US20 EB / SR12 NB	22	1	4	17	47
A166		Yes	CHARLTON	STURBRIDGE RD / OX BOW RD	US20 EB	19	0	7	12	47
A167		Yes	OXFORD, AUBURN	SOUTHBRIDGE RD / MAIN ST	US20 EB / SR12 NB	22	1	4	17	47
A168		Yes	STURBRIDGE	ROUTE 20 / FISKE HILL RD	US20 EB	19	0	7	12	47
A169		Yes	WORCESTER	WATER ST / HARRISON ST	SR122 SB	23	0	6	17	47
A170		Yes	WORCESTER	WINTHROP ST / PROVIDENCE ST	SR122A NB	23	0	6	17	47
A171		Yes	WORCESTER	MAIN ST / GODDARD MEMORIAL DR	SR9 EB	19	0	7	12	47
A172		Yes	WORCESTER	CAMBRIDGE ST / MCKEON RD		19	0	7	12	47
A173		Yes	WORCESTER	PROVIDENCE ST / DORCHESTER ST		27	0	5	22	47
A174		Yes	CHARLTON	SOUTHBRIDGE RD / STURBRIDGE RD	SR169 NB / US20 EB	22	0	6	16	46
A175		Yes	HOLDEN	MAIN ST / SHREWSBURY ST	SR122A NB	26	0	5	21	46
A176		Yes	SHREWSBURY	MAPLE AV / BOSTON TURNPIKE	SR9 EB	30	0	4	26	46
A177		Yes	SPENCER	MAIN ST / MECHANIC ST	SR9 EB	21	1	4	16	46
A178		Yes	UXBRIDGE	HARTFORD AV WEST / NORTH MAIN ST	SR122 NB	26	0	5	21	46
A179		Yes	WORCESTER	WEST BOYLSTON ST / BOARDMAN ST	SR12 SB	22	0	6	16	46
A180		Yes	WORCESTER	LINCOLN ST / RAMP-RT 290 WB TO RT 70	SR70 NB	18	0	7	11	46
A181		Yes	WORCESTER	BELMONT ST / ALVARADO AV	SR9 EB	26	0	5	21	46
A182		Yes	WORCESTER	BEACON ST / HAMMOND ST		22	0	6	16	46
A183		Yes	WORCESTER	STAFFORD ST		18	0	7	11	46
A184		Yes	MILLBURY, WORCESTER	SOUTHWEST CUTOFF / GRANITE ST	US20 EB	17	0	7	10	45
A185		Yes	WORCESTER	PLANTATION ST / WINCO RD		16	1	5	10	45
A186		Yes	WORCESTER	SOUTHBRIDGE ST / SOUTHGATE ST		20	1	4	15	45
A187		Yes	WORCESTER	CHANDLER ST / BELLEVUE ST	SR122 NB	21	0	6	15	45
A188		Yes	WORCESTER	LINDEN ST / ELM ST		17	0	7	10	45
A189		Yes	WORCESTER, MILLBURY	SOUTHWEST CUTOFF / GRANITE ST	US20 EB	17	0	7	10	45

[1] PDO - Property Damage Only
[2] EPDO - Equivalent Property Damage Only weighted by fatal crashes = 10, injury crashes = 5, PDO =1
[3] HSIP- Hiway Safety Improvement Program
† Excluding Interstate Highways

Region's Top 5% Automobile Crash Clusters

Excludes Interstate Highways

Crash Cluster : Locates crashes using a 25 meter radius and merges areas into clusters.

Ranked on EPDO

Source : Mass DOT Highway

							2006 - 2008			
Id	State Top 200	[3] HSIP Eligible	TOWN	† LOCATION	ROUTE	Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
A190		Yes	LEICESTER	MAIN ST / PLEASANT ST	SR9 EB / SR56 NB	21	0	5	16	41
A191		Yes	SPENCER	PLEASANT ST / NORTH SPENCER RD	SR31 NB / SR31 NB	16	0	6	10	40
A192		Yes	DUDLEY	WEST MAIN ST / AIRPORT RD	SR197 NB	17	0	5	12	37
A193		Yes	LEICESTER	PAXTON ST / MARSHALL ST	SR56 NB	17	0	5	12	37
A194		Yes	MENDON	UXBRIDGE RD / HARTFORD AV WEST	SR16 EB	17	0	5	12	37
A195		Yes	MILLBURY	PURPLE HEART HIGHWAY / WEST MAIN ST	SR146 NB	29	0	2	27	37
A196		Yes	WEST BOYLSTON	FRANKLIN ST / WEST BOYLSTON ST	SR12 NB	17	0	5	12	37
A197		Yes	STURBRIDGE	MAIN ST / STALLION HILL RD	US20 EB	16	0	5	11	36
A198		Yes	PAXTON	PLEASANT ST / WEST ST	SR122 NB / SR31 NB	11	0	6	5	35
A199		Yes	STURBRIDGE	ROUTE 20 / SOUTHBRIDGE RD	US20 EB	19	0	4	15	35
A200		Yes	DUDLEY	BRANDON RD / SCHOFIELD AV /BRANDON RD	SR12 NB	18	0	4	14	34
A201		Yes	DUDLEY	WEST MAIN ST / PAGLIONE / MASON RD	SR197 NB	18	0	4	14	34
A202		Yes	MENDON	BATES ST / BELLINGHAM ST		10	0	6	4	34
A203		Yes	MILLBURY	GREENWOOD ST / MCCRACKEN RD		21	0	3	18	33
A204		Yes	UXBRIDGE	NORTH MAIN ST / DOUGLAS ST	SR16 EB / SR16 EB	13	0	5	8	33

[1] PDO - Property Damage Only
[2] EPDO - Equivalent Property Damage Only weighted by fatal crashes = 10, injury crashes = 5, PDO =1
[3] HSIP- Hiway Safety Improvement Program
† Excluding Interstate Highways

Table V-2

Region's Top 5% Pedestrian Crash Clusters

Crash Cluster : Locates crashes using a 25 meter radius and merges areas into clusters.
Ranked on EPDO

Source : Mass DOT Highway

Id	State Top 200	[3] HSIP Eligible	TOWN	† LOCATION	ROUTE	Figure No.	2006 - 2008 Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
P1	Yes	Yes	WORCESTER	MAIN ST / AUSTIN ST / CHANDLER ST	SR122 NB		33	0	27	6	141
P2	Yes	Yes	WORCESTER	MAIN ST / MURRAY AV			17	0	14	3	73
P3	Yes	Yes	WORCESTER	BELMONT ST / I 290	I290 EB / SR9 EB		19	1	11	7	72
P4	Yes	Yes	WORCESTER	FOSTER ST / MAIN ST			17	0	13	4	69
P5	Yes	Yes	SPENCER	MAIN ST / ELM ST / MAPLE ST	SR9 EB / SR31 NB		16	1	10	5	65
P6	Yes	Yes	WORCESTER	MAIN ST / PIEDMONT ST			13	0	12	1	61
P7	Yes	Yes	WORCESTER	PARK AV / PLEASANT ST	SR9 EB		13	1	7	5	50

Top 5% Bicycle Crash Clusters

Crash Cluster : Locates crashes using a 25 meter radius and merges areas into clusters.
Ranked on EPDO

Source : Mass DOT Highway

Id	State Top 200	[3] HSIP Eligible	TOWN	† LOCATION	ROUTE	Figure No.	2006 - 2008 Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
B1	Yes	Yes	WORCESTER	I 290 / BELMONT ST	I290 EB / SR9 EB	4	8	0	6	2	32
B2	Yes	Yes	WORCESTER	MAIN ST / KING ST		18	6	0	5	1	26
B3		Yes	WORCESTER	PARK AV / PLEASANT ST	SR9 EB		6	0	4	2	22
B4		Yes	WORCESTER	PARK AV / MILL ST	SR9 EB / SR12 NB		6	0	4	2	22

[1] PDO - Property Damage Only
[2] EPDO - Equivalent Property Damage Only weighted by fatal crashes = 10, injury crashes = 5, PDO =1
[3] HSIP- Hiway Safety Improvement Program
† Excluding Interstate Highways

Table V-3

Region's Top Crash Corridors

Excludes Interstate Highways

Combined Crash / Bike / Ped Cluster Road Segments - HSIP Eligible

Id	# Crash Clusters	# Bike Clusters	# Ped Clusters	TOWN	LOCATION	ROUTE	Mileage	2006 - 2008 Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
C1	3	1	2	WORCESTER	BELMONT ST FROM EVERARD ST TO MAIN ST	SR9	0.94	496	0	117	379	964
C2	3	0	3	WORCESTER	CHANDLER ST / MADISON ST FROM PIEDMONT ST TO GOLD ST	SR122	0.64	307	0	98	209	699
C3	3	0	3	WORCESTER	PARK AV FROM ELM ST TO MAY ST	SR9	0.69	648	1	399	248	648
C4	0	1	2	WORCESTER	MAIN ST FROM MAY ST TO MADISON ST	MAIN ST	0.57	150	0	42	108	318

[1] PDO - Property Damage Only
[2] EPDO - Equivalent Property Damage Only weighted by fatal crashes = 10, injury crashes = 5, PDO =1
[3] HSIP- Hiway Safety Improvement Program
† Excluding Interstate Highways

Table V-4
Other Automobile Crash Clusters

Excludes Interstate Highways

Crash Cluster : Locates crashes using a 25 meter radius and merges areas into clusters.
Ranked on EPDO

Source : Mass DOT Highway

Id	State Top 200	[3] HSIP Eligible	TOWN	† LOCATION	ROUTE	2006 - 2008 Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
A205		No	BARRE	SOUTH BARRE RD / VALLEY RD	SR32 NB / SR122 NB	7	0	3	4	19
A206		No	BARRE	VALLEY RD / HUBBARDSTON RD / MECHANIC ST	SR62 EB / SR62 EB	7	0	3	4	19
A207		No	BARRE	SOUTH ST / CONCERT MALL / SUMMER ST	SR32 NB / SR32 NB	8	0	2	6	16
A208		No	BERLIN	GATES POND RD / CENTRAL ST	SR62 EB	12	0	4	8	28
A209		No	BERLIN	CENTRAL ST	SR62 EB	6	0	3	3	18
A210		No	BERLIN	SAWYER HILL RD / CENTRAL ST	SR62 EB	5	0	3	2	17
A211		No	BLACKSTONE	MAIN ST / SAINT PAUL ST	SR122 NB	17	0	2	15	25
A212		No	BLACKSTONE	RATHBUN ST / DOLLARD AV		6	0	3	3	18
A213		No	BOYLSTON	MAIN ST / WEST BOYLSTON ST	SR70 NB / SR140 NB	14	0	4	10	30
A214		No	BOYLSTON	SCHOOL ST / EAST TEMPLE ST		10	0	4	6	26
A215		No	BOYLSTON	CROSS ST / CENTRAL ST		9	0	3	6	21
A216		No	BOYLSTON	SHREWSBURY ST	SR140 NB	4	0	4	0	20
A217		No	BROOKFIELD	WEST MAIN ST / RIVER ST / POST RD	SR9 EB / SR148 NB	5	0	3	2	17
A218		No	DOUGLAS	WEBSTER ST / CEDAR ST	SR16 EB	10	0	5	5	30
A219		No	DOUGLAS	MARTIN RD / FRANKLIN ST		4	0	3	1	16
A220		No	EAST BROOKFIELD	MAIN ST / HARRINGTON ST	SR9 EB	8	0	4	4	24
A221		No	EAST BROOKFIELD	MAIN ST	SR9 EB	2	0	2	0	10
A222		No	EAST BROOKFIELD	PODUNK RD		2	0	2	0	10
A223		No	GRAFTON	WORCESTER ST / SNOW RD	SR122 NB	19	0	3	16	31
A224		No	GRAFTON	WORCESTER ST / HITCHINGS RD	SR122 NB	12	0	4	8	28
A225		No	GRAFTON	NORTH MAIN ST / SHREWSBURY ST	SR140NB	8	1	2	5	25
A226		No	GRAFTON	WORCESTER ST / BRIDGE ST	SR122NB	12		3	9	24
A227		No	GRAFTON	WORCESTER ST / PROVIDENCE RD	SR122NB	16		2	14	24
A228		No	GRAFTON	WORCESTER ST / WHEELER RD	SR122NB	12		3	9	24
A229		No	GRAFTON	PROVIDENCE RD / MILLBURY ST	SR122NB	9		3	6	21
A230		No	GRAFTON	NORTH MAIN ST / BRIDGE ST	SR230EB	7	1	1	5	20
A231		No	HARDWICK	CHURCH ST / MAIN ST	SR32 NB / SR32 NB	3	0	2	1	11
A232		No	HOPEDALE	MENDON ST / HOPEDALE ST	SR16 EB	16	0	3	13	28
A233		No	HOPEDALE	SOUTH MAIN ST	SR140 NB	11	0	4	7	27
A234		No	LEICESTER	MAIN ST	SR9 EB	23	0	2	21	31
A235		No	MILLVILLE	MAIN ST / LINCOLN ST	SR122 NB	9	0	1	8	13

[1] PDO - Property Damage Only
[2] EPDO - Equivalent Property Damage Only weighted by fatal crashes = 10, injury crashes = 5, PDO =1
[3] HSIP- Hiway Safety Improvement Program
† Excluding Interstate Highways

Other Automobile Crash Clusters

Excludes Interstate Highways

Crash Cluster : Locates crashes using a 25 meter radius and merges areas into clusters.

Ranked on EPDO

Source : Mass DOT Highway

Id	State Top 200	[3] HSIP Eligible	TOWN	† LOCATION	ROUTE	2006 - 2008 Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
A236		No	MILLVILLE	CHESTNUT HILL RD / TOWER ST		3	0	2	1	11
A237		No	NEW BRAINTREE	BARRE RD / RAVINE RD	SR67 NB	6	0	3	3	18
A238		No	NORTH BROOKFIELD	WARD ST / OLD EAST BROOKFIELD RD / ELM ST		3	0	3	0	15
A239		No	NORTH BROOKFIELD	WEST BROOKFIELD RD / BROOKFIELD RD	SR67 NB / SR148 NB	4	0	2	2	12
A240		No	NORTH BROOKFIELD	WARD ST / RYAN RD		4	0	2	2	12
A241		No	NORTHBRIDGE	CHURCH ST / THURSTON AV		7	0	3	4	19
A242		No	OAKHAM	WORCESTER RD	SR122 NB	2	0	2	0	10
A243		No	OAKHAM	NORTH BROOKFIELD RD	SR148 NB	2	0	2	0	10
A244		No	PAXTON	PLEASANT ST / RESERVOIR DR	SR56 NB	7		1	5	20
A245		No	PAXTON	RICHARDS AV / COMMON ST	SR56 NB / SR31 NB	8	0	2	6	16
A246		No	PAXTON	PLEASANT ST / INDIAN HILL RD	SR122 NB	4		2	2	12
A247		No	PAXTON	PLEASANT ST / GROVE ST	SR56 NB	6		1	5	10
A248		No	PAXTON	PLEASANT ST / COLONY LN	SR122 NB	5		1	4	9
A249		No	PAXTON	PLEASANT ST / CAMP	SR122 NB	5		1	4	9
A250		No	PRINCETON	REDEMPTION ROCK TRAIL NORTH / ROCKY POND RD	SR140 NB	3	0	2	1	11
A251		No	PRINCETON	BEAMAN RD / REDEMPTION ROCK TRAIL NORTH / MAIN ST	SR31 NB / SR140 NB	3	0	2	1	11
A252		No	RUTLAND	PLEASANTDALE RD / BARRE PAXTON RD	SR122 NB	17	0	3	14	29
A253		No	RUTLAND	MAIN ST / MAPLE AV	SR122A NB / SR56 NB	12	0	2	10	20
A254		No	SHREWSBURY	BOYLSTON ST / COLONIAL DR	SR140 NB / SR140 NB	9	0	3	6	21
A255		No	STURBRIDGE	HOLLAND RD / BROMFIELD RD	US20 EB	21	0	2	19	29
A256		No	STURBRIDGE	ROUTE 20 / HALL RD	US20 EB	13	0	4	9	29
A257		No	SUTTON	PUTNAM HILL RD / CENTRAL TURNPIKE		6	0	2	4	14
A258		No	SUTTON	BOSTON RD / UXBRIDGE RD		5	0	2	3	13
A259		No	UPTON	MAIN ST / GROVE ST / MILFORD ST	SR140 NB / SR140 NB	11	0	3	8	23
A260		No	WARREN	MAIN ST / MAPLE ST	SR19 NB / SR19 NB	2	0	2	0	10
A261		No	WARREN	OLD WEST WARREN RD / HIGHLAND ST		2	0	2	0	10
A262		No	WEBSTER	EAST MAIN ST / LINCOLN ST	SR12 NB	15	0	4	11	31
A263		No	WEBSTER	EAST MAIN ST / CODY ST	SR12 NB	9	0	5	4	29
A264		No	WEBSTER	EAST MAIN ST / RACICOT AV	SR12 NB	9	0	5	4	29
A265		No	WEST BOYLSTON	WOODLAND ST / PROSPECT ST		10	0	5	5	30
A266		No	WEST BROOKFIELD	SCHOOL ST / NORTH MAIN ST	SR67 NB	6	0	1	5	10
A267		No	WEST BROOKFIELD	PLEASANT ST / MAIN ST	SR9 /SR67	5		1	4	9

[1] PDO - Property Damage Only
[2] EPDO - Equivalent Property Damage Only weighted by fatal crashes = 10, injury crashes = 5, PDO =1
[3] HSIP- Hiway Safety Improvement Program
† Excluding Interstate Highways

Other Automobile Crash Clusters

Excludes Interstate Highways

Crash Cluster : Locates crashes using a 25 meter radius and merges areas into clusters.

Ranked on EPDO

Source : Mass DOT Highway

Id	State Top 200	[3] HSIP Eligible	TOWN	† LOCATION	ROUTE	2006 - 2008 Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
A268		No	WEST BROOKFIELD	MAIN ST / NORTH MAIN ST	SR67 NB	5		1	4	9
A269		No	WEST BROOKFIELD	WEST MAIN ST / GILBERTVILLE RD	SR32 / SR9	4		1	3	8
A270		No	WORCESTER	CAMBRIDGE ST / RICHARDS ST		7	0	2	5	15

[1] PDO - Property Damage Only
[2] EPDO - Equivalent Property Damage Only weighted by fatal crashes = 10, injury crashes = 5, PDO =1
[3] HSIP- Hiway Safety Improvement Program
† Excluding Interstate Highways

Table V-5
Other Pedestrian Crash Clusters

Crash Cluster : Locates crashes using a 25 meter radius and merges areas into clusters.

Source : Mass DOT Highway

Id	State Top 200	[3] HSIP Eligible	TOWN	† LOCATION	ROUTE	Figure No.	2006 - 2008 Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
P8		No	BLACKSTONE	MAIN ST / SAINT PAUL ST	SR122 NB		4	0	4	0	20
P9		No	OXFORD	MAIN ST / SUTTON AV	SR12 NB		5	0	3	2	17
P10		No	SOUTHBRIDGE	MAIN ST / HAMILTON ST	SR131 EB		4	0	4	0	20
P11		No	SOUTHBRIDGE	WORCESTER ST / CHARLTON ST			4	0	4	0	20
P12		No	SOUTHBRIDGE	MAIN ST / ELM ST	SR131 EB / SR198 NB		4	0	3	1	16
P13		No	WEBSTER	MAIN ST / HIGH ST / SCHOOL ST	SR12 NB		5	0	3	2	17
P14		No	WEBSTER	NEGUS ST / CHURCH ST			3	0	2	1	11
P15	Yes	No	WORCESTER	MADISON ST / FRANCIS J. MCGRATH BLVD	SR122 NB		12	0	9	3	48
P16	Yes	No	WORCESTER	HIGHLAND ST / WEST ST	SR9 EB		16	0	8	8	48
P17	Yes	No	WORCESTER	PARK AV / DEWEY ST	SR9 EB		7	2	5	0	45
P18	Yes	No	WORCESTER	BELMONT ST / EASTERN AV	SR9 EB		10	0	8	2	42
P19	Yes	No	WORCESTER	DEWEY ST / CHANDLER ST / PARK AV	SR9 EB / SR122 NB		7	1	6	0	40
P20		No	WORCESTER	PLEASANT ST / MERRICK ST			11	0	7	4	39
P21		No	WORCESTER	WINTHROP ST / VERNON ST	SR122A NB / SR122A NB		10	0	7	3	38
P22		No	WORCESTER	CHANDLER ST / AUSTIN ST	SR122 NB		11	0	6	5	35
P23		No	WORCESTER	MAIN ST / MAY ST			8	0	6	2	32
P24		No	WORCESTER	MAIN ST / BEAVER ST / MAYWOOD ST			8	0	5	3	28
P25		No	WORCESTER	I 290 / VERNON ST / HARDING ST	SR122A NB / SR122 NB		7	0	5	2	27
P26		No	WORCESTER	GRAFTON ST / ORIENT ST	SR122 NB		7	0	5	2	27
P27		No	WORCESTER	MAIN ST / TIRRELL ST			7	0	5	2	27
P28		No	WORCESTER	PARK AV / WESTFIELD ST / PARK AV	SR9 EB		6	0	5	1	26
P29		No	WORCESTER	DORCHESTER ST / HOUGHTON ST			6	0	5	1	26
P30		No	WORCESTER	PARK AV / MAYWOOD ST	SR9 EB		7	0	4	3	23
P31		No	WORCESTER	LINCOLN ST / PAINE ST	SR70 NB		6	0	4	2	22
P32		No	WORCESTER	FRANKLIN ST / FRANCIS J. MCGRATH BLVD			6	0	4	2	22
P33		No	WORCESTER	I 290 / WASHINGTON SQUARE	I290 EB		5	0	4	1	21
P34		No	WORCESTER	MAIN ST / EUREKA ST	SR9 EB		5	0	4	1	21
P35		No	WORCESTER	CAMBRIDGE ST / IVES ST			5	0	4	1	21
P36		No	WORCESTER	JAMES ST / GENESEE ST			5	0	4	1	21
P37		No	WORCESTER	I 290 / FRANKLIN ST / RAMP-RT 122 TO RT 290 EB	I290 EB		4	0	4	0	20
P38		No	WORCESTER	PARK AV / LOVELL ST	SR9 EB		4	0	4	0	20

[1] PDO - Property Damage Only
[2] EPDO - Equivalent Property Damage Only weighted by fatal crashes = 10, injury crashes = 5, PDO =1
[3] HSIP- Hiway Safety Improvement Program
† Excluding Interstate Highways

Other Pedestrian Crash Clusters

Crash Cluster : Locates crashes using a 25 meter radius and merges areas into clusters.

Source : Mass DOT Highway

Id	State Top 200	[3] HSIP Eligible	TOWN	† LOCATION	ROUTE	Figure No.	2006 - 2008 Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
P39		No	WORCESTER	PARK AV / MAY ST / DEWEY ST	SR9 EB		7	0	3	4	19
P40		No	WORCESTER	I290 / RAMP-RT 70 TO RT 290 EB / LINCOLN ST / CRESCENT ST	I290 EB / SR70 NB		5	0	3	2	17
P41		No	WORCESTER	MAIN ST / HOLLAND RD	SR9 EB		4	0	3	1	16
P42		No	WORCESTER	I 290 / ENDICOTT ST / PURPLE HEART HIGHWAY	I290 EB / SR146 NB		3	0	3	0	15
P43		No	WORCESTER	I 290 / LINCOLN ST / CONCORD ST	I290 EB / SR70 NB		3	0	3	0	15
P44		No	WORCESTER	WEST BOYLSTON ST / SUMMERHILL AV	SR12 NB		3	0	3	0	15
P45		No	WORCESTER	GRAFTON ST / FAIRMONT AV	SR122 NB		3	0	3	0	15
P46		No	WORCESTER	BELMONT ST	SR9 EB		3	0	3	0	15
P47		No	WORCESTER	GREAT BROOK VALLEY AV / BROOKVIEW DR			3	0	3	0	15
P48		No	WORCESTER	GREENWOOD ST / ADELLE CIRCUIT			3	0	3	0	15
P49		No	WORCESTER	MAIN ST / OBERLIN ST			3	0	3	0	15

Other Bicycle Crash Clusters

Crash Cluster : Locates crashes using a 25 meter radius and merges areas into clusters.

Ranked on EPDO

Source : Mass DOT Highway

Id	State Top 200	[3] HSIP Eligible	TOWN	† LOCATION	ROUTE	Figure No.	2006 - 2008 Crash Count	Fatal Crashes	Injury Crashes	[1] PDO & Non Reported Crashes	[2] EPDO
B5		No	OXFORD	MAIN ST / CHARLTON ST	SR12 NB		4	0	3	1	16
B6		No	OXFORD	MAIN ST / DANA RD / MILLBURY BLVD	SR12 NB		3	0	2	1	11
B7		No	SOUTHBRIDGE	HAMILTON ST / HOOK ST			5	0	2	3	13
B8		No	SOUTHBRIDGE	CENTRAL ST / WORCESTER ST			3	0	2	1	11
B9		No	WEBSTER	EAST MAIN ST / RACICOT AV / PARK AV	SR12 NB		3	0	3	0	15
B10		No	WESTBOROUGH	MILK ST / EAST MAIN ST	SR135 EB / SR30 EB		4	0	3	1	16
B11		No	WORCESTER	CHANDLER ST / BELLEVUE ST	SR122 NB		5	0	4	1	21
B12		No	WORCESTER	OAK AV / KENDALL ST			4	0	4	0	20
B13		No	WORCESTER	PIEDMONT ST / CHANDLER ST	SR122 NB		5	0	3	2	17
B14		No	WORCESTER	MAIN ST / MURRAY AV			5	0	3	2	17
B15		No	WORCESTER	PARK AV / MAY ST	SR9 EB		7	0	2	5	15
B16		No	WORCESTER	MAIN ST / CRYSTAL ST / MAYWOOD ST			3	0	3	0	15
B17		No	WORCESTER	PLEASANT ST / DELLWOOD RD / MORELAND ST			3	0	3	0	15

[1] PDO - Property Damage Only
[2] EPDO - Equivalent Property Damage Only weighted by fatal crashes = 10, injury crashes = 5, PDO =1
[3] HSIP- Hiway Safety Improvement Program
† Excluding Interstate Highways

TRANSPORTATION SECURITY PROGRAM

VI

VI. TRANSPORTATION SECURITY PROGRAM

A. SAFETEA-LU EMPHASIS

SAFETEA-LU calls for an increase in planning for the security of the transportation system and requires it to be a stand-alone planning factor. The CMMPO has come to regard security for all agencies and users of our transportation system – motorists, cyclists, pedestrians and transit users – as an important component of the Regional Transportation Plan.

Transportation security refers to both personal and homeland security, including attention to the vulnerability to intentional attack and natural disasters, and the associated evacuation procedures. Security is generally defined as freedom from intentional harm or tampering. A targeted terrorist attack is not the only threat to Central Massachusetts infrastructure, as natural disasters, accidents and safety issues may also present security risks. Traditional crimes, fires, system property damage, trespassing, failure of vehicles or equipment, infrastructure deterioration, and vehicular gridlock are constant security risks. Responding to emergencies is often complicated by vehicular congestion, inadequate first responder access, and other factors not directly related to the specific incident.

An overall goal is to increase the security of the transportation system for both motorized and non-motorized users.

B. CENTRAL REGION HOMELAND SECURITY ADVISORY COUNCIL

The Central Region Homeland Security Advisory Council (CRHSAC) has taken a lead effort in planning for the region's security needs. The CMHSC is taking a regional approach and is exploring ways to better integrate prevention, response, mitigation, and recovery efforts directed toward security incidents, regardless of whether they are natural or manmade. The Council's Transportation voting member is the Administrator of the Worcester Regional Transit Authority, and MassHighway is represented by a non-voting member. The Council has funded one transportation-related project to date; installation of security cameras at the North Leominster Commuter Rail Station.

CMRPC assists the CRHSAC in its security planning and funding efforts. As part of that collaborative effort, CMRPC will prepare an Evacuation Plan beginning Summer 2011.

C. TRANSPORTATION INFRASTRUCTURE HAZARD/THREAT IDENTIFICATION

The Central Massachusetts Region has a vast and large transportation system, if one system is affected during an incident, most likely the remaining systems will see an impact at some level. Worcester is the keystone and hub for most transportation throughout Central Massachusetts.

While security planning encompasses any scenario imaginable, one of the most likely types of emergencies in Central Massachusetts is flooding. A Hazard Mitigation Plan was developed by CMRPC Community Development staff. The Plan demonstrates that an area of Central Massachusetts is included within the 18-mile Hurricane Barrier, stretching from Providence Rhode Island to the Uxbridge, Millville, Blackstone region. This region is also at moderate risk for flooding. With its low lying elevation and large volumes of water it is an area of concern.

Another major security issue in correlation with flooding is Dam Safety. Massachusetts Department of Conservation and Recreation (DCR) has been responsible for implementing regulations and until 2002 were responsible for dam inspections. Recently the state has inspected the dams in Central Massachusetts, giving them a classification of High Hazard, Significant Hazard and Low Hazard. The January 2011 Massachusetts Dam Safety Law report showed fifteen critical dams in eleven municipalities in Central Massachusetts. These dams are depicted with the regional waterways, and elevation in Figure VI-1.

The Towns of Auburn, Brookfield, Grafton, Northbridge, and Southbridge are areas that have historically experienced flooding and have flood prone areas or high hazard dams. These towns have valuable transportation infrastructure and major transportation routes can be affected in a flood.

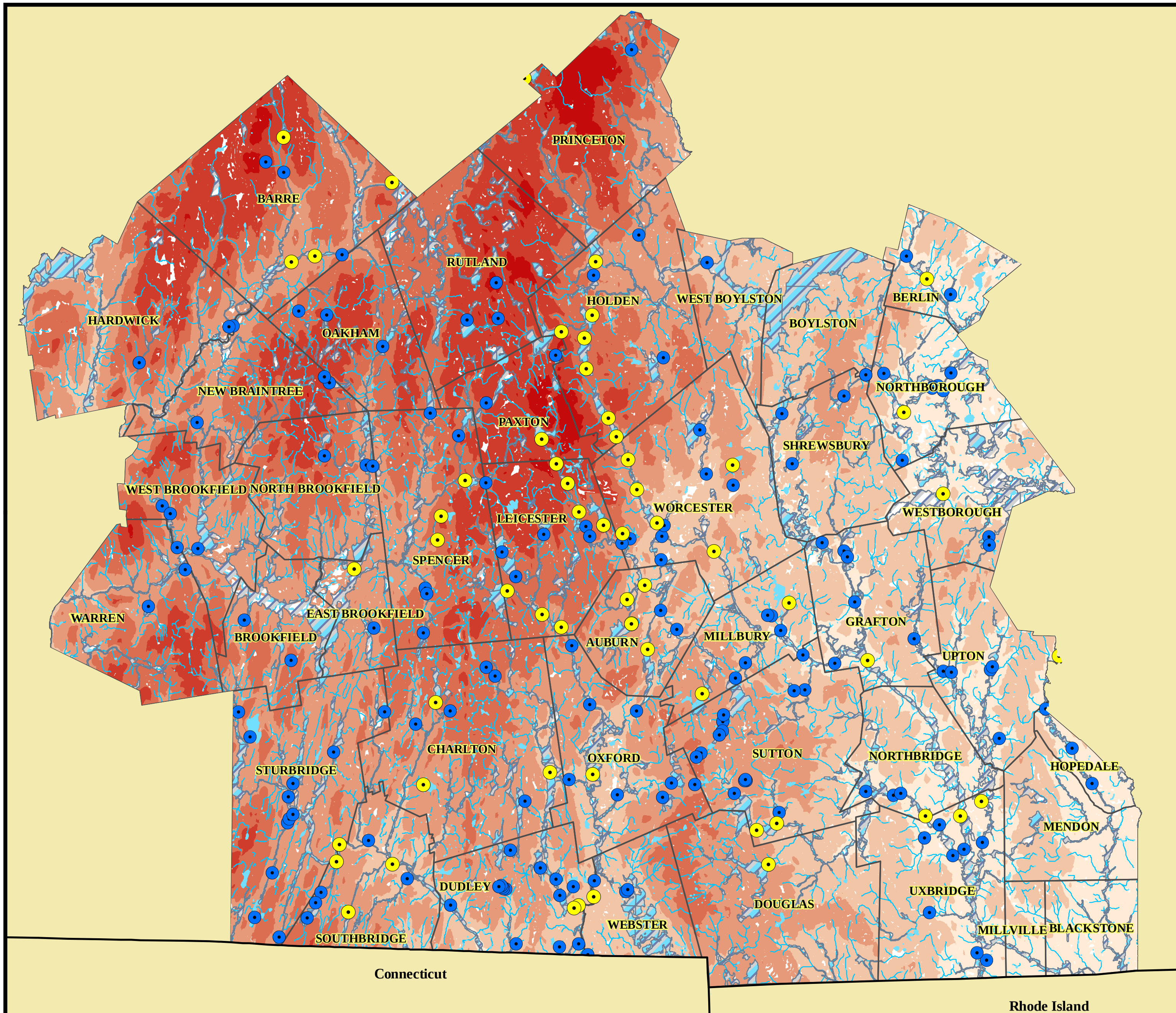
Other Transportation systems that can be affected by flooding include bridges, WRTA transit routes, commuter rail, railroads, and high volume roadways. Figure VI-2 shows high volume roads and transit routes and their proximity to 100 year flood zones, and Figure VI-3 shows bridges over water.

Recently, the region has added another roadway security initiative. The Telegram.com has installed an up-to-the-minute traffic alerts website. With rapidly advancing technology, the Telegram has introduced an up to the minute Traffic Alert system for traffic on the major highways, including Route 9 in and out of the city, with updates by the minute.

D. TRANSIT SECURITY INITIATIVES

The Worcester Regional Transit Authority (WRTA) is the organization responsible for providing both fixed-route bus service for the general public and paratransit services for elders and people with disabilities in the greater Worcester area. As the primary provider of public transit services for the Central Massachusetts region, the WRTA serves 37 communities and maintains a fleet of 44 buses for 28 fixed routes in Worcester and 13 surrounding communities. The WRTA also provides demand responsive service for elders and people with disabilities with its 75 paratransit vans and minibuses.

To establish the importance of security and emergency preparedness in all aspects of its organization, the WRTA has developed a System Security Program Plan (SSPP). The SSPP outlines the process to be used by the WRTA to make informed decisions that are appropriate for operations, passengers, employees and communities regarding the development and implementation of a comprehensive security and emergency preparedness program.



Legend

- High Hazard Potential Dam
- Significant Haz. Potent. Dam
- 100 Year Flood Zones
- Regional Waterbodies
- Regional Waterways

10ft Contour [ft]

- 98.00 - 374.00
- 374.00 - 570.00
- 570.00 - 767.00
- 767.00 - 944.00
- 944.00 - 1131.00
- 1131.00 - 2007.00

0 1 2 4 6 8 Miles

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Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), massDOT/Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

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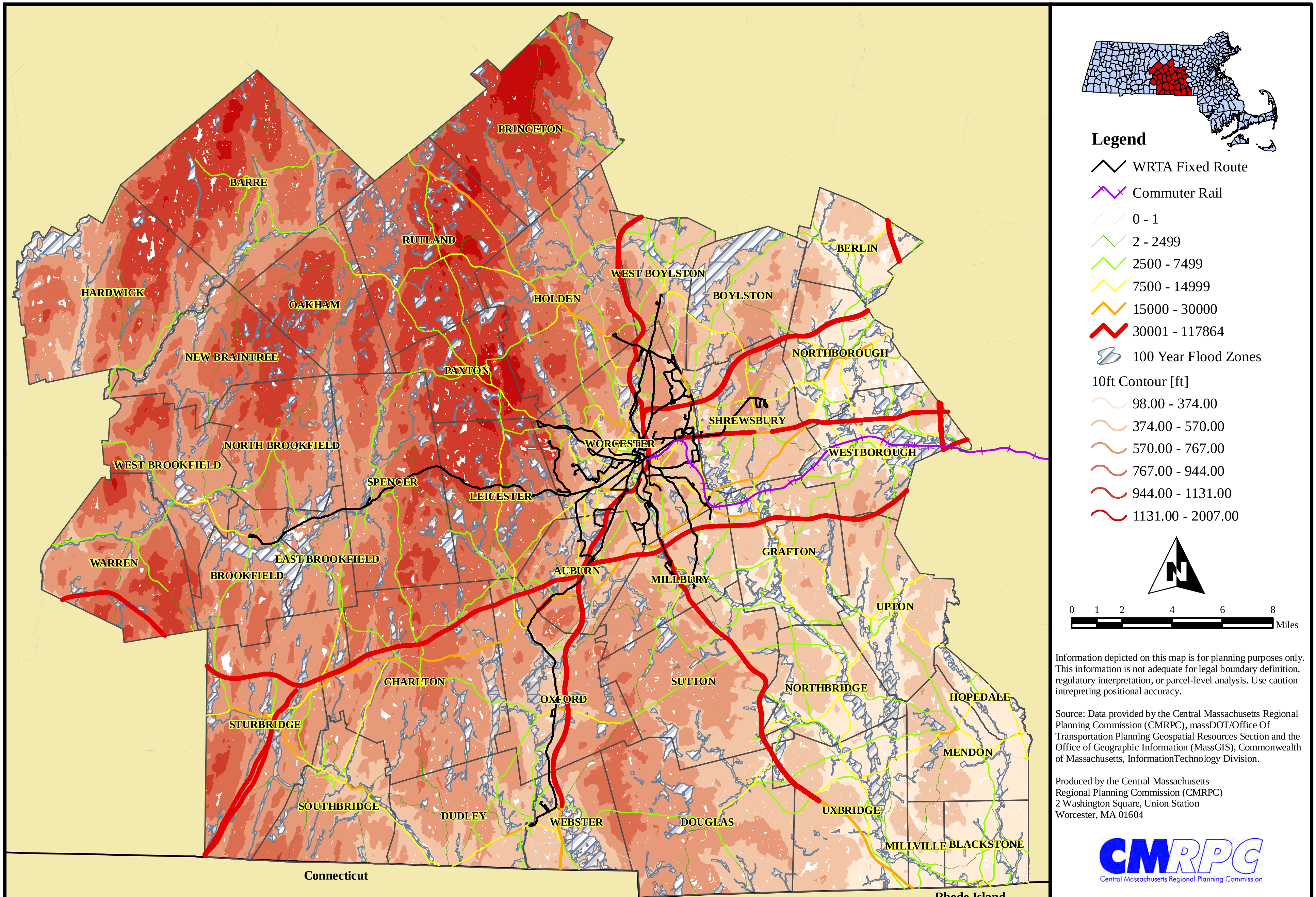
Figure VI-1 Flood Zones with Hazardous Dams, Regional Waterways, and Elevation



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Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), massDOT/Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

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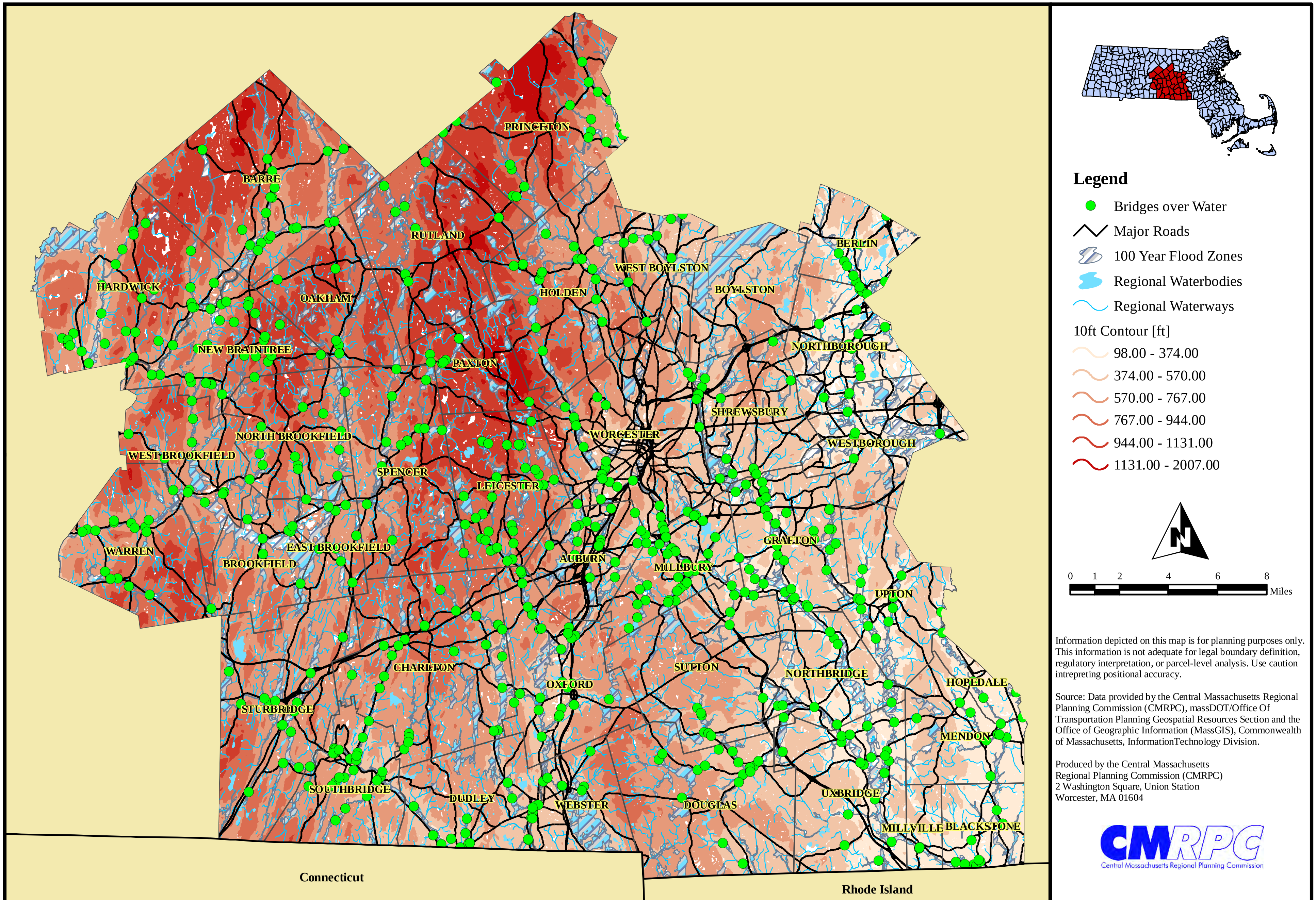
Figure VI-2 Flood Zones with High Volume Roads, WRTA Fixed Route, Commuter Rail, and Elevation



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Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC), massDOT/Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

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Figure VI-3 Flood Zones with Bridges Over Water and Major Roads

The purpose of the plan is to help establish and maintain the System Security Program. It serves as a detailed blueprint for all security activities by:

- establishing how security activities are organized;
- outlining employee and department responsibilities with respect to security;
- instituting threat and vulnerability identification, assessment, and resolution methodologies; and
- setting goals and objectives (including periodic drills and audits of the plan).

Elements included in the SSPP are Emergency Action Plan, Homeland Security, Relocation Procedures, Evaluation of Emergency Preparedness, and Security Committee. The plan is updated continually to record and evaluate past security performance of the system, to identify modifications that are needed, and to establish objectives for the upcoming year.

The WRTA continuity of operations (COOP) Plan was developed to ensure the safety and well-being of WRTA and RTA transit employees, and facilitate the execution of the WRTA's essential functions during any crisis or emergency in which one or more WRTA locations are threatened or not accessible.

WRTA prepared the COOP in compliance with Department of Homeland Security Headquarters COOP Guidance Document, dated April 2004, which provides a structure for formulating a COOP plan; Presidential Decision Directive–67, "Ensuring Constitutional Government and Continuity of Government Operations," which requires all Federal departments and agencies to have a viable COOP capability; and Commonwealth of Massachusetts Executive Order No. 144, which requires all Commonwealth agencies to prepare for emergencies and disasters and to provide emergency liaisons to Massachusetts Emergency Management Agency for coordinating resources, training, and operations. The plan offers a management framework, establishes operational procedures to sustain essential functions, and guides the restoration of full functions if normal operations in one or more of the WRTA's locations are not feasible.

The basic COOP elements include essential functions, critical systems, alternative facilities, orders of succession, delegations of authority, and vital records. The development of procedures that address the basic COOP elements and work in concert with business continuity and disaster recovery plans allows for uninterrupted delivery of the WRTA's essential functions. Specific WRTA COOP Plan objectives are as follows:

- Enable staff to perform essential functions to prepare for and respond to the full spectrum of possible threats or emergencies including terrorism, technological catastrophes, natural or manmade disasters, and other crises.
- Identify key principals and supporting staff who will relocate.
- Ensure that the Emergency Relocation Site (ERS) can support Emergency Relocation Group operations.
- Protect and maintain vital records and critical systems.

The COOP offers maintenance requirements, leadership responsibilities, and provides for a deliberate and preplanned movement of selected principals and supporting staff to the ERS, as well as defined criteria for an ERS location. The plan is updated annually.

In addition to achieving an effective physical security program, the WRTA works to enhance its coordination with the local public safety agencies in the region. The WRTA anticipates that improved communication will increase the awareness of resources and capabilities, and improve readiness to support efforts to manage community-wide emergencies. The WRTA has joined the Worcester Police initiative to "Text a Tip" in effort to boost security measures. The goal is to allow riders on the WRTA to use their cell phones to text regarding suspicious activities. The local police are able to respond quickly upon receiving notification of the text. After the WRTA began to post the "Text a Tip" message on their buses, the number of tips phoned in increased significantly.

CMMPO staff and the WRTA have completed an effort to identify existing bus stops using GPS technology to allow for management activities using a GIS platform. The integration effort produced an identification of safety, security, and accessibility concerns by stop location.

Intercity carriers are also concerned about security planning. Peter Pan Bus Lines has installed security cameras on a portion of their fleet. In addition, security cameras and security personnel are continually monitoring the intercity bus area of the Union Station intermodal facility, which accommodates both Peter Pan and Greyhound Bus Lines.

E. RAILROAD AND UNION STATION SECURITY INITIATIVES

Rail security has been a concern ever since September 11, 2001. In a 2010 article in The Journal of Commerce, CSX officials said that passenger rail was the biggest security threat. As Worcester's Union Station provides service to both CSX cargo and passenger rail, the state is accutely aware of the need for security in this area. CSX has its own police force that has been nationally recognized by the Commission on Accreditation for Law Enforcement Agencies, which includes a Rapid Response Team.

As noted in the DRAFT Massachusetts State Rail Plan, Amtrak has instituted security measures aimed at improving passenger rail security. Amtrak's security measures that may be conducted in stations or on board a train include:

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

These security checks done by Amtrak may be conducted on a random basis and are unpredictable. The Department of Homeland Security assists in funding this Amtrak effort through its Transit Security Grant Program.

Amtrak also has a strong influence with local authorities in efforts to cut down on vandalism and theft. In addition, the Massachusetts State Police has increased efforts to reduce trespassing and theft on the rail lines and have formed task forces to address this ongoing problem.

Massachusetts railroads have participated in the Section 130 highway-rail grade crossing program. The focus of the program is to improve operations, safety and security of grade crossings to minimize accidents between rail and highway traffic. Since 2007, over $1.5 million in Section 130 has been spent on grade crossing projects. Providence and Worcester Railroad, the MBTA, and Mass Central Railways took part in the project.

Other actions taken by the railroad industry since September 2001 include increased cyber-security, restricted access to railcar location data, spot employee identification checks, increased tracking and inspection of certain shipments, new encryption technology for selected data communications, increased security at physical assets, and increased employee training to ensure that the industry's more than 200,000 employees serve as the "eyes and ears" of the security effort.

The rail industry also created a DOD-certified, 24/7 operations center that links the railroads with the appropriate national security intelligence officials. This allows the railroad industry and the intelligence community to immediately share information and respond to threats." In addition, the Association of American Railroads (AAR.org) has conducted a rail industry wide comprehensive risk analysis and has initiated a security plan to protect 142,000 miles of rail network.

In March 2011, Massachusetts Lt. Gov. Tim Murray and U.S. Homeland Security Secretary Janet Napolitano re-launched an MBTA security initiative, “If you see something, Say something.” The initiative is similar to the “Text a Tip” in that it encourages and urges the public to take an active role in keeping the MBTA system secure. Routinely, the MBTA’s Transit Police conduct training exercises in Union Station, and conduct passenger screening checkpoints on unannounced dates. The MBTA is also addressing a concern with theft and break-ins of personal vehicles at the rail station parking lots.

Due to proximity and response times, the Worcester Police Department is the primary responder to incidents in the city. As such, various tactical and operational plans have been developed that incorporate facilities such as Union Station, including an Automated Critical Asset Management System evaluation.

When Worcester’s new 500 space municipal parking garage was constructed two years ago, additional security was placed throughout Union Station’s property, including security cameras in the new garage and additional cameras in Union station. Union Station has private security personnel on property during all hours of operation.

F. ROLE OF INTELLIGENT TRANSPORTATION SYSTEMS IN REGIONAL SECURITY PLANNING

Technology is constantly evolving and being comprehensively applied in ways that improve our everyday mobility and increase the efficiency of our transportation systems. Intelligent Transportation Systems, or ITS, is the use of electronics, communications, or information processing to improve the efficiency or safety of transportation systems. In a setting where changes can occur in the blink of an eye, ITS technologies provide real-time solutions in a real-time environment. As such they are a natural fit for improving the management and operations of transportation systems. Among other things, management and operations encompass special circumstances like preparing and responding to accident-related congestion, planned special events, and other unplanned security concerns. By focusing on the evolving technology of ITS and the day-to-day activities of management and operations, transportation planners have a greater opportunity of providing more efficient and effective solutions to the region's transportation problems.

The CMMPO is monitoring and encouraging development of ITS implementation strategies that improve the security of the region. Of particular note, the recently completed Worcester Regional Mobility Study (WRMS) recommended a stronger dialogue between the region and the state’s Operation Control Center to facilitate the flow of incident information. Of late, the variable message signs on I-290 have been re-activated and have begun to produce some timely information regarding incidents. The WRMS also recommended creating new locations for variable message signs further out from the center of the region, along I-90, I-290, I-395, and I-190. Such signs could be an important security component that provides the public of early warning messages while there is still time to detour their route.

Recently, the WRTA has embarked on an ITS implementation that will provide a better communications system, fixed route scheduling software, and an Automatic Vehicle Locator/Computer Aided Dispatch system, all which will increase the security of the public transportation system for the safety of both employees and riders. Possible future sharing of resources may include video transit/traffic monitoring, and coordination of incident management efforts. The sharing of ITS information between user bodies broadens the technology’s effectiveness and maximizes its usefulness, particularly with regard to security planning.

G. CMMPO SECURITY STRATEGIES

As part of its current work program, the CMMPO explored its potential role in the field of security planning. The organization recognized the importance of transportation security planning to all agencies and users of the regional transportation system. Over a dozen agencies perform functions crucial to our transportation system. Some are implementing security measures, while others may not be. To ensure that security needs are met promptly and equitably, the CMMPO effort coordinates and cooperates with transportation agencies and stakeholders.

> Transportation stakeholders include the Worcester Regional Transit Authority; MassDOT Office of Transportation Planning and Highway Division; Massachusetts Bay Transportation Authority; Peter Pan, Greyhound and Bonanza bus lines; Amtrak; freight railroad operators; and city and community public works departments.
>
> Regulatory and advisory stakeholders include the Central Region Homeland Security Advisory Council, U.S. Department of Homeland Security, Federal Highway Administration, Federal Transit Administration, Federal Aviation Administration, Massachusetts Bicycle Coalition, city and town planners, and city and town officials.
>
> First responders include state and local police and fire departments and emergency medical technicians.

It was identified that security efforts may focus on the following three components and related planning:

Coordination with transportation agencies and stakeholders

- Meet regularly to develop working relationships for information and resource sharing
- Identify existing emergency command/operations facilities and assess role of transportation in emergency procedures
- Assist transportation stakeholders in planning and mitigation efforts, utilizing information available through our planning processes, including management systems

Identification and prioritization of security components of transportation infrastructure enhancements

- Develop an inventory of critical transportation infrastructure and at-risk locations
- Identify levels of prioritization of transportation security components
- Ensure timeliness and equity of projects and funding through the TIP process

Contingency planning for evacuations and other emergencies

- Utilize modeling software to predict effects of potential emergencies such as bridge closure, rail emergency between stations, bus service suspension, and other incidents
- Survey potential hazards and develop transportation emergency response and evacuation plans
- Ensure security drills and related exercises are coordinated with transportation stakeholders, and assist agencies and towns in identifying and coordinating such efforts
- Develop a process to identify and discuss transportation experiences and lessons learned, for prevention efforts and improved incident management

While most of these efforts overlap, the CMMPO recognized that its role as a coordinator was a natural one. The CMMPO can develop stronger relationships and communications through all transportation agencies and coordinate with agencies and stakeholders by meeting regularly for information and resource sharing.

The CMMPO prioritized its effort to "Identify existing emergency command/operations facilities and assess role of transportation in emergency procedures". As part of that effort, the CMMPO has produced the map of critical transportation infrastructure (dams, bridges, high volume roads, flood zones, and transit routes) discussed earlier (see Figures VI-1 through VI-3). From this planning exercise, the CMMPO hopes to better understand where flood prone areas exist, highlight the transportation infrastructure that could be most affected, monitor future flooding events, and provide an analysis of the transportation impacts of each event to feed into future planning efforts.

In addition, in conjunction with the CRHSC, an Evacuation Plan will also be produced in the Summer/Fall of 2011. Travel Demand Modeling software will be used to project travel effects of potential emergencies, including bridge closure, WRTA service/system shut down, roadway spill, or commuter/freight rail incident.

The CMMPO is also involving its congestion management planning process to identify existing bottlenecks that can potentially become security issues, particularly in evacuation and incident management situations. As part of a past effort to survey Emergency Medical Technicians to determine roadway locations where first responders' response time is inhibited, as well as the cause of the delay, the CMMPO seeks to plan transportation projects to facilitate first response travel. In part, the region's security relies on the ease and accessibility of first responders throughout the central Massachusetts region.

Consistent with the goals of the CRHSC, the CMMPO will be able to identify and prioritize security components of transportation infrastructure enhancements. The CMMPO will involve itself to the extent permissible in future post-incident planning to identify and discuss transportation experiences and lessons learned for prevention efforts and improved incident management.

REGIONAL PROGRAMS AND ANALYSIS

VII

VII. REGIONAL PROGRAMS AND ANALYSIS

A. INTRODUCTION

Earlier Chapters have discussed the existing characteristics of the Central Massachusetts region, including population and employment trends, travel patterns, and land use and economic activity overviews; inventoried the current transportation infrastructure, including existing conditions and challenges; and outlined some of the environmental issues facing the region and the Commonwealth as a whole.

The materials in this Chapter will discuss some of the many ways in which needs are specifically analyzed and studied in order for the region to objectively uncover and prioritize project and policy needs. With available resources at levels much lower than those that would be required to properly address all the region's transportation issues, these programs and systems can assist in defining how needs can be met and can inform the difficult project choices ahead by adding factual and projected evaluations of infrastructure condition and reach.

With this information in mind, we can better fulfill the stated goals of the region's transportation planning effort, namely, the attainment of a safer, more secure and better-maintained system, the promotion of livable communities and improved air quality, and the development of a system that integrates and enhances the ability to use multiple travel modes.

B. TRAVEL DEMAND MODEL

The Regional Travel Demand Forecast Model is an important planning tool both for the evaluation of proposed regional transportation improvements and the projection of mobile source air emissions for significant regional projects. The model is the most effective and comprehensive way to project transportation needs within a twenty-year planning horizon as required by Federal regulation.

In the regional travel demand model, traffic volumes are forecast through the interaction of transportation demand and supply. Traffic zones are defined to encompass areas of development that represent the demand, while the actual road network represents the supply. A network is developed consisting of a series of points, or nodes, that graphically show locations of roadway intersections and other elements of the network. Connections between nodes are called links. Links represent highway segments and contain information such as speed and road capacity. Traffic zones contain demographic and employment information, and are represented by special nodes called centroids. Each zone is attached, or "loaded," onto the network by specialized links called centroid connectors.

Each traffic zone produces and attracts person trips based on its land use. Information entered into the model for each zone (such as population, households, income and employment) determines the amount of trips produced and attracted to that zone. Households are the primary producer of trips, while employment sites are the primary attractors. These productions and attractions are converted to vehicle trips that enter and leave each zone. The fact that people make trips for different purposes (work, shopping, school, personal business, recreation, etc.) – and have different vehicle occupancy rates in doing so – is also calculated into the model.

The regional travel demand model was used to generate the Daily Vehicle Miles Travelled and Total Daily Auto Person Trips for the current "2010" and Future "2035" years. Please see the table VII-1 below for comparison.

Table VII-1

Comparison of travel behavior Current Vs. Future

	2010	2035	Percent Growth
Daily Vehicle Miles Travelled	16,039,842	20,052,704	25%
Total Daily Auto Person Trips	4,434,363	5,308,547	20%

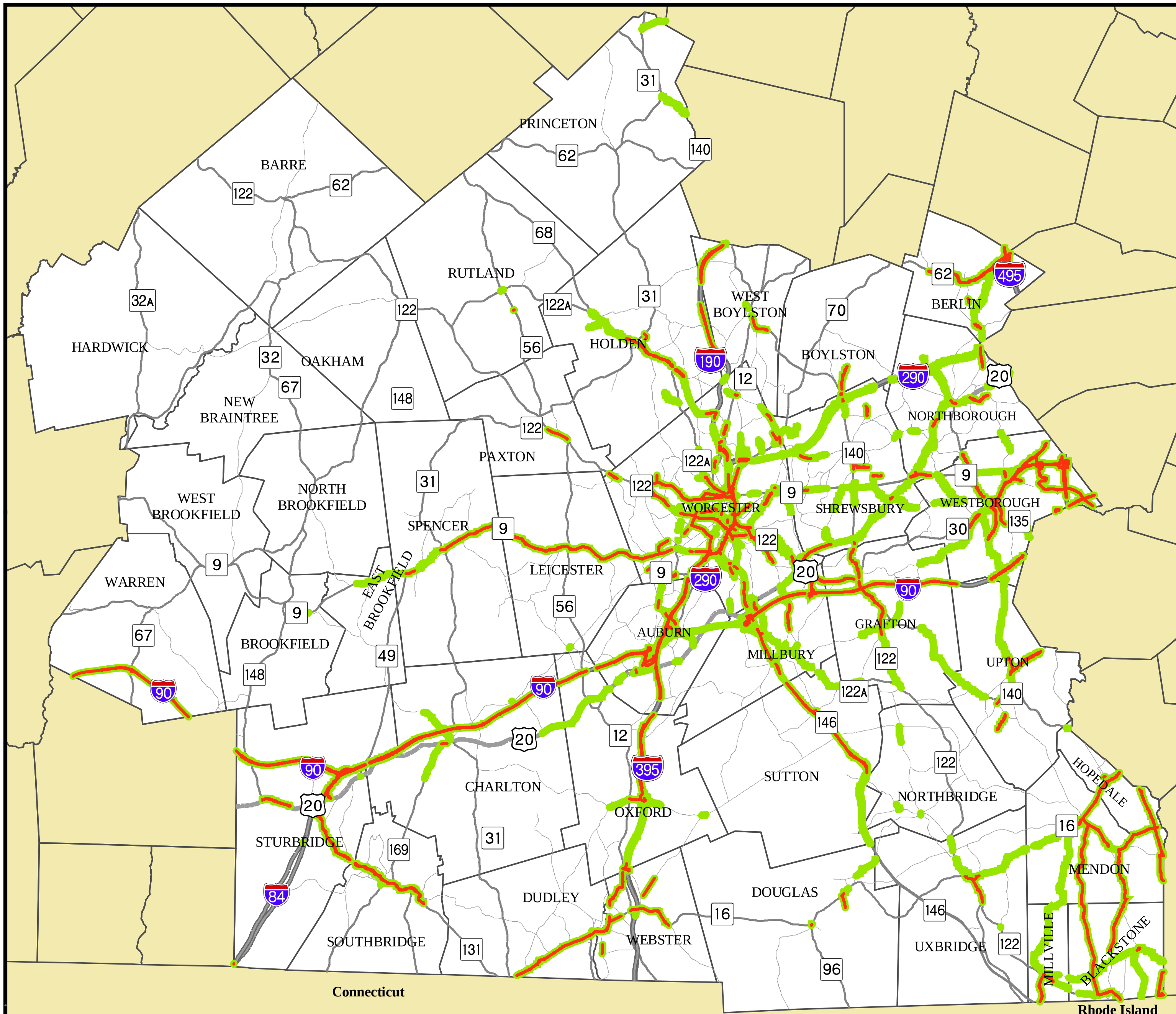
The table above shows that there will be an increase of about 20% of daily auto person trips, and vehicle miles travelled increases by 25%. Given the increase in the both the daily person trips and the VMT it is very obvious that the congestion on the roadway network will only get worse in the year 2035. Please see the Figure VII-1 below to show the comparison of congested locations for current and future conditions. As mentioned above the major roadway network in the urban area of the region is completely congested by the year 2035.

Given the limited funding to expand the transportation system, there is a need to look at innovative ways to reduce congestion by looking more deeply at walking and bicycling as modes that can improve livability and public health. Some of the initiatives that could help alleviate congestion are investing in increasing and promoting transit use and investing in programs that reduce single occupancy vehicle use such as MassRIDES, Park and Ride lots and Transportation Demand Management techniques. Intelligent Transportation Systems can also be used for both recurring and non-recurring congestion like construction and accident delays.

C. MANAGEMENT SYSTEMS AND INTEGRATION

C.1 Congestion Management Process (CMP)

The Congestion Management Process (CMP) is a systematic approach, collaboratively developed and implemented throughout a metropolitan region, that provides for the safe and effective management and operation of new and existing transportation facilities through the use of demand reduction and operational management strategies. The CMP provides information to decision-makers on system performance and the effectiveness of implemented strategies. Although major capital investments are still needed to meet the growing travel demand, the CMP also develops lower cost strategies that complement capital investment recommendations. The result is a more efficient and effective transportation systems, increased mobility, and a leveraging of resources. The CMP involves the following programs and activities:



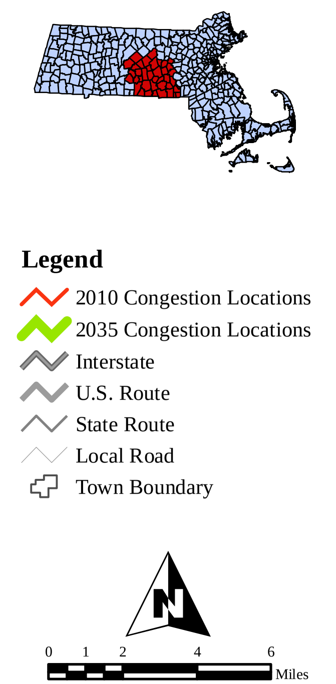


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Figure VII-1 Current (2010) and Future No-Build (2035) Congestion Locations

C.1.1 Localized Bottleneck Reduction Program

C.1.1.1 Introduction

In November 2008 FHWA and FTA recommended that the MPOs *identify the top three (3) bottleneck areas in their regions. Based on the identification of these bottleneck areas, the MPOs should develop tasks to conduct studies to target low-cost countermeasures*. Based on the FHWA/FTA directive, a ***Localized Bottleneck Reduction Program*** pilot effort was developed to complement the region's established and ongoing Congestion Management Program (CMP). The region's entire federal-aid highway system, with a particular focus on the *"Vital Links"* established by the CMMPO, was screened as part of this effort.

C.1.1.2 Definition

A ***Traffic Bottleneck*** is defined by FHWA as a localized constriction of traffic flow, often on a highway segment that experiences reduced speeds and inherent delays, due to recurring operational influence or a nonrecurring impacting event. Further, a bottleneck is an area of poor LOS or high V/C ratio which *ends* at a *point*, has a *recurring cause*, and, maybe most importantly, *exhibits a return to free flow speeds* after the bottleneck end point.

FHWA further indicates that "a bottleneck has congestion, but congestion is often more than a bottleneck", citing an example of a wide highway with a narrow bridge that restricts traffic flow on a regular basis. It should also be noted for differentiation purposes that a road that has a high V/C or poor LOS for an extended length, or for its entire length, is *not* a bottleneck, but rather is considered a chronically congested roadway, where demand routinely exceeds capacity.

Elements that typically exist in a bottleneck situation include:

- A traffic queue upstream of the bottleneck
- A beginning point for the traffic queue
- Free flow traffic conditions downstream of the bottleneck
- A predictable recurring cause

At this time, the focus of the Local Bottleneck Reduction Program (LBRP) is operationally-influenced recurring bottlenecks.

The Transportation Management Systems, along with their respective GIS components, maintained by CMRPC (congestion, pavement, safety, freight planning, public transit planning) and MassDOT (bridge and pavement) have been referenced in attempting to determine the "root causes" of recurring Traffic Bottleneck locations. As indicated by FHWA, there are often other root causes, beyond congestion, that lead to recurring bottleneck conditions at various locations. *This is considered another component of the region's ongoing efforts to integrate the Management Systems.*

Other recently completed and ongoing work efforts in the region were also considered in the identification of Traffic Bottleneck locations. Notably, the recently completed Worcester Regional

Mobility Study (WRMS) was referenced as part of this effort, for Route 9 (Belmont Street) at I-290 interchange #17.

C.1.1.3 Location Identification

Building on the planning agency's extensive knowledge of the region's federal-aid highway system, the Localized Bottleneck Reduction Program considers all roadway segments and major intersections in the region's federal-aid highway system, with an emphasis on CMMPO indentified "Vital Links", or core federal-aid roadways.

The regional travel demand model was used to screen all roadway segments and major intersections seeking the "top three" Traffic Bottlenecks. Based on the Volume-to-Capacity (V/C) ratios calculated by the model, roadway segments and intersections where generated vehicular traffic volumes far exceed theoretical roadway capacities were identified.

Further, as part of the Localized Bottleneck Reduction Program, projects listed for information purposes on the CMMPO Endorsed TIP, yet to be programmed for regional target funding, were also considered. The Localized Bottleneck Reduction Program seeks to further support these eligible projects through observations in the field and subsequent planning analyses. Ongoing Management Systems activities and public outreach feedback were also considered in the development of the pilot program.

Based on the traffic bottleneck definition, staff has identified bottlenecks and their start and end points. Operationally recurring bottlenecks were identified at three (3) selected locations in the planning region: urban, suburban, and rural. The communities and locations are as follows:

URBAN: City of Worcester

Route 9 (Belmont Street) at I-290 Exit #17 interchange

SUBURBAN: Town of Northbridge

Route 122 (Providence Street)/Church Street intersection, aka "Plummer Corner"

RURAL: Town of Spencer ("Downtown")

Route 9 (Main Street) with Route 31 South (Maple Street) and Route 31 North (Pleasant Street)

C.1.1.4 Field Verification: Observations & Analyses

Observations in the field were used to verify the top three Traffic Bottleneck locations in the region. One evolving method utilized for the verification of Traffic Bottleneck conditions in the field is referred to as a "Congestion Audit". Congestion Audits were used to verify the Traffic Bottleneck locations indicated by the regional travel demand model and other available references. Model-identified locations were visited in the field in order to view congested conditions as well as to observe the *recurring* nature of the identified Traffic Bottlenecks.

Staff collected field data and conducted various planning analyses at each indentified Traffic Bottleneck location. These included:

- Intersection Turning Movement Counts (TMCs) during the peak travel periods
- Signalized intersection LOS analysis
- Travel Time & Delay Studies, GPS-based
- Intersection inventories including field-observed signal timing and phasing
- Digital photographs taken in the field (visualization purposes)
- Pictometry images of the identified locations (visualization purposes)

The Congestion Audits conducted in the field led to the development of a number of suggested improvement options for further consideration by MassDOT and the host communities.

C.1.1.5 Suggested Improvement Options

After reviewing the Localized Bottleneck Reduction Program analysis results for a given location, suggested improvement options aimed at reducing and eliminating the identified Traffic Bottlenecks were formulated for consideration by MassDOT and the host communities. *(Please refer to the Congestion Audit Summaries included on the following pages.)* Based on FHWA/FTA's call for "low-cost countermeasures" or solutions, a range of improvement options were considered, with the primary intent of identifying workable, low-cost Transportation System Management (TSM) improvements eligible for federal-aid funding. TSM improvements are "low-cost" by nature, ranging from $100,000 to $500,000, and can often be implemented within the existing right-of-way.

Other generalized approaches to reducing and eliminating bottleneck conditions include the following:

- Provide alternatives as to how, when, where and whether to travel
- Expand roadway capacity
- Improve management and operation of the system, including consideration of access management techniques

C.1.1.6 Next Steps: CMMPO TIP Development Process

The results of the Localized Bottleneck Reduction Program may lead to the development of projects funded through the CMMPO Transportation Improvement Program (TIP). These potential improvement projects would need to compete with others deemed eligible for programming on the TIP's highway-related project listing.

The intent of seeking low-cost solutions, as discussed, is that projects generated by the Localized Bottleneck Reduction Program could perhaps use the balance of any available regional federal-aid target funding. When the TIP project listing is developed and amended/adjusted, the CMMPO considers a range of factors, such as feasibility, cost and readiness, while being mindful of FHWA's emphasis on safety and congestion projects.

Certainly, depending on prevailing conditions, high-cost solutions may be the only viable improvement alternatives, based on screened and field-verified bottleneck conditions. The additions of general purpose travel lanes, for example, could require investments in excess of $1 million. Based on the conditions observed in the field, an initial priority could be assigned to the suggested improvements for later use in programming.

C.1.1.7 Bottleneck Location Findings

1. Route 9 (Belmont St)/I-290 Ramps Intersection - Worcester

Summary of Field Observations:

<u>Travel Time & Delay Study</u>
The data for this study was collected on Belmont Street from Lincoln Street to Hospital Drive (Figures VII-2 and VII-3). Belmont Street, in Worcester, is a heavily traveled route and is very congested. Along this road is a major hospital, an elementary school, and on/off ramps to I-290. There is also a considerable amount of pedestrian traffic along this focus segment as well. The intersections with the I-290 ramps and Belmont Street are considered a bottleneck area for this segment of road. A "bottleneck" is an obstructed portion of a roadway that is a hindrance to the progress of vehicles. In the easterly direction, there is a lane drop after the I-290 off ramp intersection and the roadway becomes one lane in each direction. Due to a concentration of vehicles entering/exiting I-290 and vehicles traveling to the hospital, this section can be very slow, especially during peak hours. Heading westbound in the AM, vehicle speeds start out near 40 mph, but by the time they reach Lincoln Street speeds drop to below 30 mph. There are a number of delay points between Skyline Drive and the I-290 ramps. Traveling eastbound is just as slow as westbound. Again, vehicle speeds are near 20 mph around the I-290 ramps and increase to near 40 mph just before Hospital Drive.
In the PM, delay is much worse, especially heading eastbound. Traveling westbound, the slowest vehicle speeds are between Skyline Drive and the I-290 ramps. There is also some delay before the Skyline Drive intersection, as well as just before Lincoln Street. Heading eastbound, there is a heavy amount of delay from the I-290 ramps to Skyline Drive. Vehicle speeds are below 20 mph for a good portion of this segment. For each of the runs is this direction, the data collection vehicle had to stop multiple times due to the steep incline of the roadway and slow moving buses or left turning vehicles.

<u>Critical Intersection Operations (1)</u>
The Belmont Street/Converse Street/I-290 EB Off Ramp intersection is signalized controlled. Converse Street is a one-way street for entering vehicles only. A turning movement count was completed at this location to determine the Level of Service (LOS). The count was conducted between 7 AM and 9 AM and between 4 PM and 6 PM. For the peak hour, there were over 2,700 vehicles in the morning and 2,500 vehicles in the afternoon. The overall LOS for this intersection is a "C" for both the AM and PM, with the I-290 Off Ramp as the worst lane group, having an average of a "D" and over 30 seconds of delay.

<u>Critical Intersection Operations (2)</u>
The intersection of Belmont Street with the I-290 WB On Ramp is also under signalized control. There is a church parking lot entrance near the intersection that sometimes slows down the flow of traffic. A turning movement count was conducted at this intersection during the same day and time as the adjacent

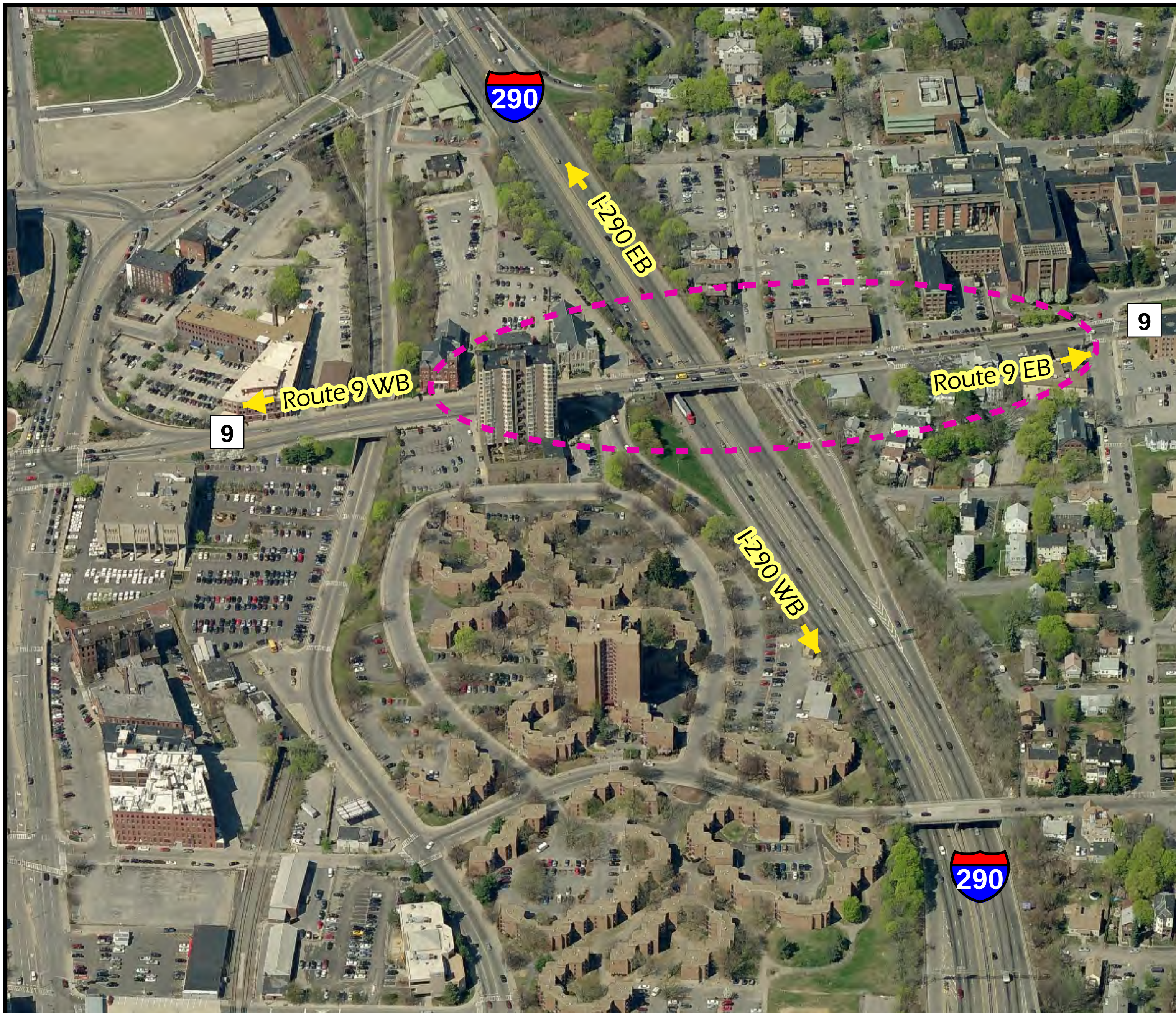
study intersection noted previously. The peak-hour volumes were very similar to the other intersection with the AM having over 2,500 vehicles and the PM being over 2,800. The overall intersection LOS is a “B” for both the AM and PM periods. The only approaches that are controlled by the signal are both directions of Belmont Street. The westbound direction has an LOS of “A” for both directions and has less than five seconds of delay. Heading eastbound, vehicles have over 30 seconds of delay and the LOS is a “D”, as vehicles must be stopped in order to let westbound traffic have clear access to I-290 west.

Potential Suggested Improvement Options for Host Community Consideration (Figure VII-4)

1) Reduce unnecessary weave maneuvers through signs and pavement markings, other potential modifications to Belmont Street weave areas.
2) Improved regulatory lane use signs in order to minimize vehicle weaves.
3) Perhaps consider overhead guide signs and lane use signs. Potential forthcoming improvements to (non-conforming) city-owned guide signs.
4) Route 9 on-street parking east of the bridge needs to be completely eliminated as suggested by MassDOT. Off-street parking opportunities in this area need to be emphasized to the benefit of local businesses. (Another option is peak period parking restrictions.)
5) Optimize traffic signal timing, phasing and coordination to be reactive to fluctuations in flows. Consider improvements to vehicle detection using mast mounted equipment (as opposed to failure-prone pavement loops).

Longer Term Improvement Concept

1) Reconstruction of the Route 9 bridge over I-290 (W-44-094) is planned, it has been determined by MassDOT to be “Structurally Deficient” with a rating of 34.0. (Built in 1958 and never rebuilt, this structure has the worst rating of any state highway bridge over I-290 in the City of Worcester.) When the bridge is replaced, an additional center left turn lane will be added. Bicycle and pedestrian accommodation will also be improved. Consider projected future traffic increases in design of replacement bridge structure.



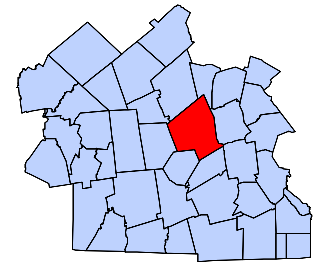


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Figure VII-2 Bottleneck Reduction Program Belmont Street, Worcester

Figure VII-3 View of Evening Peak Hour Conditions at Bottleneck Location

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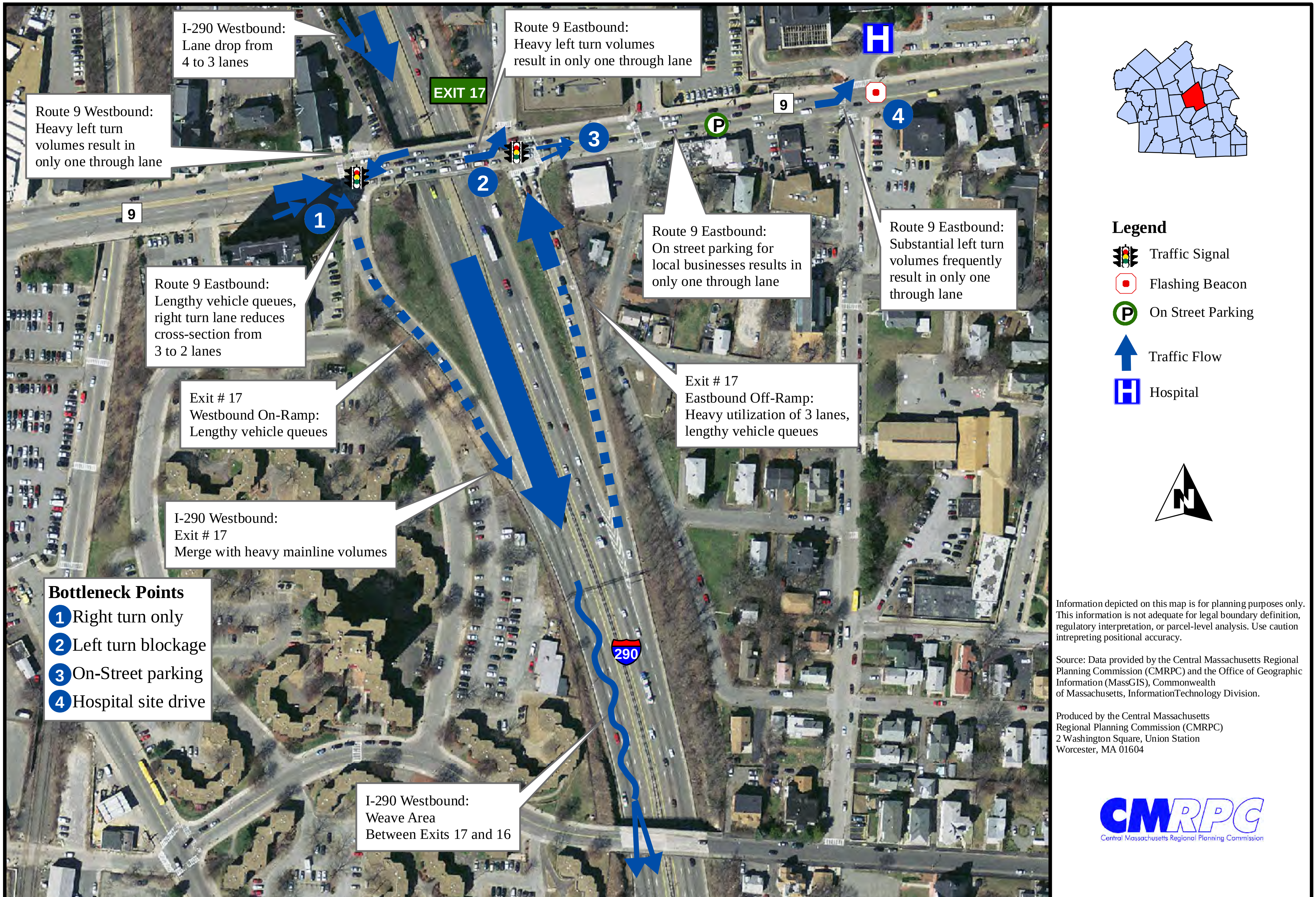

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Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC) and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

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Figure VII-4 Potential Suggested Improvement Options for Host Community Consideration

2. Route 122/Church Street Intersection (Plummer Corner) - Northbridge

Summary of Field Observations:

Travel Time & Delay Study (1)
The data for this study was collected on Route 122 from the Uxbridge town line to Sutton Street (Figure VII-5). Route 122 is a major north/south route in the Central Massachusetts region that stretches from Barre to Blackstone. Heading northbound, vehicle speeds are generally between 30 mph and 40 mph. Between the Uxbridge town line and Church Street, vehicle speeds occasionally are close to 50 mph. The heaviest delays are on the approach to the Church Street intersection. During a couple of the runs, the study vehicle had to stop at some point between Church Street and Benson Road, probably due to a turning vehicle. For the last half mile before Sutton Street, vehicle speeds drop 5 mph to 10 mph because of on-street parking and a narrower roadway width. Heading southbound, vehicle speeds and delays are very similar to the northbound direction. Again, speeds are slow near Sutton Street and delays still occur near the Church Street intersection.

In the PM, vehicle speeds and delays are similar to the AM, with just more delays. Heading northbound, there are delays on the approach to the Church Street intersection again. Between Church Street and Benson Road, vehicle speeds were as low as 20 mph for a couple of the runs during the data collection period. There was even one stop delay just before Benson Road, probably due to a turning vehicle. Heading southbound, vehicle speeds are slow again near Sutton Street and the Uxbridge town line. Delays are also still occurring at Church Street.

Travel Time & Delay Study (2)
The data for this study was collected on Church Street from the Upton town line to Cross Street. Church Street in the town of Northbridge is a local street that starts from the town center and continues all the way to Quaker Street, which travels into the town of Upton. It is a two-lane roadway and has a moderate amount of traffic. Heading eastbound in the AM, one of the runs had to stop multiple times between Cross Street and Route 122, possibly due to a school bus. Another run had to stop multiple times between Route 122 and Quaker Street, also possibly due to a school bus or general congestion. At the Quaker Street intersection, vehicles must stop at the stop sign before turning left or right. Vehicle speeds are at their highest between Quaker Street and the Upton town line. Traveling westbound, there are fewer delays compared to the eastbound. Vehicle speeds are still the highest from the Upton town line to Quaker Street. As vehicles make a right turn onto Church Street, from Quaker Street, speeds drop about 10 mph to 15 mph for about one tenth of a mile before speeding up again. This could be due to the tight turning radius at the Quaker Street/Church Street intersection. Vehicle delays are at their heaviest on the approach to the Route 122 intersection (Plummer Corner) for both directions.
In the PM, vehicle delays were at their heaviest heading westbound. Traveling eastbound, delays were present again around the Route 122 intersections, as well as, the first quarter mile pass Cross Street. Heading westbound, many of the vehicles are probably heading towards Route 146 at the western part of Northbridge. There are moderate delays approaching Route 122 and even heavier delays near Cross Street. Almost every single run had to stop numerous times before traveling past Cross Street. The last half mile of the focus segment, vehicle speeds were below 30 mph.

Critical Intersection Operations

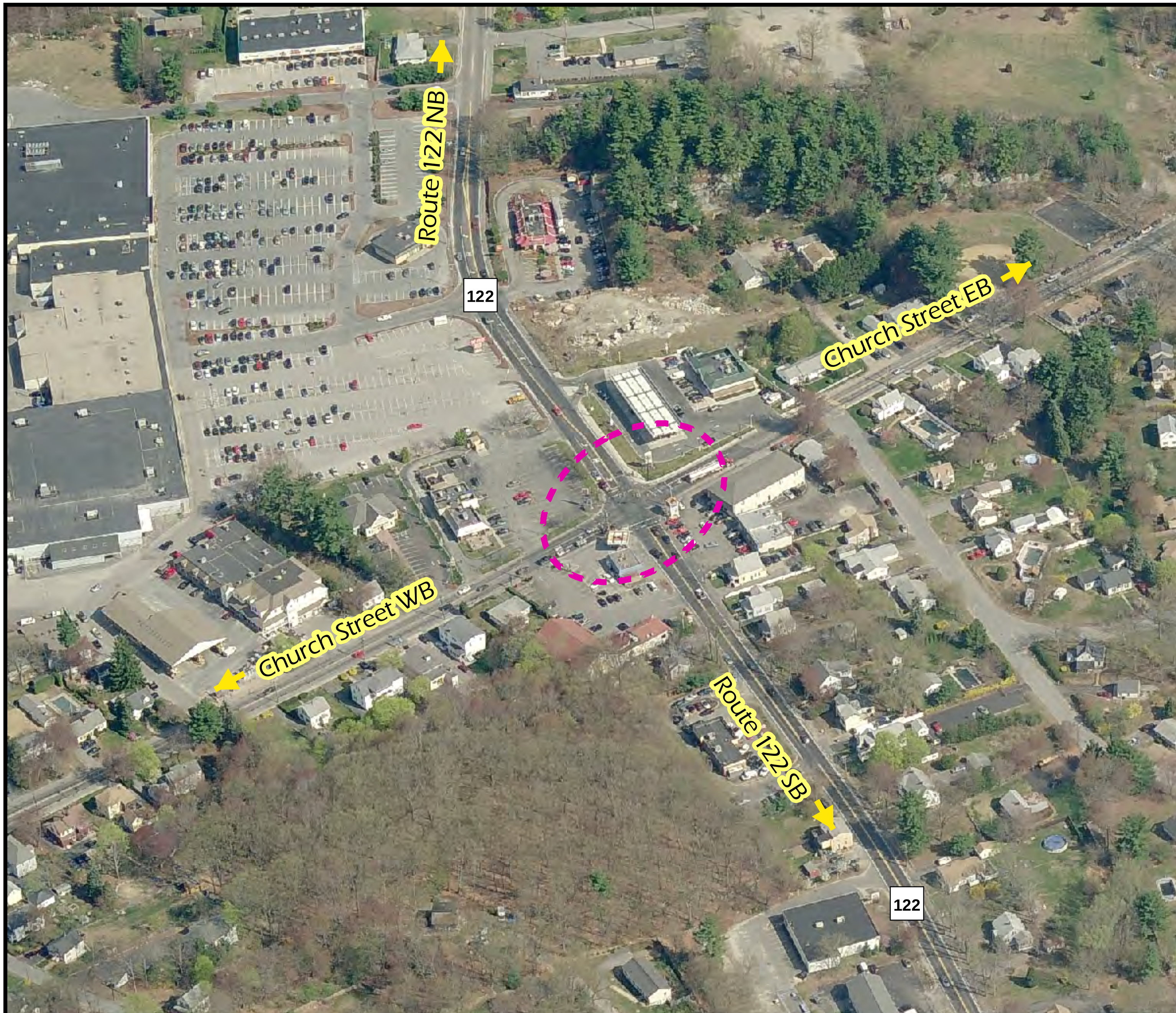
The intersection of Route 122 & Church Street (Plummer Corner) is a four-way signalized controlled intersection. A turning movement count was conducted at this location to determine the Level of Service (LOS). The count was conducted between 7 AM and 9 AM in the morning and between 4 PM and 6 PM in the afternoon. The peak-hour volume in the morning was 1,800 and the afternoon it was over 2,300. The highest volume percentages come from the east in the AM and the west in the PM. The truck percentages at this location were less than two percent in the AM and less than one percent in the PM. The overall LOS for this location was a "D" in the AM and an "E" for the PM. In the AM, the average intersection delay was 51 seconds. Route 122 northbound was the worst lane group with an average of over 100 seconds of delay. The other three approaches had between 10 and 15 seconds. In the PM, the average total intersection delay was over 60 seconds. With 500 more vehicles in the PM, delays were worse for all approaches. The westbound approach had the most delay with over 100 seconds.

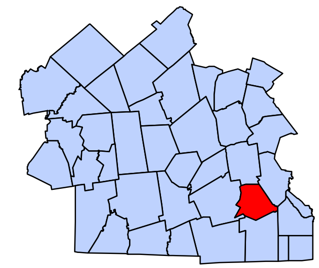
Potential Suggested Improvement Options for Host Community Consideration

1) Work to improve operations of the existing signal
2) MassDOT Highway Division D-3 office recently implemented timing and phasing changes that appear to have improved conditions. Intersection monitoring effort is suggested.
3) Actuation needs to be reactive to fluctuations in flows.
4) Continue to be mindful of projected future traffic increases.
5) Improve regulatory lane use signs.
6) Continue to maintain pavement markings/traffic control signs, devices.
7) Continue to utilize access management techniques on each roadway approach to the intersection to limit the number of nearby curb cuts, especially those serving adjacent development on each of the four corners. Further, where applicable, consider left turn prohibitions.

Longer Term Improvement Concept

1) Consider additional intersection capacity through the installation of turn lanes where feasible. This would require land takings from adjacent development on each of the four corners.





Bottleneck Area

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Figure VII-5 Bottleneck Reduction Program Route 122/Church Street (Plummer Corner), Northbridge

3. Route 9/Route 31 Intersections - Spencer

Summary of Field Observations:

Travel Time & Delay Study

The data for this study was collection for Route 9 from the Leicester town line to West Main Street (Figure VII-6). Route 9, through Spencer, is a two-lane roadway with a high volume of traffic. The downtown area, where Route 31 intersects with Route 9, is considered a bottleneck area. A "bottleneck" is a localized section of highway that experiences reduced speeds and inherent delays due to a recurring operational influence. Traffic becomes very congested through this segment, especially during the AM and PM peak periods. In the AM, vehicle speeds are generally between 35 mph and 45 mph for the entire segment, except for a few sections. Heading eastbound, there is much delay between West Main Street and the Route 31 intersections. For one of the runs, the data collection vehicle had to stop several times, possibly due to a school bus. For all of the runs traveling eastbound, there was stop delay approaching Route 31. Between Paxton Road and the Leicester town line, there were a couple of runs that had some delay and the rest of the runs the vehicle speeds were near 40 mph. Traveling westbound, most vehicles speeds are between 30 mph and 40 mph for the entire roadway. Similar to the eastbound direction, there was delay in the downtown area near Route 31. There are also slower speeds for a couple of the runs after the Paxton Road intersection, probably due to the school traffic from David Prouty High School.

In the PM, vehicle speeds are quite similar to the AM. Heading eastbound, there is less delay than in the AM, but vehicle speeds seem to be more variable throughout the entire roadway segment. Again, vehicle speeds slow down on the approach to Paxton Road, probably due to vehicles turning left onto Paxton Road. Traveling westbound, delays are at their heaviest near the downtown section, especially between both the Route 31 intersections. There are also a couple of runs that had some stop delay about a quarter mile after Paxton Road. Lastly, there was about a 15 mph drop in vehicle speeds just before West Main Street.

Critical Intersection Operations (1)

The intersection of Route 9 & Route 31 (Pleasant Street) is basically a three-way intersection with signalized control. There is a fourth approach, but it is a small parking lot with very little traffic entering or exiting. A turning movement count was completed at this intersection to determine its Level of Service (LOS). The count was conducted from 7 AM to 9 AM in the morning and between 4 PM and 6 PM in the afternoon. The total volume for the AM peak-hour was over 1,100 and near 1,700 vehicles in the PM peak-hour. There were minimal trucks traveling through this intersection with less than two percent in the AM and less than one percent in the PM. The overall average intersection delay was about 16 seconds in the AM and a little over 20 seconds in the PM. Route 9 carries the most vehicles through the intersection with about 80% of the total. The approach with the worst delay was Route 31 (Pleasant Street) and it had an average delay of 30 seconds in the AM and 40 seconds in the PM.

Critical Intersection Operations (2)

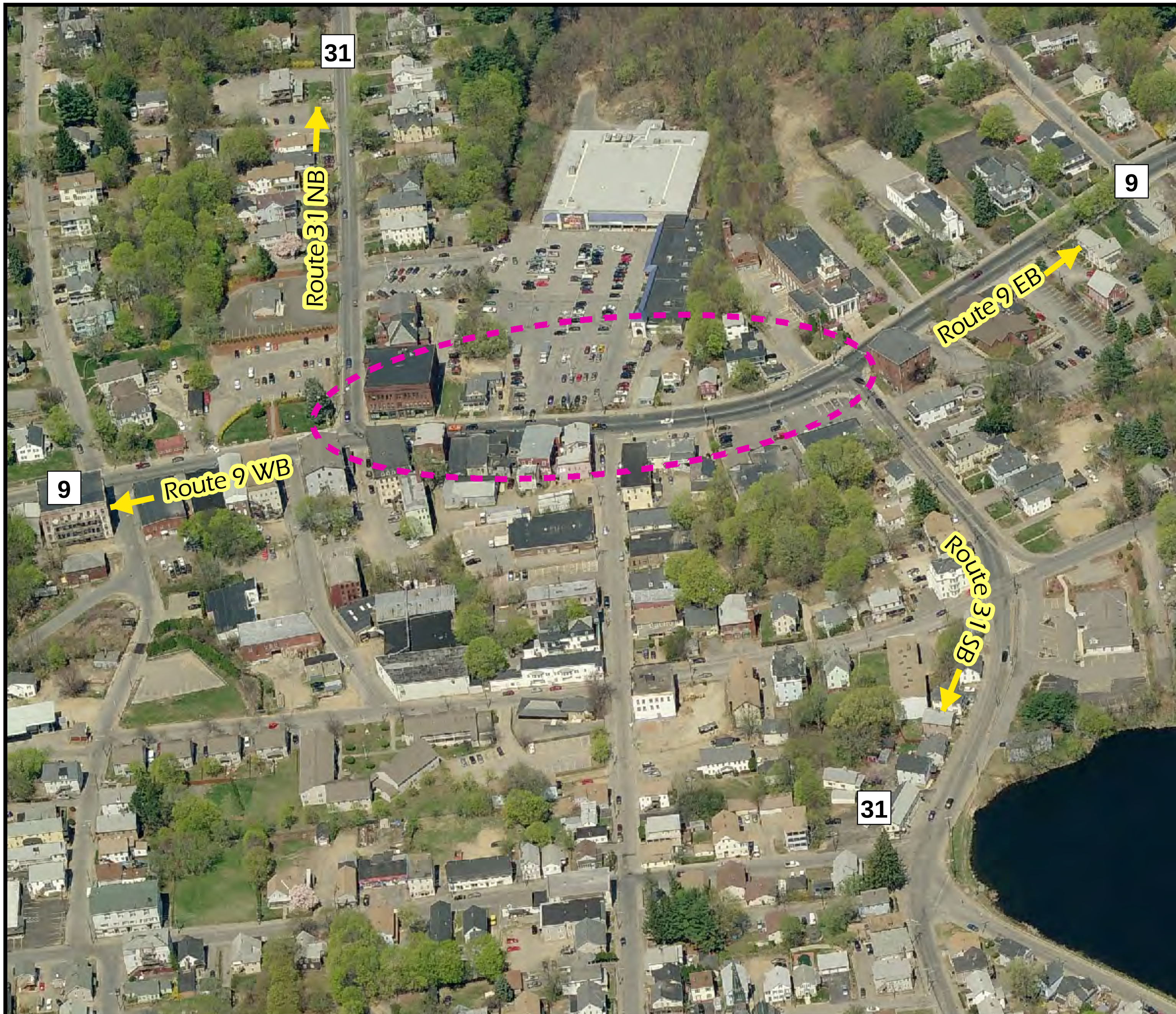
The intersection of Route 9 & Route 31 (Maple Street) is another three-way intersection with signalized control. There is also a fourth approach, but there was minimal vehicles entering or exiting the Spencer Town Hall parking lot. There was also a turning movement count conducted at this intersection during the same day and time as the previously mentioned intersection. The AM peak-hour volume for this intersection was about 1,200 and the PM peak-hour volume was above 1,600. The truck percentage at this intersection was over five percent in the AM and below three percent in the PM. The overall average intersection delay was 14 seconds in the AM and 16 seconds in the PM. Route 31 (Maple Street) was the worst approach lane at the intersection with over 20 seconds of delay for both the AM and PM.

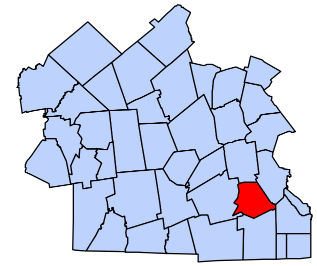
<u>Potential Suggested Improvement Options for Host Community Consideration</u>

1) Improved pavement markings, regulatory lane usage signs.
2) Optimize traffic signal operations at both Route 9/Route 31 locations; coordinate these signals to the extent possible to be reactive to fluctuations in flows, mindful of projected future traffic increases.
3) Consider improvements to vehicle detection using mast mounted equipment (as opposed to failure prone pavement loops).
4) Off-street parking alternatives in this area need to be emphasized to the benefit of local businesses. (Another option is peak period parking restrictions)
5) Recently completed Route 9 West Corridor Profile document prepared by CMRPC staff also includes a range of suggested improvement options for downtown Spencer.

<u>Longer Term Improvement Concept</u>

1) Based on previously completed consultant studies, consider implementation of “Downtown Spencer Bypass” concept. This idea helps minimize Route 31 through volumes on The Route 9 mainline. Route 31 North (Pleasant Street) at Route 9 would be made into a four-way intersection, with Route 31 continuing to Cherry Street (bypassing parallel Route 9), then joining Route 31 South (Maple Street) south of Route 9.





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Bottleneck Area

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Figure VII-6 Bottleneck Reduction Program Route 9/Route 31, Spencer

C.1.2 Reduction of Single Occupancy Vehicles

C.1.2.1 Rideshare Activities

MassRIDES is the Massachusetts Department of Transportation's free statewide travel options program. MassRIDES helps to reduce congestion and improve air quality across the Commonwealth by encouraging travelers to use options such as ridesharing, vanpooling, public transit, bicycling, and walking.

Programs and Services

- NuRide - The Massachusetts Department of Transportation (MassDOT) and MassRIDES have partnered with NuRide, the nation's largest commuter rewards program, to encourage healthier and more sustainable modes of travel while reducing traffic and emissions throughout the Commonwealth. The NuRide service is available free to anyone who lives or works in Massachusetts.

- Worksite Services - MassRIDES provides assistance to eligible Commonwealth employers who want to support their employees' use of alternative means of commuting. MassRIDES partners with over 400 organizations to help implement programs and services that save Massachusetts' commuters time and money, and help employers improve recruitment and retain employees.

- Emergency Ride Home - MassRIDES supports partner companies in providing transportation for employees in case of family or personal emergency. This service, which provides free taxi rides in case of emergency or unscheduled overtime to individuals who pre-register with MassRIDES and who regularly commute to work by means other than driving alone, is designed to provide transportation security when needed.

- Safe Routes to School Program –The Massachusetts Safe Routes to School program aims to create safe, convenient, and engaging opportunities for children to walk and bicycle to and from school, as part of the federally-funded nationwide SRTS program, and is administered by MassRIDES for the Massachusetts Department of Transportation.

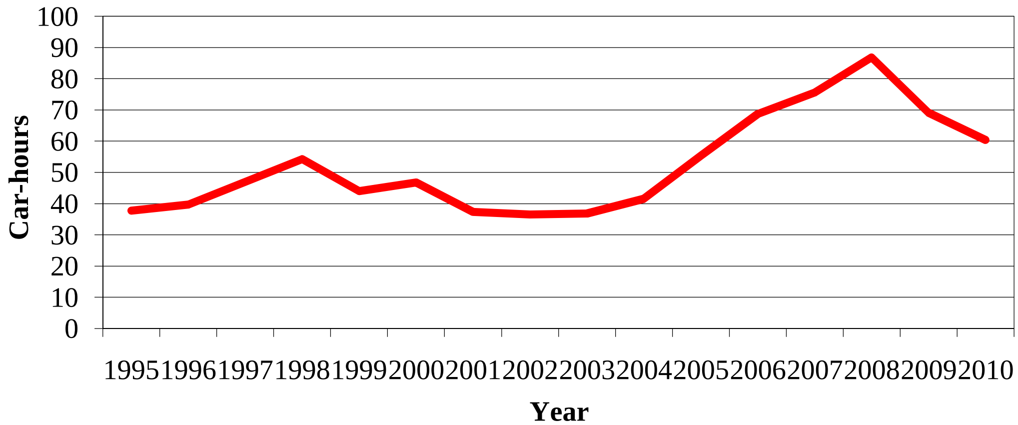
C.1.2.2 Park-and-Ride Lot Usage (Trends in Peak Hour Usage at the Berlin Park-and-Ride)

Usage at the MassDOT Park-and-Ride in Berlin has been summarized by counting and analyzing the number of vehicles that enter and exit the facility as well as the number that remain parked. Figure VII-7 shows the annual results using sample observation days over the past several years. The total usage shown in the charts is in car-hours, that is, the number of vehicles in the lot times the amount of time they remain there. These values are for the busier AM and PM peak travel periods when, presumably, most of the activity in addition or subtraction of parked vehicles occurs.

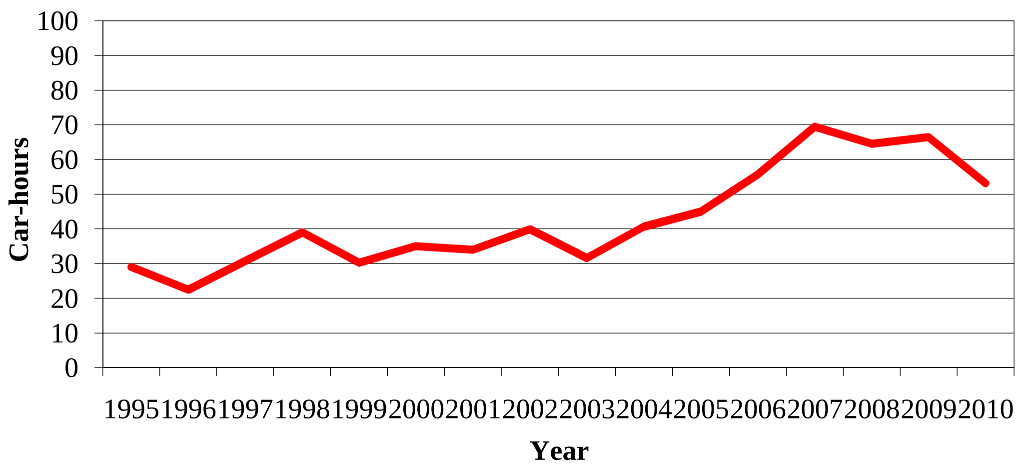
Trends have been about even by this measure in early study years; however there have been significant increases in peak period usage in the last five years. The notable uptick observed in the year 2005 continued for several years, during periods of both level and increasing fuel prices. We do note that the 2009 observation includes a dip in AM utilization and that usage in both AM and PM showed declines

Figure VII-7
Observed Usage at
MassDOT Maintained Park-and-Ride Lot
Town of Berling, Route 62 @ I-495

Morning Peak Period (6:00-8:30)



Evening Peak Period (3:30-6:00)



LOT CAPACITY: 45 marked spaces

in 2010 as well. This is likely a continuing temporary aberration due to the state of the economy and the relative stability of fuel prices. The lot has approached maximum usage in recent years and this situation is likely to reoccur. We should consider whether there are available and appropriate additional parcels of land that could be used in a similar manner.

We note also that many of the trips to the lot and much of its usage are for the transfer of passengers. Many vehicles rendezvous and exchange riders that do not stay in the lot for any appreciable period of time. By its nature, that type of activity would not be counted in the car-hour measurement figures. However, it appears that this type of activity is still one to be worthy of support, as it is apparent that an increase in the utility of commuting vehicles is being attained.

C.1.2.3 Travel Demand Management

New Federal and State priorities aim at renewable energy generation and air quality improvement through greenhouse gas reductions and improved livability through promotion of alternative transportation modes. Feedback received by CMMPO staff during outreach for the RTP echoed much of that sentiment. Additionally, an increase in alternative transportation mode shares would provide congestion relief to regional roadways.

The CMMPO has taken a position that it will attempt to dedicate a set amount or percent of CMMPO's annual TIP target funds to a systematic program aimed at promoting changes in transportation demand by boosting use of alternative modes. Eligible projects would be those that improve mobility for people and freight, reduce congestion, and improve air quality through travel demand management.

Funding may come from Congestion Mitigation and Air Quality (CMAQ) funds, or the MPO may dedicate the percentage from the entire TIP target using other funding categories. Based on ongoing high system maintenance needs, the amount will initially be modest, such as $500,000 to start, and adjusted in future years based on response and success of program.

C.2 Public Transportation

The Regional Transportation Plan envisions a public transportation system that is safe, maintained in a state of good repair and expanded to areas that are not served under existing conditions. In addition, the vision for transit calls for more use in order to reduce automobile dependency and emissions causing climate change. Addressing the needs and problems identified below will promote the realization of the vision:

C.2.1 WRTA

C.2.1.1 Operating Funds and System Preservation

The most pressing need that the WRTA currently faces is providing funding for maintaining and expanding operations of the existing bus and paratransit system. Since 2004, the WRTA has cut a total of 10 routes from its system due to lack of funding from State Contract Assistance for operations and forcing the WRTA to cut night-time and weekend services to bare minimum levels. By acquiring additional operating dollars, the existing system will be preserved and potentially expanded to meet demand (see *Projected Growth*). In addition, improved coordination between local land use planning and transit planning would create expanded partnerships and convey more comprehensive planning.

C.2.1.2 Capital Asset Modernization and New Construction

Since 2008, the WRTA has upgraded almost half of its 47 bus fixed-route fleet with 23 new fixed route buses (four of which are hybrid buses) and its 50 van demand response fleet with 37 new demand response vans. The average age of the WRTA fixed-route fleet is 7.66 years. While FTA recommends an average age of 6.0 years, the WRTA is currently looking to continue its fleet upgrade. In 2012, the WRTA is expected to add an additional eight fixed-route buses (three of which are hybrid) to the fleet bringing the total of new buses to 31.

The WRTA is also in the process of building a new Maintenance and Operations facility to replace its current Maintenance and Operations facility built in 1933. The current facility was originally constructed as a trolley barn and retrofitted for transit bus operations in the mid-1940s. Over the years, significant environmental concerns have been identified at the current site and the WRTA has obtained federal funding to construct a new facility closer to Union Station in Worcester.

In addition to the Maintenance and Operations facility, the WRTA will also be constructing a new bus hub at Union Station to provide improved intermodal connections to MBTA commuter rail, Amtrak, Peter Pan/Greyhound buses, taxi service and its demand response fleet. This new “hub” will replace the existing one at City Hall, however City Hall will continue to be served as a major stop.

Further examples of capital asset modernization include, but are not limited to:

- Upgrading of some bus stops in Worcester to be made more accessible
- Installation of Transit Signal Priority (TSP) technology inside traffic signals on certain roadways for improved transit service operations in the Worcester area
- Replacement of the remaining 16 fixed-route buses after the 2012 buses are delivered and ongoing replacement of demand response vans
- Working with the City of Worcester and MassDOT to create improved access to bus stops, including sidewalk construction and crosswalk installation
- Creating “mini-hub” facilities in suburban communities to house transit vehicles and create passenger transfer centers between suburban routes
- Installation of Intelligent Transportation Systems (ITS) technology to improve efficiency and ease of passenger use

C.2.1.3 Mobility

Achieving and maintaining a state of good repair for the WRTA system is critical to mobility, as it will ensure that vehicles, infrastructure and access are available when and where they are needed to provide safe and reliable service that meets demand. Also of critical importance to transit mobility are alleviating system constraints, filling gaps in the existing system and expanding the system to meet growth in future demand.

C.2.1.4 Service Reliability/On-Time Performance

Reliability and on-time performance is a function of several factors including traffic congestion, fleet size, conditions of vehicles and physical infrastructure. In May 2011, current WRTA service had an on-time performance level of 85.5%, while the WRTA's *Service Standards for Fixed Route Operations* has identified a goal of 95% for on-time performance. Primary causes for this performance level cited were traffic congestion and equipment breakdowns due to aging rolling stock.

C.2.1.5 Infrastructure Constraints

A number of infrastructure constraints place limits on transit service operations and expansion including, but not limited to:

- Old traffic control devices on major arterials
- Crumbling pavement on heavily traveled roadways with transit service
- Missing or damaged shelters
- "Complete streets" and transit accommodations on bridges, corridor arterial roadways and

C.2.1.6 Gaps in Service

Although WRTA service covers a 35 community area over 960 square miles fixed route service remains limited. Some geographic areas and times of day could benefit from expanded or added service:

- In Worcester, service for third-shift workers, particularly at the area hospitals, distribution centers and 24-hour Wal-Mart stores, is non-existent
- For multi-community trips, connections to other RTAs and at suburban MBTA commuter rail stations are non-existent and would increase intermodality in the region
- In the towns of Southbridge and Webster, initial analyses have shown high potential for transit use between these two communities. Similarly, connections to transit service in Northeastern Connecticut also shows strong potential ridership increases.
- New transit routes/service in eastern towns of the WRTA service area, particularly Shrewsbury, Northborough and Westborough
- Fifteen minute frequency systemwide
- Weekend service improved and expanded back to pre-2004 levels
- Improved and expanded transit service outside of Worcester
- Improved connections and service to area colleges
- Improved connections and service to area employers
- "Shuttle"-type service between area hotels and local restaurants on Highland and Shrewsbury Streets in Worcester
- "Crosstown" service to connect to destinations without transferring in Downtown Worcester

C.2.1.7 Projected Growth

Ridership since 2007 has grown at least 2.5 percent annually (13% overall) and the WRTA has re-aligned some bus routes to provide service where other routes have been cut. With increases in ridership, a downed economy and two major increases in gasoline prices in three years, the WRTA is poised to add service where needed to meet demand, if operating resources can be identified.

C.2.2 Regional Passenger Rail

C.2.2.1 Operating Funds and System Preservation

Like the WRTA, the most pressing need that the regional passenger rail services currently face is also providing funding for maintaining operations of the MBTA commuter rail and Amtrak systems.

For the MBTA, their funding comes directly from sales tax revenues, however their debt service is in the multi-billion dollar range. Since MBTA commuter rail service came to Worcester in 1994, the number of runs has expanded and is currently at 13 inbound and 12 outbound trips. Maintaining this minimum number of runs is crucial or regional economic development and linking Boston and Worcester.

For Amtrak, funding comes from federal allocations set at the Congressional level. While under numerous threats to be defunded, Amtrak's Northeast corridor services are its most used providing both regional and long-distance service from Maine to Washington DC/Virginia.

C.2.2.2 Capital Asset Modernization and New Construction

The MBTA produces an Annual Capital Investment Plan (CIP) that identifies which capital assets it plans to upgrade and/or replace over a five year period. The current CIP is produced for Fiscal Years 2012-2016 and has identified the following commuter rail capital asset upgrades:

- **Commuter Rail Locomotives Midlife Overhaul:**
  - **F40PH-2C Midlife Overhaul (25) -** This effort funded a standard midlife overhaul for 25 F40PH-2C locomotives. The overhaul, which was completed in 2003, reconditioned the fleet for passenger safety and efficiency.
  - **F40PHM-2C Midlife Overhaul (12) -** This effort funded a standard midlife overhaul of 12 F40PH-2M locomotives. The overhaul, which was completed in 2004, reconditioned the fleet for passenger safety and efficiency.
- **Commuter Rail Locomotives Top-Deck Overhaul:**
  - **F40PH-2 Locomotives (18) -** This project funded a top-deck overhaul program for 18 F40PH-2 locomotives. The program, which was completed in 2004, reconditioned these vehicles for passenger safety and efficiency.
  - **GP40-MC Locomotives (25) -** This effort funds the overhaul of 25 GP40-MC locomotives. Work consists of replacing rotating equipment such as power assemblies, turbochargers, camshafts, fuel injectors, pump compressors and fans. The completion of this overhaul will improve the service reliability of these units, help maintain on-time performance standards, and increase operating efficiency by reducing the number of failures.
- **Coach Reliability and Safety Program (CRASP) -** This project funds the overhaul of key components of the coach fleet. To be included in this overhaul program are important safety components such as trucks, brakes, couplers, and draft gears, in addition to others such as air conditioning systems and toilets. The program encompasses approximately 270 coaches of the coach fleet.
- **Locomotive Procurement (28) -** This project funds the procurement of 28 locomotives, which will replace portions of the existing fleet while reducing emissions.

- **Coach Procurement (75) -** This project funds the procurement of 75 bi-level coaches. This project will allow the Authority to retire a portion of the coach fleet while increasing commuter rail passenger capacity.
- **CTC, BTC-4 Kawasaki Coach Overhaul (75) -** This project funds the full midlife overhaul of 75 bi-level Kawasaki coaches acquired in 1990-91. The overhaul work includes replacing and reconditioning trucks, couplers, HVAC system, electrical system, batteries and battery chargers, some interior fixtures and safety-emergency equipment.

In addition to MBTA equipment upgrades, improvements will also be made to the Framingham/ Worcester Line's track and right-of-way as part of the CSX freight rail yard expansion and the MBTA is working with the WRTA to create a compatible fare collection system that can be used between WRTA buses and MBTA commuter rail.

For Amtrak, the agency has produced the *Northeast Corridor Infrastructure Master Plan* (May 2010) which outlines capital improvements for the corridor including track, bridges, right-of-way, signals, rolling stock and stations. The projects outlined below will provide improved multimodal connections to other area:

- **Boston Terminal Storage and Capacity Improvements –** South Station and Southampton Yard are at capacity. Additional terminal capacity will be needed to accommodate 2030 service levels and equipment needs. These plans include initiating MBTA South Coast commuter service to Fall River and New Bedford and adding intercity trains to the "Inland Route" between Boston South Station and Springfield. Short-term plans call for adding up to six station tracks at South Station, undertaking a full Environmental Impact Statement (EIS) for the proposed North-South Rail Link and initiating a terminal capacity Study similar to those currently underway in New York and Washington. Projects in this program include:
    - Boston South Station – Track Capacity Improvements
    - Grand Junction Connection – Purchase
    - Boston – New Layover Yard Facility (Location TBD)
    - North-South Rail Link – Environmental Impact Statement
- **Station Improvements** – Station improvements are designed to bring facilities to a state of good repair and meet accessibility requirements under the Americans with Disabilities Act (ADA). While this program includes 10 projects between Boston and Westerly, Rhode Island, for the purposes of this report, only the projects in Massachusetts are listed below:
    - Boston South Station – ADA/SGR Improvements
    - Boston Back Bay Station – ADA/SGR Improvements
    - Route 128/Westwood Station - ADA/SGR Improvements
- **Positive Train Control –** Project includes installation of ACSES wayside transponders incorporating positive stop and civil speed control in areas of the corridor where ACSES is not currently installed (operating speeds greater than 150 mph) as mandated by the Federal Rail Safety Improvement Act of 2008 between Boston and Washington.
- **High Speed Rail Improvements/Other Corridor Wide –** Amtrak, the 11 states (Maine to Virginia) and commuter agencies have identified improvements necessary for 15-miniute trip time reductions between Boston and New York by 2015; and 30-minute reductions by 2028 after completion of State of Good Repair (SGR). Additional improvements above 30 minutes are also being explored. While this program includes a number of projects between Boston and

Washington, for the purposes of this report, only the projects with direct effects to Massachusetts are listed below:

- Long Term Power Consumption and Supply Study
- Protection of Freight Routes
- Major Terminal S&I Facility Improvements
- Storage Track and Facility Improvements
- Boston to New York – Bridge Rehabilitation Program
- Boston to New York – Facility Improvement Program
- Boston to New York – Right of Way Fencing above 150 MPH

C.2.2.3 Mobility

Achieving and maintaining a state of good repair for the regional rail system is critical to mobility as it will ensure that rolling stock, infrastructure and access are available when and where they are needed to provide safe and reliable service that meets demand. Also of critical importance to regional rail mobility are alleviating system constraints, filling gaps in the existing system and expanding the system to meet growth in future demand.

C.2.2.4 Service Reliability/On-Time Performance

Reliability and on-time performance is a function of several factors including traffic congestion, fleet size, conditions of vehicles and physical infrastructure. In February 2011, MBTA Worcester Line commuter rail service had an on-time performance level of 74%, far below the MBTA's goal of 95% of trains being on-time. Primary causes for this performance level cited were severe winter weather and locomotive/equipment breakdowns due to aging rolling stock. Amtrak's *Lake Shore Limited* had an on-time performance level of 66% in May 2011. Primary causes for this performance level were due to its long route (Chicago to Boston), interference with various freight railroad trains, track and signals and passenger delays.

C.2.2.5 Infrastructure Constraints

A number of infrastructure constraints place limits on regional rail service operations and expansion including, but limited to:

- Old power supply substations
- Old signals/control devices
- Track, bridges, switches/interlockings, overhead wires and bridge/tunnel structures
- Non-ADA compliant areas at stations and terminals
- Outdated and/or deteriorating rolling stock and locomotives

C.2.2.6 Gaps in Service

Although the MBTA commuter rail service area covers 175 communities, some geographic areas and times of day could benefit from expanded or added service:

- In Worcester, expanded mid-day, night and weekend service to and from Boston would benefit reverse commuters, regional transit riders and recreation riders

- For multi-community trips, connections to other RTAs at suburban MBTA commuter rail stations are non-existent and would increase intermodality in the region
- Increased frequency of commuter rail service from Worcester to Boston with 20 trains per day
- Extension of commuter rail service from Worcester to Springfield
- Use of the Grand Junction branch for some Worcester commuter rail trains to access North Station
- Improved on-time performance
- Purchasing of newer and more reliable rolling stock and locomotives
- Station and parking lot security
- Station parking lot capacity

For Amtrak, some geographic areas and times of day could benefit from expanded or added service:

- Restoration of direct service to New York via the "Inland Route"
- For multi-community trips, connections to RTAs at Amtrak stations that are either non-existent or minimal would increase intermodality in the region and state

C.2.3 Regional Passenger Bus

C.2.3.1 Operating Funds and System Preservation

Like other public transportation, the most pressing need that the regional bus services currently face is also providing funding for maintaining operations. The region's two largest carriers are Peter Pan Bus Lines and Greyhound Bus Lines. Since 1999, both companies have partnered to create "pool service" which allows the companies to coordinate frequent departures, provide more non-stop service and set ticket prices more competitively. Funding for these services comes primarily from fare revenue and other fees, with some government subsidies. By acquiring additional operating dollars, whether public or private, both Peter Pan and Greyhound will be preserved and potentially expanded to meet demand.

C.2.3.2 Capital Asset Modernization and New Construction

Both Peter Pan and Greyhound's primary capital assets are their bus fleets. Since 2009, both Peter Pan and Greyhound have purchased new buses and developed new exterior paint schemes that show a streamlined and more modern fleet. In addition, these new buses also offer the latest in on-board, high-tech equipment that provides WiFi, electrical plug-ins and tray tables to keep up with customer needs and wants to stay connected when traveling, as well as on-board GPS and on-board ticket scanners for drivers.

Since both Peter Pan and Greyhound operate from Union Station, there are no current plans for expansion or construction of any new fixed-facilities in the near future.

C.2.3.3 Mobility

Achieving and maintaining a state of good repair for the regional bus system is critical to mobility as it will ensure that rolling stock, infrastructure and access are available when and where they are needed to provide safe and reliable service that meets demand. Also of critical importance to regional bus mobility are alleviating system constraints, filling gaps in the existing system and expanding the system to meet growth in future demand.

C.2.3.4 Gaps in Service

Although the Peter Pan and Greyhound service provide services to multiple cities nationwide, some geographic areas and times of day could benefit from expanded or added service in the region, such as:

- Increased service from Worcester to Providence
- Creating new alliances for increased bus service or new bus service to rural areas and other regional and national destinations

C.3 Bicycle and Pedestrian

According to the 2000 U.S. Census Journey to Work data, approximately 3.3% of all work trips made in the CMMPO area occur by walking and 1.0% are made by bicycling. This is below the state average of 4.3% for walking work trips (compared to 10.4 percent of all walking trips), but equal to the 1.0% average for bicycling. As outlined in Chapter One, walking and bicycling are basic forms of non-motorized transportation and have a number of health, environmental and economic benefits.

C.3.1 Benefits and Impediments to Bicycling and Walking

C.3.1.1 Benefits

Public Health - A continuation of dispersing land use patterns that has been the primary method of development in the U.S over the last 60 years has resulted in an increase in vehicle miles traveled (VMT) and an increase in automobile dependency in achieving daily living activities and with an accompanying decrease in physical activity. Physical activity reduces the risk of developing a number of personal health problems such as heart disease, high blood pressure, diabetes and cancer. Studies have also shown that physical activity has also been linked to a reduction in anxiety and depression.

According to the Center for Disease Control (CDC), the obesity rate among Massachusetts adults increased from 10-14 percent of the population in 1998 to 20-24 percent of the population in 2008. Many people find it difficult to set aside time for exercise into their daily routines because of work and other life commitments. This problem is further compounded when much of a person's "free" time is decreased by being stuck in traffic while commuting. Using walking and/or bicycling for transportation allows a person to incorporate physical activity into their daily routine as is recommended by health experts. CMRPC will be using Health Impact Assessments as a means of assessing the health impacts of policies, plans and projects in diverse economic sectors using quantitative data in the coming years.

Air Quality - In the greater Worcester area, 58% of all automobile trips are less than five miles in length. "Cold starts" on cars that have been idle for some time have a disproportionate effect on air quality with these short trips causing a relatively higher level of air pollutants, such as carbon monoxide (CO), carbon dioxide (CO_2), nitrous oxide (NOx), volatile organic compounds (VOCs) and particulates to be released. Air pollution from vehicle exhaust contributes to or aggravates a number of health conditions such as asthma, emphysema, bronchitis and lung and heart disease. Walking and bicycling create no emissions whatsoever. By making walking and bicycling safe, accessible and feasible mobility options for transportation needs, automobile pollutants will be reduced.

Economic - The cost for shorter trips is lower for walking or bicycling than if using an automobile. The American Automobile Association's 2010 "Your Driving Costs" report estimates that the average total annual cost of driving a new passenger car, excluding loan payments, is $9,519. That is 19.8% of the 2000 Worcester County median household income of $47,874. The Census Bureau's Consumer Expenditure Survey for 2008 shows that Northeastern U.S. families spend $8,898 annually (12.6% of their total expenditures) on transportation costs, including vehicle purchases, maintenance, fuel, and public transportation.

In addition to the personal costs of automobile dependency, national costs attributed to obesity (medical costs and lost productivity), which bicycling and walking can help reduce, amounted to an estimated $147 billion in the year 2010.* Automotive pollution also creates additional health costs and expanded bicycling and walking can also help reduce the need for some roadway expansion. By helping more drivers in our region to travel by bicycle or walking, we will help to reduce the cost of living at a personal and a public level.

Bicycling and walking do not just offer cost savings—they can also be a generator of positive economic activity through tourism. As identified in the *Massachusetts Statewide Bicycling Plan*, there is a recommendation to develop bicycle tourist publications through the Massachusetts Office of Travel and Tourism (MOTT). MOTT already promotes bicycling and walking/hiking activities in its statewide travel guide and identifies places to walk or ride such as rail trails, state reservations and forests, and the Appalachian Trail.

C.3.1.2 Impediments

Inadequate Facilities - People who want to walk or bicycle more often face impediments in the form of design restrictions or deferred maintenance of bicycling and walking infrastructure. While many of the town centers and neighborhoods within the region have on-street accommodations for pedestrians, bicycle accommodations are limited, and much of the existing infrastructure is aging, falling into disrepair or does not connect to a destination. While most sidewalks are passable for the average walker, many of them are not accessible for persons with disabilities, the elderly and young children. Damage or disrepair to sidewalks can occur through a number of ways; however, frost heaves, tree roots and missing pavement are the most common occurrences. Similarly, crosswalks and bicycle lanes can become faded after many years of motor vehicles passing

over them and not being repainted. These inadequate facilities can cause injury and/or death to pedestrians and bicyclists if not maintained because pedestrians, cyclists and drivers may not be aware of an accommodation if the markings cannot be seen.

On-road bicycle infrastructure (a.k.a. bicycle lanes) is also limited in the region as well to small sections of certain streets. There are more off-road locations with bikeways and paths. However, like the pedestrian trails, access to them is usually via a trailhead from a satellite parking lot.

Safety – MassDOT obtains crash data from local police reports collected by the Registry of Motor Vehicles (RMV) Crash Records Section and then uses an automated procedure for processing, standardizing, matching and aggregating the crash data by geographical location using Geographic Information System (GIS) tools. These procedures result in crash clusters, bike clusters and pedestrian clusters. In addition to the procedure previously described, MassDOT also factors two additional important criteria to compare crashes: '*Equivalent Property Damage Only (EPDO)*' and '*Crash Clusters*' as follows:

Equivalent Property Damage Only (EPDO)
Equivalent Property Damage Only (EPDO) crashes are weighted by fatal crashes assigned a value of 10, injury crashes a value of five (5) and property damage only or non-reported a value of one (1). This weighting system helps us to compare crashes.

Crash Clusters
This method locates clusters by merging adjacent crash locations into clusters. It finds nearby crashes then creates an imaginary buffer of 25 meter radius for automobiles (100 meter radius for pedestrian / bicycle) crashes. The resulting polygons are merged resulting in crash clusters. Note that clusters are only applied to crash locations where there is no grade separation.

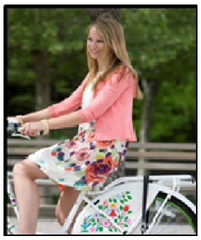
Within the CMMPO region, there are a total of 107 individual pedestrian crash locations with six (6) of those locations within the Top 5% of all pedestrian crash locations in the region. For bicycles, there were 36 individual bicycle crash locations with two (2) of those locations within the Top 5% of all bicycle crash locations in the region.

Level of Skill Variations - Skill levels among bicyclists and pedestrians vary and without the construction or accommodation of various facilities and infrastructure to accommodate those levels, we have impediments.

Bicyclists - The skills, confidence and preferences of bicyclists vary dramatically. Some bicyclists are confident riding anywhere they are legally allowed to and can negotiate busy and high speed roads that have few, if any special accommodations. Most adult riders are less confident and prefer to use roadways with a more comfortable amount of operating space, perhaps with designated space for bicyclists, or shared use paths that are separated from motor vehicle traffic. Children may be confident riders and have excellent bicycle handling skills, but have yet to develop the traffic sense and experience of adult riders.

There are typically three types of bicycle users:

1) Advanced or experienced riders generally use their bicycles for almost all trips. These users ride for convenience and speed and want direct access to destinations with a minimum amount of detour or delay. They are typically comfortable riding with motor vehicle traffic, however they prefer to have sufficient operating space to allow them or the passing motor vehicles to not have to shift positions.



2) Basic or less confident adult riders may also use their bicycles for many trips, however they prefer to avoid roads with fast and busy motor traffic. They are typically comfortable riding on neighborhood streets and shared use paths and prefer designated facilities such as bicycle lanes or wide shoulders on busy streets.

3) Children, riding on their own or with adults, may not travel as fast as adults, but still require access to key destinations, such as schools, convenience stores and recreational facilities. Residential streets with low motor traffic and speeds, linked with shared use paths and busier streets with well-defined pavement marking between bicycles and motor vehicles, can accommodate children while discouraging them from riding on major roadways in the travel lanes.

Pedestrians - Unlike bicyclists, the characteristics of pedestrians are quite different and more universal to most people. However, pedestrians can range in many of these characteristics including age (e.g., children, adults, and the elderly), walking speed, ability (e.g., ambulatory or visual impairments), and purpose (e.g., recreational walking, running, commuting). These characteristics often dictate the type of facility a pedestrian is comfortable using. Wider, detached sidewalks with a landscaped or amenity zone buffer are generally preferred and typically serve the greatest number of pedestrians by providing a buffer between the pedestrian and vehicular traffic. Similarly, wider sidewalks also provide adequate space to accommodate passing and use by persons in wheelchairs or other mobility devices. Like bicyclists, multi-use trails primarily serve as recreational facilities for pedestrians. However, these facilities can provide important everyday connections to key destinations.

C.3.2 Community Initiatives

A variety of municipal departments and committees have an interest in pedestrian and bicycle issues, including Public Works and Highway Departments, Planning Boards, safety officials, and other groups such as sidewalk and bicycling committees. Some committees may have established methods of

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**Sources include: National Institute of Diabetes and Digestive and Kidney Diseases, American Heart Association, U.S. Department of Health and Human Services, Center for Disease Control and Prevention, Robert Wood Johnson Foundation and the National Institutes of Health.*

collaborating between entities with an interest or responsibility in accommodating pedestrians, but many do not. Participation in the planning process from municipal departments, committees and citizens create a more comprehensive and effective organization for developing pedestrian and bicycle improvements.

C.3.2.1 Master Planning

A community may choose to prepare a Bicycle and/or Pedestrian Master Plan to serve as a guide for long-term implementation of sidewalks and other pedestrian-related projects. Pedestrian programs and issues can be addressed either in the Circulation Element of the existing Master Plan or a stand-alone Master Plan could be prepared.

Bicycle and pedestrian planning can also take place on a sub-municipal level. For example, Brandeis University recently implemented a comprehensive campus signage program. Taking about a year to implement, this well-received program made the campus more welcoming and accessible, improved wayfinding, provided a unifying visual theme, and promoted the university's character and spirit.

Multiple studies have found that presence of bicycle and pedestrian infrastructure greatly increases safety for not only bicyclist and pedestrians, but also for motorists. MassDOT's *Project Development and Design Guidebook* emphasizes the importance of facilities that serve all users and consider pedestrians, bicyclists, and motorists equally. Specifically, the guidelines state, "sidewalks are desirable in all areas where pedestrian activity is present, expected, or desired." There are several possible approaches to increasing sidewalk coverage and bicycle facilities in a community, on both new and existing roadways. They are discussed below, along with benefits and potential issues to consider:

C.3.2.2 Land Development Requirements

A community can request or require that private developers build sidewalks on streets, multi-use paths on the subdivided property or on-street bicycle facilities within a subdivision and/or along property frontage. If there are particular reasons why these facilities cannot or ought not to be built along the development itself, the community can obtain a payment in lieu and use the funds to build these facilities in a more appropriate location(s) within the community.

There are many benefits of including bicycle and/or pedestrian facilities as a routine element of new construction. First, it is more efficient to include these facilities in new construction rather than to go back and retrofit later. Including them from the beginning will ensure that there is sufficient right-of-way reserved. This eliminates future confusion over land ownership or the need to secure easements from residents. Second, this approach does not use limited community funds for facility construction which frees up funds for improvements in other areas. Unless there are unusual environmental or topographic conditions, inclusion of bicycle and/or pedestrian facilities is usually a relatively small expense compared to the entire cost of the project. Third, regularly including bicycle and/or pedestrian facilities in new developments reinforces the commitment of the community to foster bicycle and pedestrian-friendly development practices and creates a safer bicycle and pedestrian environment.

Challenges/Issues to Consider - It may be difficult for some communities to change subdivision and development regulations to formally require private developers to provide bicycle and pedestrian accommodations. Even in these cases, it can still be possible to request and prioritize bicycle and pedestrian facilities when conducting plan review discussions. However, as an example, it is not enough to just request sidewalks in a new development – in order to be truly useful, sidewalks should connect to one another and to existing pedestrian networks. At a minimum, subdivision and development regulations need to require sidewalks, crosswalks, and trees.

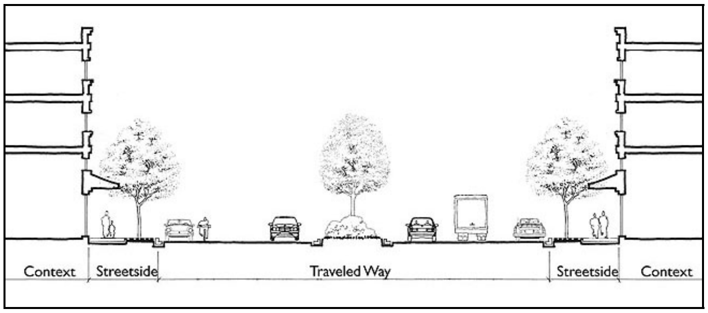
Depending on the location and layout of the development, off-road accommodations may also be appropriate to create a connected pedestrian and/or bicycle network. This is particularly important in cases where roads dead-end or end in a cul-de-sac. Providing connected paths could significantly decrease walking or bicycling distances and facilitate and encourage more use of both modes.

One possible challenge to facility building is the set of environmental issues associated with the additional impervious surfaces, particularly with sidewalks. In many communities, new development occurs in locations with impervious surface limitations based on wetland or watershed conditions.

Another challenge is the argument that these facilities are unnecessary in small residential subdivisions, as they are inconsistent with small town character. However, it may also be argued that if part of the appeal of these areas is that they are quiet and safe to raise a family, then creating a safe walking and/or bicycling environment is part of fulfilling this commitment. Establishing 'shared-use' streets, which mix pedestrians, bicyclists, and drivers in a low-speed environment that emphasize a street's community function, should be considered in these areas. Below is an example of a shared street.

C.3.2.3 Town and State Roadway Projects

MassDOT's *Project Development and Design Guidebook* recommends that the project designer calculate the cross-section from the right-of-way edge rather than center line, stating that, "through this approach, accommodations of pedestrians and bicyclists is positively encouraged, made safer, and included in every transportation project as required under Chapter 87 of state law." By doing so, walkways and/or bicycle accommodations are included on all roadway construction projects, whether on town- or state-maintained roads. The exception would be along controlled-access freeways where pedestrian or bicycle access is not allowed.



<u>*Challenges/Issues to Consider*</u> - While the focus on providing facilities for pedestrians and bicyclists is prominent in the MassDOT *Project Development and Design Guidebook,* there are still barriers in the mindset of many practitioners.

Even without the challenge of convincing local or state officials to include walkways and/or bicycling accommodations on roadway projects, it may not be physically or financially feasible to build sidewalks, bicycle lanes or paths on both sides of every road. Some communities elect to build on one or both sides based on roadway classification. For example, sidewalks are added to one side of local and collector streets and in most cases to both sides of all arterials. While it would be preferable to have sidewalks on both sides of every road, these communities determined that in the interest of building facilities on roadways throughout the entire community, it is acceptable and reasonable to limit construction to just one side of the smaller roads. In theory, local and collector streets would have low enough traffic volume and speeds that a person walking on the other side would be able to cross to access the sidewalk or specific destinations. On an arterial road with higher traffic volumes and speeds, sidewalks are necessary on both sides.

C.3.2.4 Walkable Community Workshops

The CMMPO conducts free Walkable Community Workshops to encourage safe and accessible walking environments in the region. A workshop comprises three parts. First, MPO staff gives a presentation on elements of walkability and good pedestrian design by using local, regional, and national examples. Next, workshop participants then go on a “walking audit” with MPO staff through an area chosen by the community, such as a downtown area or busy walking route to a local school, to identify shortcomings and discuss possible improvements and strategies for resolving them. Lastly, participants work together in small groups to brainstorm on how to make the walking audit area more walkable, and present their findings to the entire group.

All members of the community, including elected officials, business owners, involved residents, and local professionals in the fields of planning, engineering, law enforcement, and education are encouraged to participate. Typically following a workshop, some communities form local committees to address pedestrian needs in the municipality. To date, the MPO has conducted seven workshops in the region.

C.3.3 Regional Recommendations

If we want to increase the numbers of bicyclists and pedestrians, we must address their experiences, from the moment they leave their home until the time they begin to work, shop, study or play. This includes whether a bicyclist or pedestrian can find a route that they feel safe and comfortable using, whether they feel that motorists and law enforcement respect their rights to use the road, whether resources exist to educate bicyclists and pedestrians on the safest way to ride or walk and the best routes to follow, and whether bicyclists have a safe and convenient place to store their bike at home and at their destination.

As recognized earlier, walking trips to work make up 3.3% of all trips in the region. With this higher than average amount of walking trips to work, there is an opportunity to reduce vehicle trips and improve overall health of residents in Central Massachusetts. As such, the primary recommendation of this bicycle and pedestrian plan is to focus on improving walkability and bikeability within communities one step/one project at a time.

This plan has been developed as an implementation tool for improved bicycling and pedestrian infrastructure within the CMMPO region. While it is considered to be a "living" document, the data and principles within it are sound and apply to multiple projects. Projects and policies will be implemented using the following techniques:

C.3.3.1 Strategies and Recommendations

To increase the number of bicyclists and pedestrians, we must address their experiences, from the moment they leave their home until the time they begin to work, shop, study or play. To that end, five recommendations have been developed that supplement six basic strategies developed through discussions with the CMRPC Bicycle and Pedestrian Advisory Committee. While not all recommendations will match each strategy, each strategy has at least three recommendations.

***Strategy 1*: Encourage more trips by bicycle and walking in each community**
The benefits of bicycling and walking should be spread throughout the region. The initial focus should be on the most concentrated areas (town centers and school zones) with a later focus to increase bicycling and walking trips in other areas of our 40 communities within the region.

Recommendation 1: Work with CMMPO Representatives to include bicycle and pedestrian accommodations within future TIP roadway projects – While success has started to occur in this area, all future roadway projects, as part of their design process currently directed by MassDOT policy, should examine the accommodations of bicyclists and pedestrians on all projects and should identify that such examination occurred before being placed onto the TIP for construction funding.

Recommendation 2: Conduct "livability" assessments for CMMPO communities – As part of the U.S. Department of Transportation's new "livability" initiative, staff will perform assessments of specific locations in communities where development is planned to occur and assist MPO communities in examining the interaction of transportation, environment and land use, including walkability and bike-ability characteristics and prioritization of facility improvements.

Recommendation 3: Work with CMMPO municipalities to implement ordinances or bylaws to improve bicycle and pedestrian accommodations – CMMPO staff will work with municipalities in the region to assist them in implementing bylaws or ordinances that provide for improved or new infrastructure, and address maintenance of existing infrastructure, and will assist in identifying potential funding sources for both construction and maintenance.

Recommendation 4: Continue meeting with the Bicycle and Pedestrian Committee – The CMMPO Bicycle and Pedestrian Committee was instrumental in helping to develop this plan and will continue to be a voice for implementing change in policies and project design.
Recommendation 5: Encourage Healthy Living and Conduct Walkable Community Workshops – CMMPO staff will continue to conduct Walkable Community Workshops in the region and work cooperatively with the statewide Safe Routes to School program. Encouragement of healthy living and healthy transportation policies through the Healthy Transportation Compact and the Mass in Motion *program will continue.*

Strategy 2: Make bicycling and walking accommodations part of "standard operating procedure"
The CMMPO should ensure that all projects funded by the MPO address and improve bicycle and pedestrian mobility and access. Shared-use paths, while an important element of improving non-motorized transportation, are not sufficient and will never equal the reach of the roadway network. Considering bicyclists and pedestrians in all transportation projects, roadway or otherwise, is necessary to achieve our goals and make smart transportation investments. We can work with communities to encourage locally funded and private development projects by implementing policies that have already been adopted at the state or regional level, such as in the MassDOT *Project Development and Design Guidebook*; sharing information with other agencies, local governments, and citizens; and continuing to pursue the goals identified in guiding policy documents such as the Regional Transportation Plan (RTP).

Recommendation 1: Work with CMMPO Representatives to include bicycle and pedestrian accommodations within future TIP roadway projects

Recommendation 2: Conduct "livability" assessments for CMMPO communities

Recommendation 3: Work with CMMPO municipalities to implement ordinances or bylaws to improve bicycle and pedestrian accommodations

Recommendation 4: Continue meeting with the Bicycle and Pedestrian Committee

Recommendation 5: Encourage Healthy Living and Conduct Walkable Community Workshops

Strategy 3: Prioritize and recommend bicycle and pedestrian project proposals
The CMMPO's influence over investment in bicycle and pedestrian projects is greatest in the development of the Transportation Improvement Program (TIP), the four-year program for transportation projects in the Central Massachusetts region. Through recommendations provided through the Bicycle and Pedestrian Advisory Committee and the MPO Advisory Committee, help to ensure that TIP projects give due consideration to include bicycle and pedestrian infrastructure as

part of a multimodal approach and that the chosen projects provide the greatest regional benefits for their cost, and while achieving the policies of the RTP.

Recommendation 1: Work with CMMPO Representatives to include bicycle and pedestrian accommodations within future TIP roadway projects

Recommendation 4: Continue meeting with the Bicycle and Pedestrian Committee

Recommendation 5: Encourage Healthy Living and Conduct Walkable Community Workshops

***Strategy 4*: Assist and encourage regional/local bicycle and pedestrian initiatives**
In addition to influence over funding decisions, CMMPO staff offer technical assistance and a forum for coordination to the 40 communities in the region. The MPO and CMRPC should actively encourage communities to integrate bicycling and walking into their transportation activities and offer clear guidance to local communities on planning projects and navigating the funding process.

Recommendation 3: Work with CMMPO municipalities to implement ordinances or bylaws to improve bicycle and pedestrian accommodations

Recommendation 4: Continue meeting with the Bicycle and Pedestrian Committee

Recommendation 5: Encourage Healthy Living and Conduct Walkable Community Workshops

***Strategy 5*: Increase regional knowledge about bicycling and walking**
To better gauge progress towards achieving goals and to better prioritize investments, CMMPO staff will regularly review available safety data, encourage bicycle and pedestrian data collection by local governments where needed, and provide more information sharing and presentation. Increasing regional knowledge about walking and bicycling also includes education for bicyclists, pedestrians, motorists, and local officials on best practices for safety and design.

Recommendation 1: Work with CMMPO Representatives to include bicycle and pedestrian accommodations within future TIP roadway projects

Recommendation 4: Continue meeting with the Bicycle and Pedestrian Committee

Recommendation 5: Encourage Healthy Living and Conduct Walkable Community Workshops –

***Strategy 6*: Work with State Highway Safety Improvement Program (HSIP) to target high crash locations**
To improve safety for pedestrians and bicyclists, CMMPO staff will work with MassDOT's Highway Safety Improvement Program (HSIP) at targeted high crash locations throughout the region. By making improvements to these locations, not only will safety be improved for bicyclists and pedestrians, but also for drivers who will be made aware of their presence through improved infrastructure and design.

<u>Recommendation 1: Work with CMMPO Representatives to include bicycle and pedestrian accommodations within future TIP roadway projects</u>

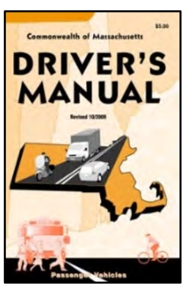
<u>Recommendation 4: Continue meeting with the Bicycle and Pedestrian Committee</u>

C.3.3.2 Policies and Programs

Education - Education and program efforts in bicycle and pedestrian planning should include planning and engineering professionals, transportation maintenance workers, school boards, teachers, law enforcement officials and elected officials as well as the public at large.

Educational efforts directed at motorists (e.g., obeying speed limits), pedestrians (e.g., legally crossing the street) and bicyclists (e.g., obeying traffic signals) can be an effective means to improve safety. School curricula should include programs instructing children on issues of pedestrian safety. Driver education programs should incorporate the rights and responsibilities of drivers, pedestrians and bicyclists. Effective education programs need to be designed with an understanding of the diverse needs and skill levels of various user groups (e.g., children, adults and people with disabilities).

<u>Driver Education, Pedestrians and Bicyclists</u>
Educational material provided by the Registry of Motor Vehicles (RMV) addresses motor vehicle laws with regard to pedestrians. Pedestrian safety is addressed in the RMV's Commonwealth of Massachusetts' Driver's Manual.



The Driver's Manual clearly conveys that drivers must always yield to pedestrians who are walking in or are crossing a roadway. The Manual tells drivers to take extra care to look for pedestrians, how to drive defensively, and discusses right-of-way rules. Pedestrian signals and signage are graphically depicted in the Manual. The Driver's Manual also addresses accommodating pedestrians in roundabouts and rules for passing pedestrians in a roadway. A section on rules for pedestrians to follow is even included in the Driver's Manual.

As a means of standardizing driver education throughout the state, the Registry of Motor Vehicles has developed a Driver Education Program. The Driver Education Program contains sections on accommodating pedestrians in its Traffic Signals and Sharing the Road modules. While materials for driver education do exist, there is room for pedestrian safety to be more strongly emphasized in driver education materials, programs and driver tests.

<u>Education in Schools</u>

Established in 2005, the Massachusetts Safe Routes to School (SRTS) program helps to teach and inspire children to start walking and bicycling more often – to and from school. The SRTS
program aims to reduce congestion, air pollution, and traffic conflicts near participating schools, while increasing the health, safety, and mobility of elementary and middle school students. The program is managed by MassDOT and funded by FHWA. It includes separate programs for education and encouragement (delivered by MassRIDES) and for infrastructure improvements.

To date, the SRTS program has worked with 309 elementary, middle, high and charter schools in 112 communities statewide, reaching over 110,000 students. Within the CMRPC region, five communities (Hopedale, Northborough, North Brookfield, West Brookfield and Worcester) and 19 schools participate in the program. Through this program, schools receive a range of direct professional services to educate students, parents, and school and community officials about the benefits of walking and bicycling to school while addressing safety concerns. The SRTS program includes education, encouragement, enforcement, engineering, and evaluation strategies to ensure a comprehensive and successful program to increase walking and bicycling to and from school.

Technical assistance in designing, implementing, marketing, and evaluating initiatives tailored to each school's needs and priorities is offered through this program. Participating schools receive free promotional materials to implement SRTS, plus no-cost educational materials targeted to students, parents, and community leaders. Training prepares school stakeholders to identify school access challenges and design solutions. Participating schools represent diverse socio-economic communities with varying population densities statewide.

The SRTS program held its annual Massachusetts Walk to School Day in May 2010. On Massachusetts Walk to School Day, children, parents, school and local officials walked to school together on a designated day. This event is intended to remind everyone of the joy of walking to school, the health benefits of regular daily activity, and the need for safe places to walk. Walk to School Day aims to create long term change by increasing physical activity among children, enhancing pedestrian safety, reducing traffic congestion, improving the environment, and building strong communities.

These programs aim to improve walking and bicycling conditions and encourage students to safely walk and bicycle to school. SRTS programs seek to reduce congestion, air pollution, and traffic congestion near participating schools, while increasing the health, safety, and physical activity of elementary and middle school students. The ultimate goal is to develop walking to school as the norm, rather than the exception, and to create long-term sustainable change.

Snow and Ice Clearance - Prompt and effective snow clearance on sidewalks is critical to maintaining safe walking conditions. If walkways, crosswalks, islands, and curb ramps are icy or unshoveled, travel is both difficult and dangerous for pedestrians. Children, the elderly and people with disabilities are most affected. Although there are challenges with enforcement, it is critical that municipalities improve sidewalk and road snow and ice clearance and enforce their regulations to encourage walking and increase pedestrian safety. Depending upon jurisdiction, snow and ice removal may be the responsibility of state and municipal agencies or private abutters (e.g., homes, businesses, property owners or tenants).

MassDOT is responsible for maintaining their respective roadways reasonably safe for public travel by keeping them sufficiently clear of ice and snow. MassDOT is responsible for providing curb-to-curb snow removal for the majority of state numbered routes. In dense urban areas, property and business owners are required to clear sidewalks (often including curb cuts and ramps) that abut their property. Usually, property and business owners have between three and twenty-four hours to clear sidewalks. Subsequently, communities may issue a warning or a ticket. Communities primarily clear sidewalks adjacent to municipally owned buildings or property. In some cases, communities clear the most heavily traveled sidewalks. To ensure pedestrian access and safety, it is critical that a community's snow removal program address both roadways and sidewalks.

Massachusetts General Laws Chapter 85, Section 5 permits cities and towns to create local sidewalk snow removal ordinances or bylaws. Sample snow clearing policies for two communities within the CMMPO region are attached in Appendix A.

WalkBoston Recommendations
The pedestrian advocacy group WalkBoston has developed seven basic recommendations to improve sidewalk snow and ice clearance for state agencies, communities, individual property owners/managers, and advocacy organizations. The seven recommendations are outlined in its 2007 report, "Keep it Clear - Recommendations for Sidewalk Snow and Ice Removal in Massachusetts" as follows:

1. *Create a norm of snow and ice clearance through social awareness campaigns.*
2. *Identify a municipal point person for snow removal.*
3. *Set priorities for sidewalk snow clearance.*
4. *Improve monitoring and enforcement.*
5. *Design sidewalks for easier snow removal.*
6. *Train municipal and private snow plowing personnel.*
7. *Create sensible state policies through appropriate legislation.*

Monitoring and Enforcement
There are three primary ways in which the clearance of sidewalks can be monitored and enforced:

- Identify who monitors and enforces.
- Define penalties and how they will be collected.
- Implement social awareness campaigns
  (e.g., distributing notices to households that indicate rules and penalties).

It is important for regulations to clearly differentiate between residential and municipal responsibilities regarding snow removal from sidewalks. Regulations should include times by when sidewalks must be cleared before being subject to fines.

Problematic Areas
The most problematic areas are curb ramps and pedestrian-crossing islands. These locations are often subject to poor drainage, which can create dangerous ponds of ice or slush. There are no laws that require abutting property owners to clear these locations and communities often do not take responsibility.

Approved Legislation

In July 2010, the Massachusetts Supreme Judicial Court abolished the long-standing law regarding liability for injuries caused by slips-and-falls on snow or ice. Previously, property owners could only be held accountable for clearing walkways of unnatural or man-made accumulations of snow. If property owners did not clear the unnatural accumulation, and a passerby slipped and fell, the owner could be held responsible for medical bills and other personal injury damages. The law has been changed to support the ideal that property owners should be responsible for clearing both natural and unnatural accumulation of snow and ice during Massachusetts winters.

C.3.3.3Regional Multi-Community Projects

While the overall focus of this plan is to foster a greater ability for daily travel by walking or bicycling, it's recognized that some people will also desire to commute or to travel longer distances occasionally. The following tier infrastructure projects offer the greatest potential for long-distance connected travel through the region and to other regions.

Tier I - Tier I projects are envisioned or planned to be part of much larger statewide or national bicycle and pedestrian projects that connect multiple communities, regions and even states. They are recommended as higher priorities as they have had significant investment placed in portions of them to date and their routings are still incomplete.

1) ***Blackstone River Greenway and Quinsigamond Bikeway Spur* -** Completion of the Blackstone River Greenway from Worcester to the Rhode Island state line

2) **M*assachusetts Central Rail Trail* -** Completion of the Mass Central Rail Trail from West Boylston to Hardwick

3) ***Titanic Rail Trail* -** Completion of the various trails that make up the Titanic Rail Trail from Blackstone to Sturbridge

Tier II - While not yet identified specifically, Tier II projects are envisioned to be connector projects that either connect the above trails together or are independent projects that provide safe bicycling and walking to multiple destinations or communities. These projects would also include on-road projects to existing roadways in each or multiple communities such, but not limited to:

- Completing gaps in the bicycle network limit many users from safely connecting to their destinations, including bus stops, schools, recreation and commercial areas
- Incorporating sidewalks where they are non-existent in many suburban neighborhoods
- Improving/reconstructing poor conditions of existing sidewalks in older neighborhoods that are impassable
- Incorporating bicycle accommodations (such as bicycle racks, lockers or other amenities) at key locations such as downtown areas, transit facilities and park-and-ride lots
- Improving poor bicycle and pedestrian access to suburban commuter rail station (Grafton and Westborough)

- Incorporation of improved sidewalks and/or bicycle infrastructure along roadways that are WRTA fixed-route bus corridors
- On-road bicycle connections along major corridor roadways is in Worcester to link off-road trails

C.4 Bridge Management System

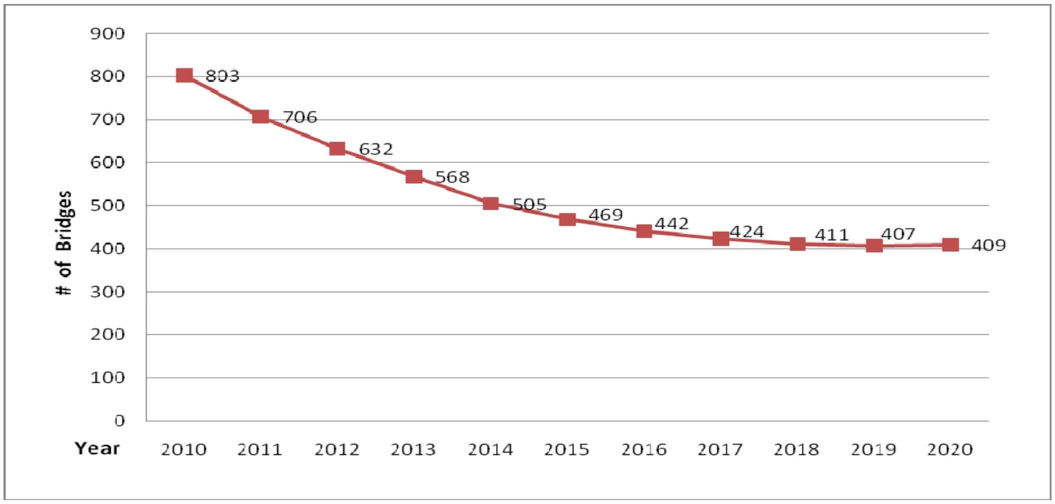
There are over 5,000 bridges in the Commonwealth, with approximately 3,500 owned by MassDOT and just over 1,500 under other agency or municipal jurisdiction. The Highway Division is the federally designated lead for bridges in the Commonwealth, responsible for achieving compliance with the National Bridge Inspection Standards (NBIS) and for ensuring the safe condition of all motor vehicle bridge, regardless of jurisdiction. The average age of all Highway Division bridges is 43 years, which means they are steadily nearing the end of their useful life. MassDOT will require greater investment just to maintain bridge condition, and significantly more investment will be needed to improve bridge conditions.

A bridge is rated as structurally deficient when the combination of its major components (Deck, substructure and superstructure) have measurably deteriorated to the point at which action is needed or when any individual component is rated at four or below on the nine-point scale (4=poor, 3=serious, 2=critical, 1=imminent failure, and zero=failed). These bridges are then prioritized for repair based upon the seriousness of the structural problems, the structure's regional and local importance, geographic equity and cost and budgetary considerations. In addition to repairing structurally deficient bridges, MassDOT also strives to appropriately maintain and preserve other bridges so that they do not fall into structural deficiency. When a bridge becomes structurally deficient, it is considered to have reached the end of its useful life and requires either a major rehabilitation or a full replacement.

By slowing the progression of bridges from the "fair" category to structural deficiency, substantial financial resources can be saved over the course of MassDOT's typical 20-year long-year planning horizon. Preservation projects generally add 20 years to the effective life span of a bridge. The Accelerated Bridge Program (ABP) has significantly reduced the number of structurally deficient bridges; however due to the continued aging of the bridge infrastructure, the relative number of structurally deficient bridges will not decrease over time without the allocation of additional funding for the Statewide (Non-ABP) bridge program.

MassDOT has set a goal to reduce the number of "fair" rated bridges to just over 400 (or 11 percent of all bridges) within ten years. The key to attaining this goal is to schedule preservation activities at the same rate at which bridges are expected to deteriorate into the fair category. This will have the effect of keeping Massachusetts bridges that are not already structurally deficient in the satisfactory and good categories. This level of effort will require funding of $155 million per year and will result in the trend depicted in Figure VII-8 below.

Figure VII-8
Forecasted Decrease in "Fair" Rated Bridges



Preservation spending does not, however, address repairs and rehabilitation of the close to 500 bridges that would remain structurally deficient. Consequently, any funding strategy must include substantial spending on fixing structurally deficient bridges. MassDOT's goal is to reduce the number of structurally deficient bridges to zero within 20 years. The funding required to achieve this goal is $150 million per year, in addition to the bridge preservation funding described above. Figure VII-9 below shows the results of this level of spending through 2020. As shown in the Table VII-2 below, this results in an overall five-year funding need of $305 million for bridges in the Commonwealth.

Figure VII-9
Forecasted Decrease in "Structurally Deficient" Rated Bridges

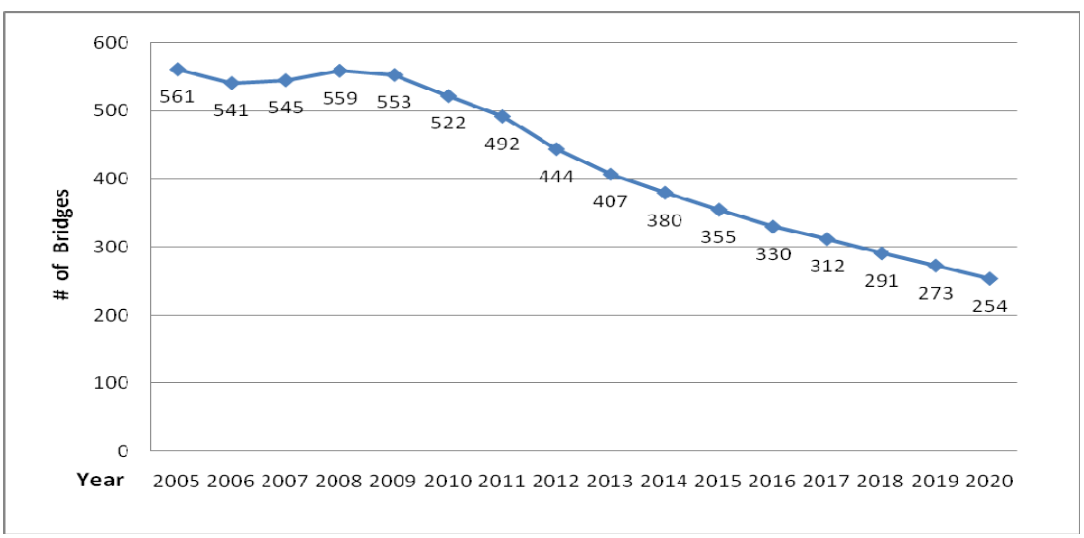


Table VII-2
Summary of Bridge Replacement/Rehabilitation and Preservation Needs

	Replacement/Rehabilitation	Preservation	Total Annual Need
Targeted Bridge Need	$150,000,000	$155,000,000	$305,000,000

C.5 Freight Planning

Transportation expenses represent a sizable portion of the cost of both raw materials and finished products. Accordingly, one major purpose of efforts to streamline regional freight flows is to reduce overall costs for local businesses and consumers alike.

C.5.1 Regionwide Rail Freight Recommendations

C.5.1.1 Overview of Recommendations

Beginning in the early 1990's, ongoing regional transportation planning efforts have considered the movement of freight. Looking to the future, continued and expanded rail freight and rail-truck intermodal operations are anticipated in the Central Massachusetts region. Although many of the rail issues summarized above are most appropriately dealt with at the state or federal levels, the CMMPO is poised to proactively engage the freight community, allowing for ongoing dialogue on the challenges facing the region. Along with a range of other factors, the often unique needs of freight movement are fully considered by the CMMPO when formulating regional transportation policy and programming improvement projects.

C.5.1.2 Freight Movement Plan for New England

In order to facilitate such multi-modal arrangements, a New England-wide freight movement plan has been suggested by *New England Futures* authors Peirce & Johnson. Such a plan would identify strategic network improvements across New England, allowing for increased connectivity with neighboring New York State and Quebec Province. When considering the global economy, strategic improvements leading to the increased utilization of the rail freight network will benefit the greater region. Beyond, in order for the greater region to remain competitive in the global economy, the need exists for Massachusetts to work with neighboring states to develop a unifying vision that addresses the entirety of the New England rail system.

As the greater area continues to grow, the need for consumer goods, bulk materials for industry, construction materials and energy-related commodities such as coal and ethanol will continue unabated. Considering anticipated increases in truck volumes on New England highways, freight rail is needed as a modal alternative and complement to trucking. When the long-haul capabilities of the railroads and the final delivery-to-anywhere service provided by trucking are combined through intermodal transloading operations, it is the consumer that ultimately benefits from the efficiencies provided by the private freight carriers. As such, public investment in the greater region's extensive highway infrastructure, which directly benefits the trucking industry, also needs to address an aging, yet invaluable, railroad network. Wise and balanced investment in the Interstate System, critical NHS Connectors, intermodal transloading and strategic railroad infrastructure will allow the entire New England region to grow and compete in the global economy.

C.5.1.3 Public-Private Partnerships

Similar to other states in the greater Northeast, freight rail carriers in Massachusetts are eager to obtain capital improvement assistance from the state, similar to the treatment of highways and airports. If the Commonwealth decides to assist with needed railroad improvements, the P&W Railroad has insisted that any available improvement monies need to be equitably distributed among the various freight rail providers.

MassCentral Railroad Capital Improvement

As an example, track maintenance is an ongoing challenge to the MassCentral Railroad. In some areas along the Ware River Line, periodic flooding is also a concern. The need to rehabilitate the state-owned track has been indicated to MassDOT and other state officials by MC Railroad operator Robert Bentley. The improvements are viewed as necessary to both retain and expand the railroad's business opportunities. Being a state-owned rail line, the railroad's operators have requested CMMPO support in seeking infrastructure improvements in order to insure continued service to customers in the Ware River Valley.

Based on a study conducted by the railroad, there exists the need for approximately $5 million in improvements to keep the line serviceable. An approximate percentage of track length in the CMRPC region and neighboring Pioneer Valley region are as follows:

10.82 miles in CMRPC region	(40%)
16.29 miles in Pioneer Valley	(60%)
Total: 27.11 mile mainline total	(100%)

Based on these mileage percentages, it is suggested that the estimated $5 million cost to rehabilitate the line between Palmer and South Barre be divided between the two planning regions with the CMMPO potentially providing $2 million and the PVMPO providing the balance of $3 million. The improvements requested by the railroad could extend line operations by at least a decade.

C.5.1.4 State Rail Banking Program

MassDOT needs to continue the Commonwealth's statewide "rail banking" program, exercising the state's right of first refusal, in order to purchase abandoned and unused railroad right-of-way, where appropriate, in order to preserve the lines for future use. By preventing the breakup and sale of railroad right-of-way, the state maintains the option of reinstated freight or passenger service. Rail banking also creates opportunities for converting the unused right-of-way into other transportation and/or recreational purposes including multi-use trails.

C.5.1.5 At-Grade Highway/Railroad Crossing Safety Improvements

Working directly with MassDOT, the freight railroads operating in the region should be provided sufficient opportunity to utilize the federal *Grade Crossing Safety Improvement Fund* for eligible locations. As indicated earlier in this section, there appear to have been a minimal number of reported at-grade vehicle crashes in the region since the mid-1970's. Although crash prevention measures appear to have been fairly effective, grade crossing deterioration has been noted. Preservation and modernization efforts are necessary in order to simply maintain the existing infrastructure. This challenge will continue to be the case as highway traffic volumes, as well as train frequencies, steadily increase.

C.5.1.6 Complete Massachusetts Double Stack Efforts

The Commonwealth needs to continue efforts to address clearance limitations in order to eventually accommodate full "Phase II" double stack container service along key railroad corridors throughout Massachusetts. The shipping industry considers full double stack the most efficient and cost effective method to move rail freight. Clearance improvements need to be implemented to enable the entire Commonwealth, including the Central Massachusetts region, to remain competitive with other industrialized states in the Northeast that have already accommodated full double stack operations for a number of years. Massachusetts needs to continue investing in rail and intermodal infrastructure to help keep the greater region competitive in the global economy.

C.5.1.7 Intermodal Facility Expansion

The Central Massachusetts region, and the city of Worcester in particular, is expected to continue serving as the "Intermodal Hub of New England". The Providence & Worcester Railroad and CSX, working with city and state officials, need to continue investigating expansion alternatives for P&W's Greenwood Yard while working to fully and properly implement the approved expansion and associated mitigation for CSX's Franklin Street Yard. Similarly, smaller rail freight carriers Grafton & Upton Railroad and the MassCentral Railroad are also poised to expand existing intermodal operations along their rail lines.

C.5.1.8 NHS Connector Maintenance

Continue to maintain and/or improve the National Highway System (NHS) Connectors that serve the region's intermodal facilities in a "to the gate" fashion. As has always been the case, internal intermodal yard improvements and operations are at the discretion of the facility operator. The RTP document's *Highway* sectional materials provides a detailed discussion of the region's established NHS Connectors.

C.5.1.9 Preservation of Rail Served Properties

Communities in the Central Massachusetts region that host rail freight operations need to consider the advantages of the availability of rail freight. Parcels of adequate size adjacent to rail lines, properly zoned for rail-served businesses, industry in particular, are often sought. Similarly, unused buildings, suitable for warehouse operations, are also in demand.

C.5.1.10 Host Community Interaction

The freight railroads operating in the region need to continue ongoing interaction with their host communities on issues ranging from emergency management to at-grade crossing safety, whistle restrictions and trespassing on railroad property. Problems with trespassing dirt bikes and snowmobiles have been noted as an ongoing issue.

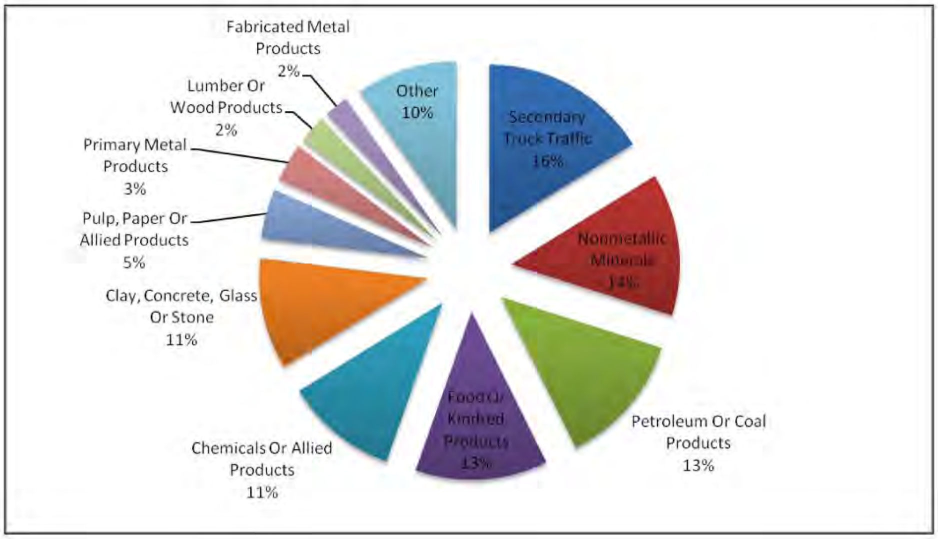
C.5.2 Greater Area Freight Flows

The recently-completed MassDOT Freight Plan revealed a great deal of current information with respect to freight flows in the Commonwealth. Much of the pertinent summarized fact is displayed in the charts and graphics in Figures VII-10 through VII-23. The many commodities which flow in and out of Massachusetts are displayed by mode of transit and my import/export status. Visuals that show a split of freight by region of origin and destination show that the Central Massachusetts area is second only to the greater Boston region with regard to shipping activity. Additionally, splits by mode of travel by region show that rail is a relatively large and growing share of the freight transport activity occurring locally, while, certainly, truck transport continues to capture the greatest share of all.

These facts and figures point out the need to keep vital road conditions maintained, and to persistently address congestion and bottlenecks, so that the lifeline of the region's supply chain, individual trucking, is not hobbled. Ideally, trucking concerns will share the responsibility to build an efficient future by working together with planners to describe and derive best routes and methods for their transport activities.

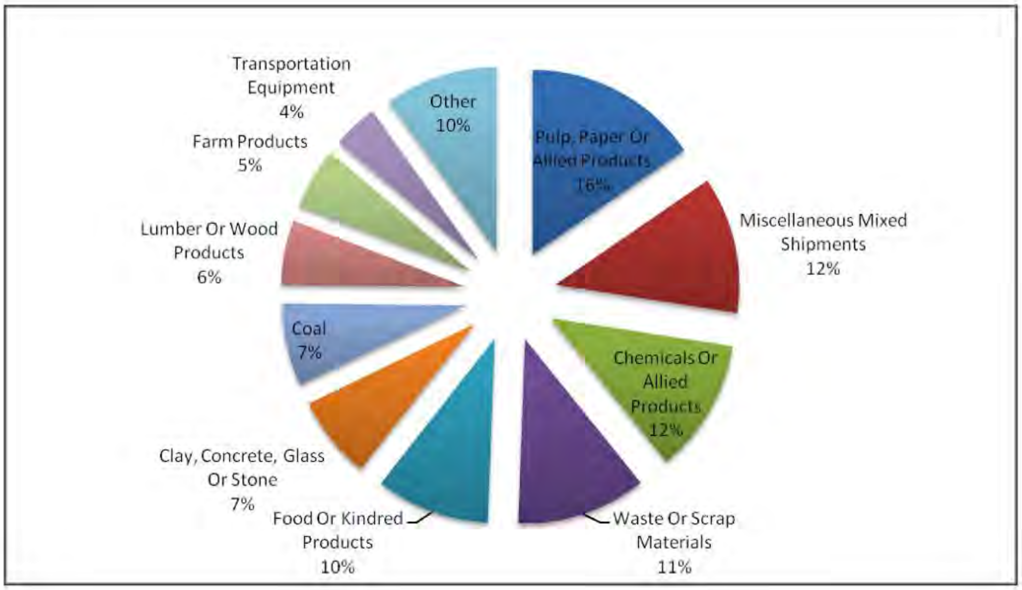
With freight rail becoming an increasingly important and more feasible, environmentally-friendly way of moving goods, the need to preserve and enhance rail links and potential intermodal interface areas is seen as an important part of building an improved, modern system of transportation for goods as well as for the commuters who consume them.

Figure VII-10
Top Ten Truck Movements by Commodity in Millions of Tons, 2007



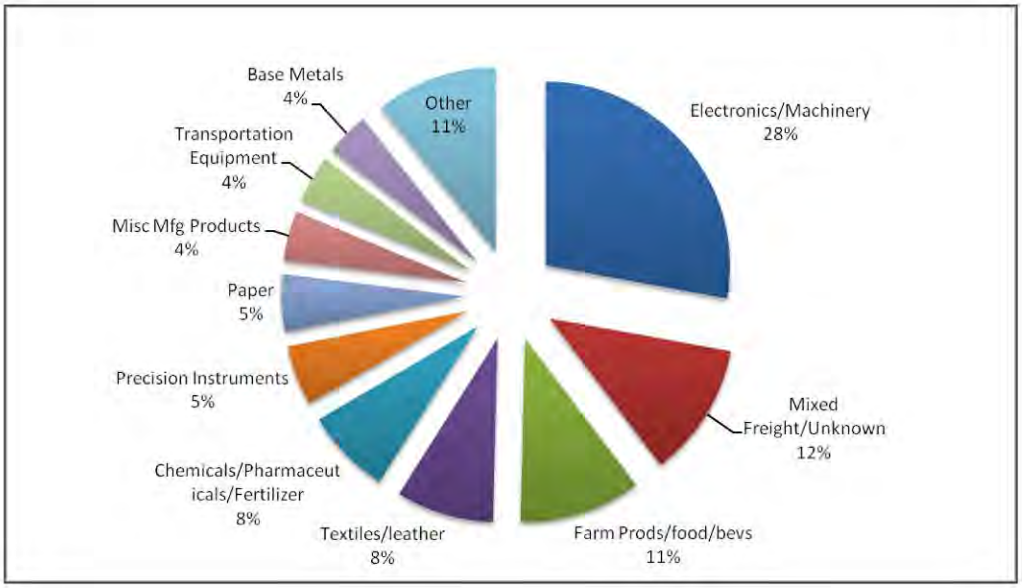
Commodity	Truck Tons	% Share
Secondary Truck Traffic	38.8	16.2%
Nonmetallic Minerals	32.8	13.7%
Petroleum Or Coal Products	30.6	12.8%
Food Or Kindred Products	30.5	12.7%
Chemicals Or Allied Products	25.9	10.8%
Clay, Concrete, Glass Or Stone	25.6	10.7%
Pulp, Paper Or Allied Products	11.4	4.8%
Primary Metal Products	8.7	3.6%
Lumber Or Wood Products	6.4	2.7%
Fabricated Metal Products	5.5	2.3%
Other	23.3	9.7%
TOTAL TONS	239.5	100.0%

Figure VII-11
Top Ten Rail Movements by Commodity in Thousands of Tons, 2007



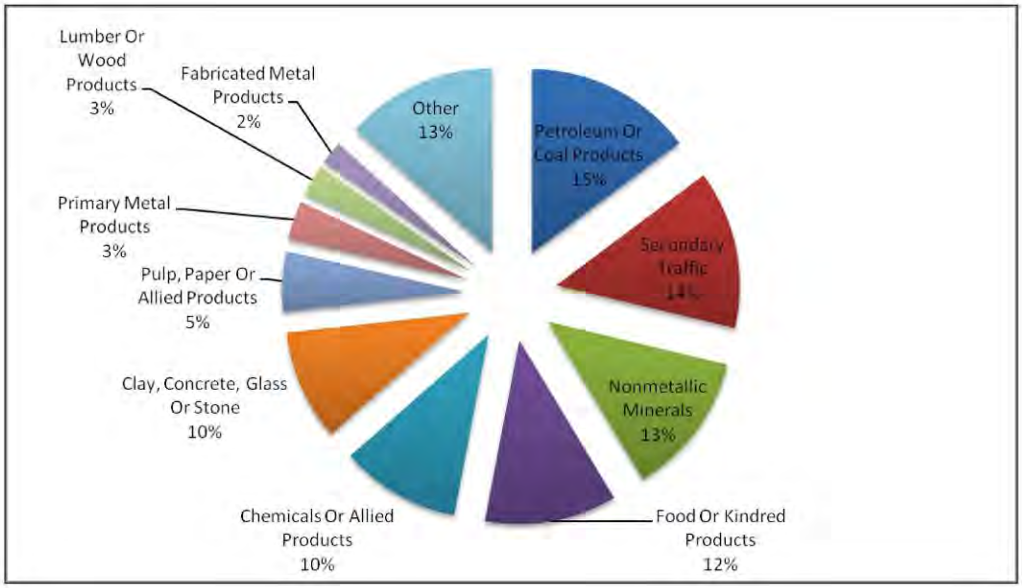
Commodity	Rail Tons	% Share
Pulp, Paper Or Allied Products	2,773	15.5%
Miscellaneous Mixed Shipments	2,148	12.0%
Chemicals Or Allied Products	2,108	11.7%
Waste Or Scrap Materials	2,049	11.4%
Food Or Kindred Products	1,800	10.0%
Clay, Concrete, Glass Or Stone	1,307	7.3%
Coal	1,301	7.3%
Lumber Or Wood Products	1,017	5.7%
Farm Products	958	5.3%
Transportation Equipment	705	3.9%
Other	1,776	9.9%
TOTAL TONS	17,942	100.0%

Figure VII-12
Top Ten Massachusetts Commodities by value in Millions of Dollars, 2007



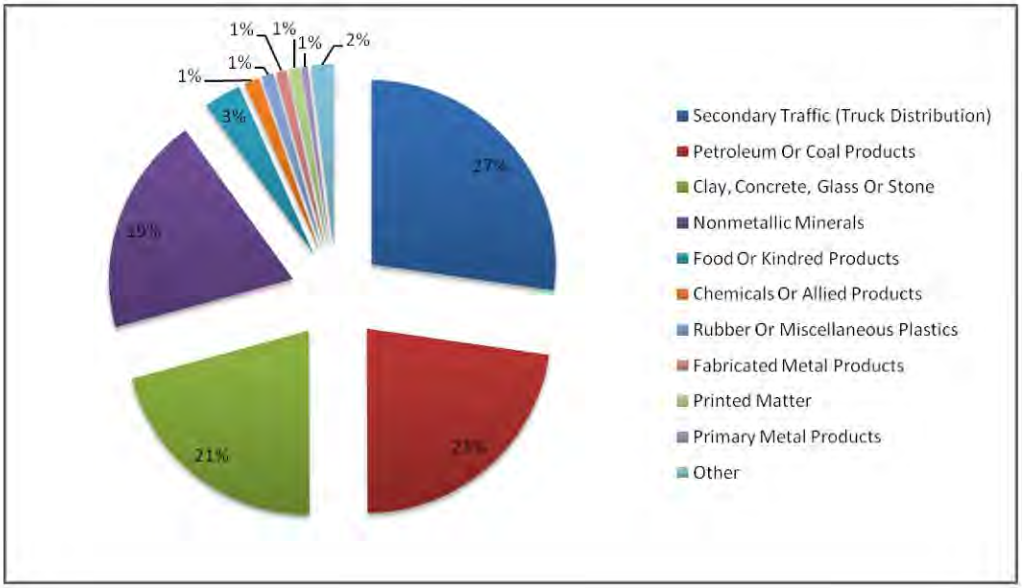
Commodity	Value	% Share
Electronics/Machinery	107,498	27.8%
Mixed Freight/Unknown	45,678	11.8%
Farm Prods/food/bevs	41,351	10.7%
Textiles/leather	33,135	8.6%
Chemicals/Pharmaceuticals/Fertilizer	29,298	7.6%
Precision Instruments	20,532	5.3%
Paper	19,439	5.0%
Misc Mfg Products	16,931	4.4%
Transportation Equipment	16,090	4.2%
Base Metals	14,717	3.8%
Other	41,323	10.7%
TOTAL VALUE	385,992	100.0%

Figure VII-13
Top Ten Massachusetts Commodities for All Modes in Millions of Tons, 2007



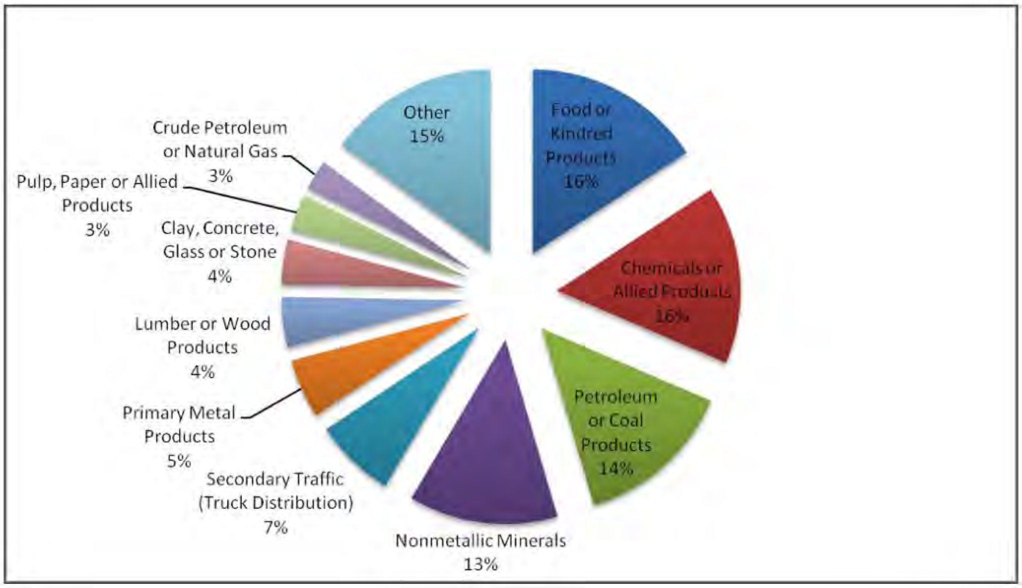
Commodity	Total Tons	% Share
Petroleum Or Coal Products	41.1	14.8%
Secondary Traffic	38.8	14.0%
Nonmetallic Minerals	35.2	12.7%
Food Or Kindred Products	32.3	11.6%
Chemicals Or Allied Products	29.3	10.5%
Clay, Concrete, Glass Or Stone	27.1	9.7%
Pulp, Paper Or Allied Products	14.7	5.3%
Primary Metal Products	9.4	3.4%
Lumber Or Wood Products	7.5	2.7%
Fabricated Metal Products	5.6	2.0%
Other	37.1	13.3%
TOTAL TONS	278.1	100.0%

Figure VII-14
Top Ten Commodities Internal to Massachusetts for All Modes (Millions of Tons), 2007



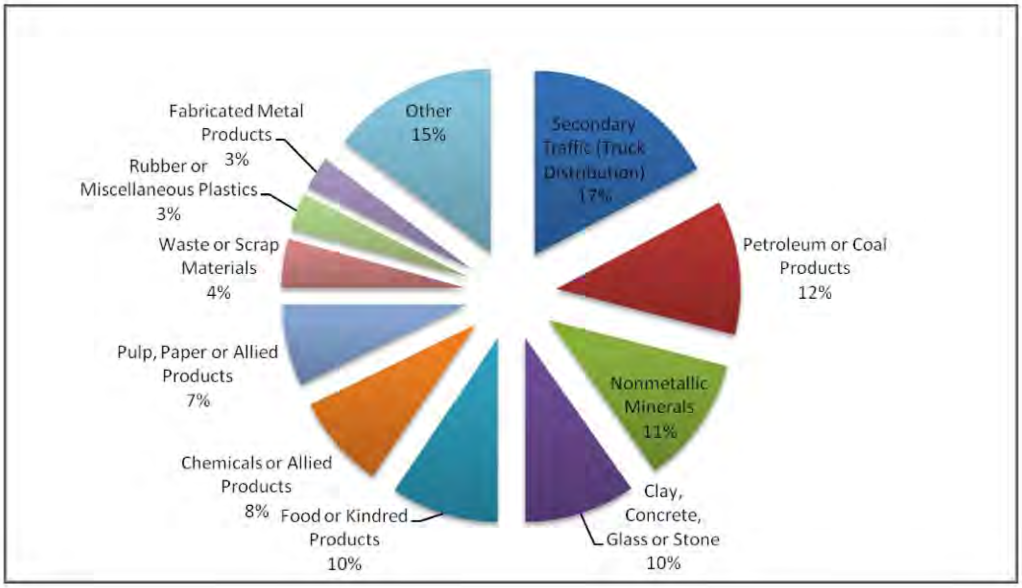
Commodity	Total Tons	% Share
Secondary Traffic (Truck Distribution)	20.8	27.3%
Petroleum Or Coal Products	17.3	22.7%
Clay, Concrete, Glass Or Stone	15.9	20.8%
Nonmetallic Minerals	14.7	19.3%
Food Or Kindred Products	2.5	3.3%
Chemicals Or Allied Products	1	1.3%
Rubber Or Miscellaneous Plastics	0.8	1.0%
Fabricated Metal Products	0.7	0.9%
Printed Matter	0.7	0.9%
Primary Metal Products	0.4	0.5%
Other	1.5	2.0%
Total Tons	76.3	100.0%

Figure VII-15
Top Ten Commodities Inbound from Massachusetts for All Modes (Millions of Tons), 2007



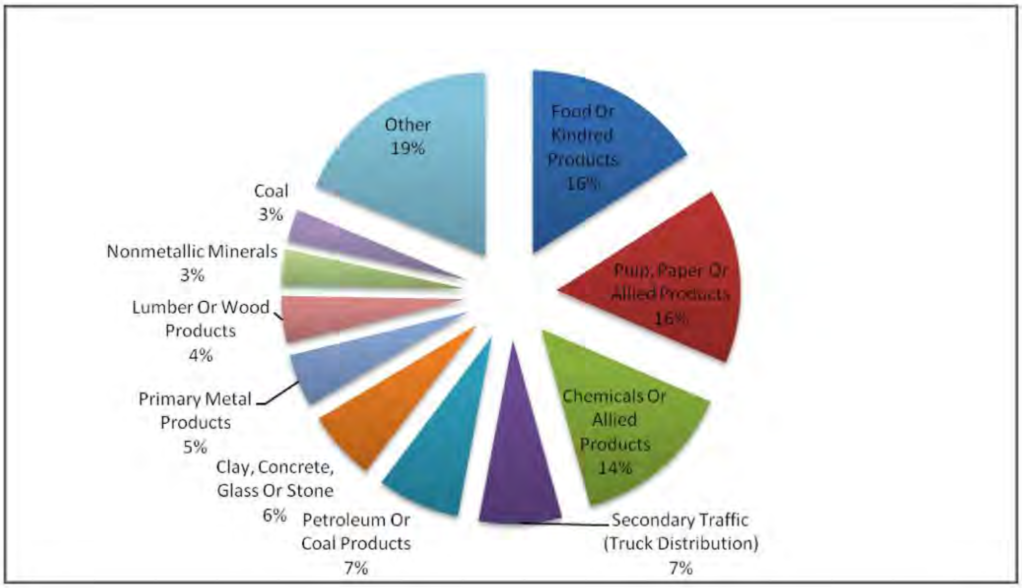
Commodity	Total Tons	% Share
Food or Kindred Products	17.9	15.8%
Chemicals or Allied Products	17.8	15.7%
Petroleum or Coal Products	15.9	14.0%
Nonmetallic Minerals	14.9	13.1%
Secondary Traffic (Truck Distribution)	8.1	7.1%
Primary Metal Products	5.9	5.2%
Lumber or Wood Products	5	4.4%
Clay, Concrete, Glass or Stone	4.5	4.0%
Pulp, Paper or Allied Products	3.6	3.2%
Crude Petroleum or Natural Gas	3	2.6%
Other	17	15.0%
Total Tons	113.6	100.0%

Figure VII-16
Top Ten Commodities Outbound from Massachusetts for All Modes (Millions of Tons), 2007



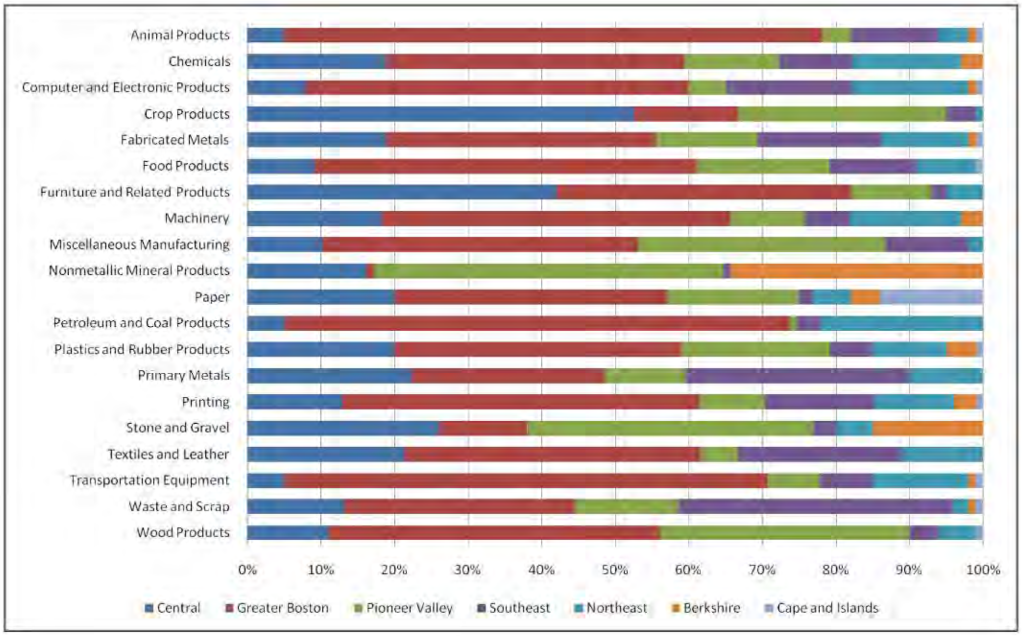
Commodity	Total Tons	% Share
Secondary Traffic (Truck Distribution)	6.0	17.2%
Petroleum or Coal Products	4.1	11.8%
Nonmetallic Minerals	3.9	11.2%
Clay, Concrete, Glass or Stone	3.4	9.8%
Food or Kindred Products	3.3	9.5%
Chemicals or Allied Products	2.9	8.3%
Pulp, Paper or Allied Products	2.5	7.2%
Waste or Scrap Materials	1.5	4.3%
Rubber or Miscellaneous Plastics	1.1	3.2%
Fabricated Metal Products	1.0	2.9%
Other	5.1	14.7%
Total Tons	34.8	100.0%

Figure VII-17
Top Ten Commodities Passing Through Massachusetts for All Modes (Millions of Tons), 2007



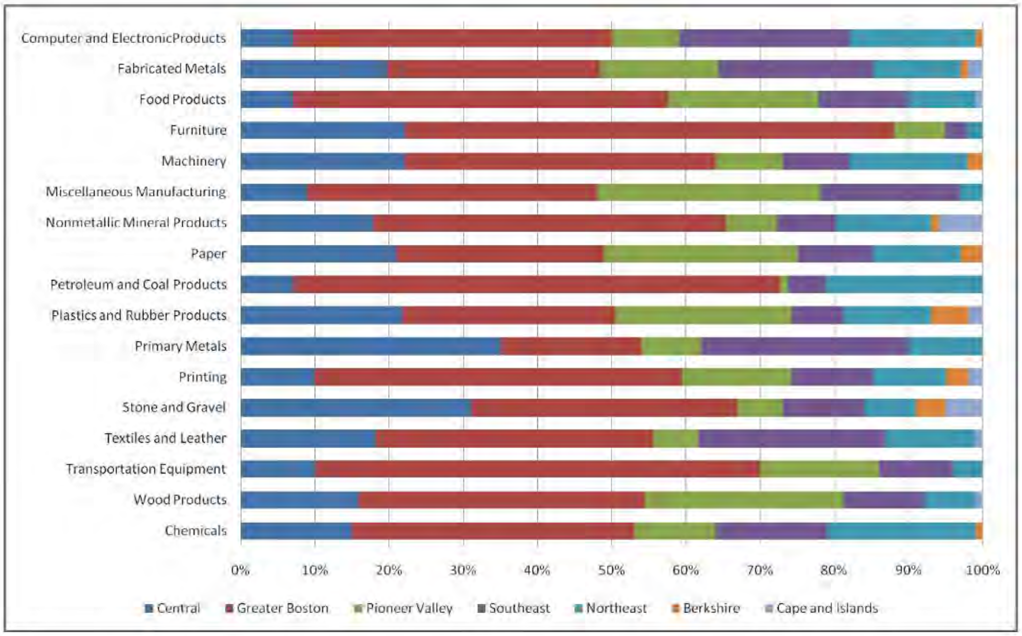
Commodity	Total Tons	% Share
Food Or Kindred Products	8.5	15.9%
Pulp, Paper Or Allied Products	8.3	15.5%
Chemicals Or Allied Products	7.6	14.2%
Secondary Traffic (Truck Distribution)	3.9	7.3%
Petroleum Or Coal Products	3.9	7.3%
Clay, Concrete, Glass Or Stone	3.3	6.2%
Primary Metal Products	2.5	4.7%
Lumber Or Wood Products	2.2	4.1%
Nonmetallic Minerals	1.7	3.2%
Coal	1.5	2.8%
Other	10	18.7%
Total Tons	53.4	100.0%

Figure VII-18
Outbound Shipments by Region of Origin (Percent by Commodity Tonnage)



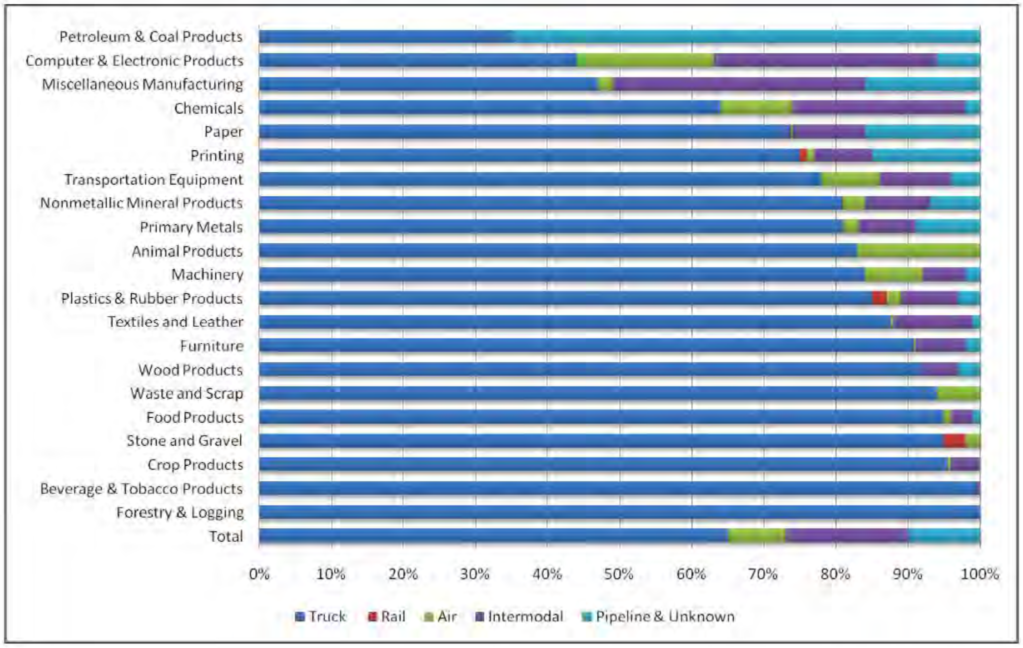
	Central	Greater Boston	Pioneer Valley	Southeast	Northeast	Berkshire	Cape and Islands
Wood Products	11%	45%	34%	4%	5%	0%	1%
Waste and Scrap	13%	31%	14%	37%	2%	1%	1%
Transportation Equipment	5%	65%	7%	7%	13%	1%	1%
Textiles and Leather	21%	40%	5%	22%	11%	0%	0%
Stone and Gravel	26%	12%	39%	3%	5%	15%	0%
Printing	13%	49%	9%	15%	11%	3%	1%
Primary Metals	22%	26%	11%	30%	10%	0%	0%
Plastics and Rubber Products	20%	39%	20%	6%	10%	4%	1%
Petroleum and Coal Products	5%	68%	1%	3%	22%	0%	0%
Paper	20%	37%	18%	2%	5%	4%	14%
Nonmetallic Mineral Products	16%	1%	47%	1%	0%	34%	0%
Miscellaneous Manufacturing	10%	42%	33%	11%	2%	0%	0%
Machinery	18%	47%	10%	6%	15%	3%	0%
Furniture and Related Products	42%	40%	11%	2%	5%	0%	0%
Food Products	9%	52%	18%	12%	8%	0%	1%
Fabricated Metals	19%	37%	14%	17%	12%	1%	1%
Crop Products	52%	14%	28%	4%	1%	0%	0%
Computer and Electronic Products	8%	52%	5%	17%	16%	1%	1%
Chemicals	19%	41%	13%	10%	15%	3%	0%
Animal Products	5%	73%	4%	12%	4%	1%	1%

Figure VII-19
Internal Commodities by Region of Origin



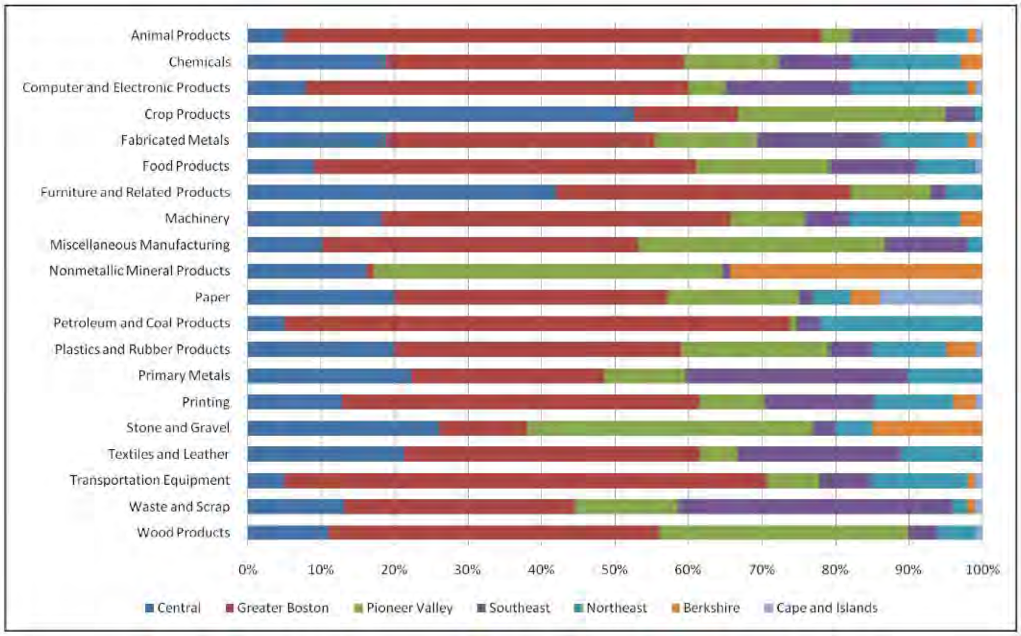
	Central	Greater Boston	Pioneer Valley	Southeast	Northeast	Berkshire	Cape and Islands
Chemicals	15%	38%	11%	15%	20%	1%	0%
Wood Products	16%	39%	27%	11%	7%	0%	1%
Transportation Equipment	10%	60%	16%	10%	4%	0%	0%
Textiles and Leather	18%	37%	6%	25%	12%	0%	1%
Stone and Gravel	31%	36%	6%	11%	7%	4%	5%
Printing	10%	50%	15%	11%	10%	3%	2%
Primary Metals	35%	19%	8%	28%	10%	0%	0%
Plastics and Rubber Products	22%	29%	24%	7%	12%	5%	2%
Petroleum and Coal Products	7%	65%	1%	5%	21%	0%	0%
Paper	21%	28%	26%	10%	12%	3%	0%
Nonmetallic Mineral Products	18%	48%	7%	8%	13%	1%	6%
Miscellaneous Manufacturing	9%	39%	30%	19%	3%	0%	0%
Machinery	22%	42%	9%	9%	16%	2%	0%
Furniture	22%	66%	7%	3%	2%	0%	0%
Food Products	7%	50%	20%	12%	9%	0%	1%
Fabricated Metals	20%	29%	16%	21%	12%	1%	2%
Computer and ElectronicProducts	7%	43%	9%	23%	17%	1%	0%

Figure VII-20
Domestic Outbound Shipments and International Exports (Percent Value by Mode)



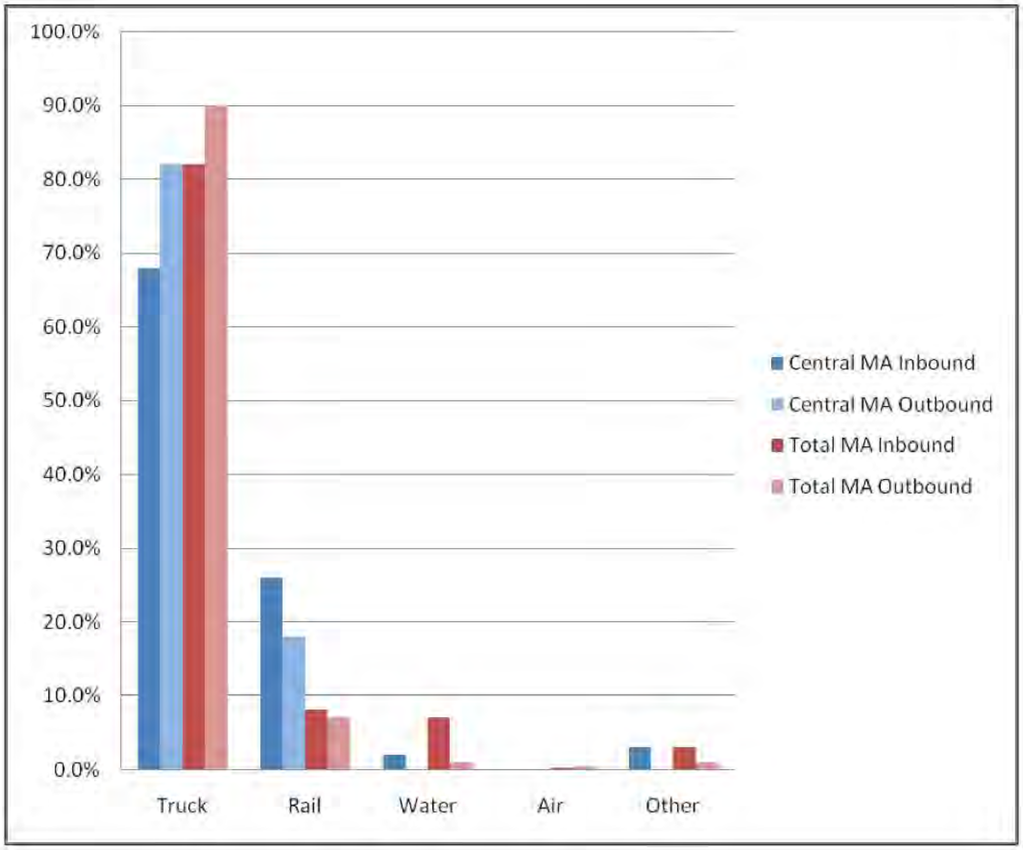
	Truck	Rail	Air	Intermodal	Pipeline & Unknown
Total	65.0%	0.1%	8.0%	17.0%	9.9%
Forestry & Logging	100.0%	0.0%	0.0%	0.0%	0.0%
Beverage & Tobacco Products	99.7%	0.2%	0.0%	0.1%	0.0%
Crop Products	95.5%	0.0%	0.4%	4.0%	0.1%
Stone and Gravel	95.0%	3.0%	2.0%	0.0%	0.0%
Food Products	95.0%	0.0%	1.0%	3.0%	1.0%
Waste and Scrap	94.0%	0.0%	6.0%	0.0%	0.0%
Wood Products	92.0%	0.0%	0.0%	5.0%	3.0%
Furniture	90.8%	0.0%	0.2%	7.0%	2.0%
Textiles and Leather	87.7%	0.0%	0.3%	11.0%	1.0%
Plastics & Rubber Products	85.0%	2.0%	2.0%	8.0%	3.0%
Machinery	84.0%	0.0%	8.0%	6.0%	2.0%
Animal Products	83.0%	0.0%	17.0%	0.0%	0.0%
Primary Metals	81.0%	0.1%	2.0%	8.0%	8.9%
Nonmetallic Mineral Products	80.9%	0.1%	3.0%	9.0%	7.0%
Transportation Equipment	78.0%	0.0%	8.0%	10.0%	4.0%
Printing	75.0%	1.0%	1.0%	8.0%	15.0%
Paper	73.6%	0.1%	0.3%	10.0%	16.0%
Chemicals	64.0%	0.0%	10.0%	24.0%	2.0%
Miscellaneous Manufacturing	47.0%	0.0%	2.0%	35.0%	16.0%
Computer & Electronic Products	44.0%	0.0%	19.0%	31.0%	6.0%
Petroleum & Coal Products	35.0%	0.0%	0.0%	0.2%	64.8%

Figure VII-21
Domestic Inbound Shipments and International Exports (Percent Value by Mode)



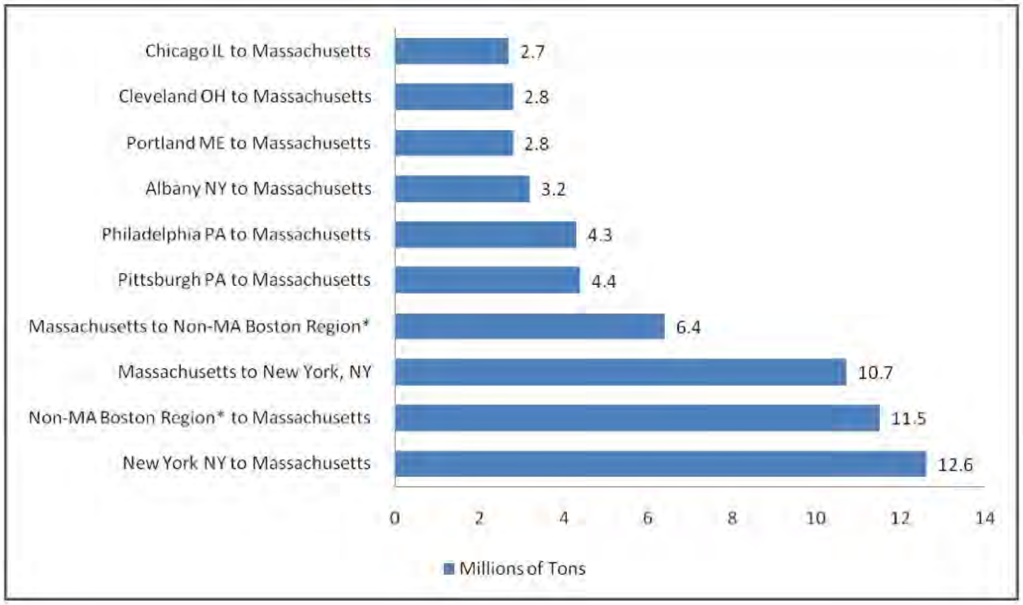
	Truck	Rail	Air	Intermodal	Pipeline & Unknown
Total	71.0%	2.0%	5.0%	14.0%	8.0%
Forestry & Logging	99.0%	0.0%	0.0%	0.0%	1.0%
Stone and Gravel	98.0%	2.0%	0.0%	0.0%	0.0%
Crop Products	95.0%	2.0%	1.0%	2.0%	0.0%
Food Products	95.0%	2.0%	0.1%	1.0%	1.9%
Animal Products	95.0%	0.0%	5.0%	0.0%	0.0%
Furniture	93.0%	0.3%	1.0%	5.0%	0.7%
Waste and Scrap	92.0%	0.0%	0.0%	5.0%	3.0%
Beverage & Tobacco Products	90.0%	2.0%	0.0%	8.0%	0.0%
Primary Metals	87.0%	3.0%	1.0%	7.0%	2.0%
Plastics & Rubber Products	84.0%	6.0%	1.0%	8.0%	1.0%
Machinery	83.0%	0.0%	6.0%	8.0%	3.0%
Nonmetallic Mineral Products	82.0%	1.0%	4.0%	7.0%	6.0%
Wood Products	81.0%	14.0%	1.0%	3.0%	1.0%
Printing	78.0%	3.0%	2.0%	12.0%	5.0%
Paper	78.0%	13.0%	0.2%	4.0%	4.8%
Chemicals	77.0%	2.0%	7.0%	12.0%	2.0%
Textiles and Leather	72.0%	0.0%	1.0%	26.0%	1.0%
Transportation Equipment	65.0%	7.0%	1.0%	17.0%	10.0%
Miscellaneous Manufacturing	60.0%	0.4%	8.0%	23.0%	8.6%
Computer & Electronic Products	39.0%	0.0%	16.0%	36.0%	9.0%
Petroleum & Coal Products	27.0%	0.2%	0.0%	0.1%	72.7%

Figure VII-22
Inbound/Outbound Shipments by Region



	Truck	Rail	Water	Air	Other
Central MA Inbound	68.0%	26.0%	2.0%	0.0%	3.0%
Total MA Inbound	82.0%	8.0%	7.0%	0.1%	3.0%
Central MA Outbound	82.0%	18.0%	0.0%	0.0%	0.0%
Total MA Outbound	90.0%	7.0%	1.0%	0.4%	1.0%

Figure VII-23
Top Ten Truck Origin-Destination Pairs (Millions of Tons), 2007



Origin Region	Destination Region	Truck Tons
New York NY	Massachusetts	12.6
Non-MA Boston Region*	Massachusetts	11.5
Massachusetts	New York, NY	10.7
Massachusetts	Non-MA Boston Region*	6.4
Pittsburgh PA	Massachusetts	4.4
Philadelphia PA	Massachusetts	4.3
Albany NY	Massachusetts	3.2
Portland ME	Massachusetts	2.8
Cleveland OH	Massachusetts	2.8
Chicago IL	Massachusetts	2.7

**Note: Non-MA Boston Region includes areas in New Hampshire and Rhode Island that are part of the Boston metropolitan region*

C.5.3 Review of Regional's Established National Highway System (NHS) Connectors

C.5.3.1 Freight Movement and the National Highway System (NHS)

Introduction
The needs of freight movement have long been considered as part of the Central Massachusetts region's transportation planning activities. The CMMPO is well aware that freight movement needs to be viewed in a context well beyond regional borders. Considering recent significant increases in fuel costs, the efficient movement of freight is ever more critical to the economic well being and quality of life in the greater region.

Well over a decade ago, CMRPC staff assisted MassDOT predecessor agencies in establishing the NHS Connectors serving the region's major intermodal facilities. Various incremental improvements have been observed over the years on these designated roadways. These improvements were funded in a variety of ways using federal, state and local resources.

The status of the established NHS Connectors was recently reviewed through an assessment of existing conditions along with the identification of suggested improvement options. As part of this review, working with MassDOT, the host communities, area freight providers and intermodal facility operators, staff has explored the concept of *NHS Connector Supplemental Guide Signs* linking key regional roadways with major intermodal terminals. Such guide signs would assist truckers and others not familiar with the region in accessing the NHS Connectors serving the various intermodal transfer facilities. The signs may also result in increased public awareness about the presence and importance of these freight facilities.

What is the NHS?
As defined by FHWA, the National Highway System (NHS) includes the Interstate Highway System as well as other major roads important to the nation's economy, defense, and mobility. The NHS consists of approximately 160,000 miles of roadway. The NHS includes the following subsystems* of roadways:

- **Interstate:** *The Eisenhower Interstate System of highways retains its separate identity within the NHS.*

- **Other Principal Arterials:** *These are NHS highways in rural and urban areas which provide access between an arterial and a major port, airport, public transportation facility, or other intermodal transportation facility.*

- **Strategic Highway Network (STRAHNET):** *This is a network of highways which are important to the United State's strategic defense policy and which provide defense access, continuity and emergency capabilities for defense purposes.*

- **Major Strategic Highway Network Connectors:** *These are highways which provide access between major military installations and highways which are part of the Strategic Highway Network.*

- **Intermodal Connectors:** *These highways provide access between major intermodal facilities and the other four subsystems making up the National Highway System.*

  **: Please note that a specific highway route may be on more than one subsystem.*

Established in the 1990's, NHS roadways serving the Central Massachusetts region include Interstates 84, 90 (MassPike), 190, 290, 395 and 495. Other important roadways that are part of the NHS include various segments of Routes 9, 20 and 146.

C.5.3.2 NHS Intermodal Connectors in Central Massachusetts

NHS Intermodal Connectors were established to complement the major highway facilities included in the NHS. The NHS Connectors are highways that provide direct access between the primary NHS and major intermodal freight and passenger facilities where goods and/or people transfer between various major modes of transportation-aviation, highway, railroad and watercraft. *FHWA has stated that, from origin to destination, "NHS Connectors tie the intermodal transportation system together."*

Originally, the CMMPO staff designated those roadways in the region serving major intermodal facilities that met the federally-established eligibility criteria as NHS Connectors. Essentially, various activity thresholds need to be reached in order to become a NHS Connector. Examples include the number of trucks generated by an intermodal railyard or the number of enplanements at a regional airport.

Review of Regional NHS Connectors
FHWA has indicated that the planning regions must periodically review the status of established NHS Connectors. This review typically includes an inventory of existing conditions, the identification of any of a variety of constraints or challenges as well as the suggestion of improvement options, as appropriate.

In the Central Massachusetts region, various incremental improvements on the NHS Connectors serving the area have been implemented over time. Notably, overhead clearance limitations were eliminated on one NHS Connector, Southbridge Street in the city of Worcester, by lowering the roadway grade beneath the long-established tracks of the Providence & Worcester Railroad.

The review of the region's established NHS Connectors included the following roadways:

Established NHS Connectors

Town of Westborough

- Computer Drive-Research Drive-Flanders Road-Walkup Drive *serving CSX*

City of Worcester

- Franklin Street *serving CSX*

- Southbridge Street *serving P&W/Intransit Container*
- McKeon Road Extension-Blackstone River Road *serving P&W/Intransit Container*
- Highland Street-Pleasant Street-Airport Drive *serving Worcester Regional Airport*

Each established NHS Connector in the region is previously shown on Figure III-2 in Chapter III. The figure shows the greater region's railroad network, NHS roadways and designated NHS Connectors along with aerial images of the intermodal freight yards located both on and off the NHS. This graphic was compiled so that the relationship of the established Connectors to the intermodal facilities could be easily perceived, and so that potential future Connectors and, possibly, intermodal sites could be envisioned.

NHS Connector Existing Conditions & Investment
For each established NHS Connector roadway in the planning region, a range of key aspects were reviewed. This review utilized regional Roadway Inventory File (RIF) information, a range of Geographic Information System (GIS) layers and the results of the Management Systems. Field visits were also conducted to view existing conditions along each of the region's established NHS Connectors.

The results of this review are summarized in Table VII-3, "NHS Connector Roadways: Facts and Observations". Further, a number of physical and situational challenges based on the observations made in the field and various analysis results are summarized in Table VII-4, "NHS Connector Roadways: Observed Deficiencies".

Suggested Improvement Options
In order to improve the federal-aid highway network serving the Central Massachusetts planning region's major - as well as the smaller - intermodal freight facilities, the following suggested improvement options have been compiled. Many of the suggested improvements will provide a direct benefit to area trucking activities. The improvement options are provided for further consideration by the host communities, area freight transportation providers, intermodal facility operators and the CMMPO through the ongoing Transportation Improvement Program (TIP) development process. *It must be specifically mentioned that the recommendations are considered "to-the-gate", aimed at improving the federal-aid highway system while leaving all potential on-site improvements to the discretion of the intermodal facility operators.*

- Prohibit on-street vehicle parking adjacent to and across from intermodal facility site drives.

- Keep site drive areas clear of all obstacles such as street furniture, utility poles and overgrown vegetation.

Table VII-3
NHS Connector Roadways: Facts and Observations

Community (Area type)	Terminal name	Facility Type	Facility ID	NHS Connector Description & mileage	Functional Class	Typical Daily Vol	Adjacent Land Use	Guide Signs	Bridges	BMS Ratings	CMP Segment	# Lanes	At Grade RR Crossings	PMS OCI	Safety: Crashes in 3-yr sample period
Westborough (Small Urban)	Westborough CSX Yard	Truck/Rail Facility	MA61R	R1: Yard to Flanders Rd to Computer Dr to Route 9 ramps (2.25 mi); R2: MA61R1 to Research Dr to Route 9 ramps (.15 mi)	Minor Arterial; Minor Collectr; Local	8000 VPD '07 HV: 8.3%	Industrial, manufacturing and warehousing; Other	Minimal	W-24-026 (Lyons St over Rt 9) (ON)	49.8	N/A	Varies; Two to Four	None	34; 82; 74 Avg= 57.7	Property damage = 25 Personal injury = 7 Fatalities = 0
Worcester (Urbanized)	Worcester CSX Yard - Franklin St	Truck/Rail Facility	MA70R	Yard to Franklin St to Grafton St (.35 mi)	Minor Arterial	7200 VPD '08 HV: 10.9%	High density business; Industrial, manufacturing and warehousing	None	W-44-082 (I-290 EB) (Over); W-44-082 (I-290 WB) (Over)	N/A	#27	Two	507885V (Currently Exempt)	65; 98; 36 Avg= 59.6	Property damage = 133 Personal injury = 61 Fatalities = 0
Worcester (Urbanized)	Worcester P&W Yard - Southbridge St (ICI)	Truck/Rail Facility	MA67R	R1: Yard to Southbridge St to cambridge St (.45 mi) R2: Yard to Southbridge St to Quinsigamond Ave (.3 mi)	Minor Arterial	14300 VPD '06 HV: 8.9%	High density business; High density residential	None	504176E (Over); 861586K (Over)	---	#24 & #45	Two	None	51; 99; 35; 96 Avg= 67.8	Property damage = 163 Personal injury = 84 Fatalities = 1
Worcester (Urbanized)	Worcester P&W Yard - Wiser Ave (ICI)	Truck/Rail Facility	MA68R	R1: Yard to Millbury St NB to Route 146 (.8 mi) R2: Yard to Millbury St SB to Route 146 (.25 mi)	Minor Arterial	4200 VPD '06 HV: 10.7%	Low density commercial; Industrial, manufacturing and warehousing; Low density residential	None	W-44-157 (Blackstone River Rd) (ON); W-44-161 (McKeon Rd) (ON)	96.6; 94.0	#37	Two	905790K; 871895A; 871893L; Add'l on Millbury St near Saint Anthony St	86; 85; 96 Avg= 87.9	Property damage = 31 Personal injury = 18 Fatalities = 0
Worcester (Urbanized)	Worcester Regional Airport	Airport	MA65A	Airport Drive to Bailey St to Pleasant St to Highland St to Rt 9/12/122A (4 mi)	Principal Arterial; Minor Arterial	18000 VPD '09 HV: 11.8%	High density commercial; High density residential	Numerous	W-44-094 (Belmont St) (ON); W-44-078 (Belmont St) (ON); W-44-073 Pleasant St) (ON)	34.0; 73.6; 74.4	#28 & #41	Varies; Two to Four	None	97; 91; 40; 66; 82; 67; 55; 60; 26; 45 Avg= 61.0	Property damage = 458 Personal injury = 198 Fatalities = 3

Table VII-4
NHS Connector Roadways: Observed Deficiencies

Community	Terminal name	Geometric/Physical Feature Deficiencies (relative extent of area)	Safety/Delay Deficiencies on Connector Roadway (AM/PM or Terminal peaks)	Safety/Delay Deficiencies at Connector/NHS Junction (AM/PM or Terminal peaks)
Westborough	Westborough CSX Yard	Tight turning radii at intersections (some) Road deterioration on Walkup Dr (most)	Heavy traffic/congested (AM/PM) Long delays at traffic signals (AM/PM) Pedestrian crossing markings faded (AM/PM)	Highly utilized interchange w/ Rte 9: Heavy traffic/congested (AM/PM) Long delays at traffic signals (AM/PM) Pedestrian crossing markings faded (AM/PM)
Worcester	Worcester CSX Yard - Franklin St	Tight turning radii at intersections (some) Pavement distress (some)	Heavy traffic/congested (AM/PM) On-street parking conflicts (AM/PM) Difficulty making turns (AM/PM) Lack of turning lanes at intersections (AM/PM)	Modern Washington Sq roundabout serves to alleviate peak period congestion: Heavy traffic/congested (AM/PM)
Worcester	Worcester P&W Yard - Southbridge St (ICI)	Tight turning radii at intersections (some) Narrow bridge underpass (one) Drainage/Flooding (most)	Roadway width varies (AM/PM) Heavy traffic/congested (AM/PM) Difficulty making turns (AM/PM, Term) Lack of turning lanes at intersections (AM/PM, Term)	Heavy traffic on mainline NHS (AM/PM) Tight turning radii at intersections (AM/PM) Lack of turning lanes (AM/PM)
Worcester	Worcester P&W Yard - Wiser Ave (ICI)	Surrounding roadway system essentially completely reconstructed as part of Rte 146 major infrastrcuture improvement project	Regional and local traffic flows now separated - congestion in area (AM/PM) reduced	Newly reconstructed roadways and interchanges need to be monitored for any new hotspots for congestion and/or safety
Worcester	Worcester Regional Airport	Tight turning radii at intersections (some) Pavement distress (some)	Heavy traffic/congested (AM/PM) Difficulty making turns (AM/PM) Lack of turning lanes at intersections (AM/PM)	Northern corridor east-west arterial mobility improvements planned to address safety and congestion

- Provide adequate truck turning radii at major intersections, optimally to fully accommodate the movement of tractors pulling 53 foot international intermodal containers.

- Address vertical clearance limitations beneath constrained bridge structures in the region to allow for the passage of tractors handling 9.5 foot high international intermodal containers.

- Maintain and resurface roadway pavement surfaces as deemed appropriate.

- Maintain all traffic control signs, signals and pavement markings. Consider the installation of "Supplemental Guide Signs" detailed below.

- Consider a regional study to identify and perhaps designate "Preferred Truck Routes" throughout the greater region.

- Consider a regional study for the location of modern rest areas capable of meeting the needs of the trucking industry. Such rest areas would provide a range of amenities, including the provision for truck hookups providing heat and air conditioning, thus reducing vehicle idling. The state's recently completed freight study suggests a location along the I-495 corridor.

Supplemental Guide Signs

The development of a "Supplemental Guide Sign" plan should be considered for the region's established NHS Connector roadways that provide access between the Interstate System, major regional highways and major intermodal terminals. Such Supplemental Guide Signs, as included in the Manual on Uniform Traffic Control Devices (MUTCD), would assist truckers and others unfamiliar with the region in following the established NHS Connectors to the intermodal freight facilities located in the town of Westborough and the city of Worcester. They could be considered "trail blazing" or "wayfarer" signs. Potential Supplemental Guide Sign examples are shown in Figure VII-24.

As indicated in the MUTCD, Supplemental Guide Signs can be used to provide information regarding destinations accessible from an interchange, over and above those shown on standard signing. No more than one would be used at any interchange approach, and they follow or come between standard advance guide signs. Each lists no more than two destinations. This suggested improvement option needs to be further explored with the host communities, intermodal facility operators, rail freight transportation providers and the CMMPO.

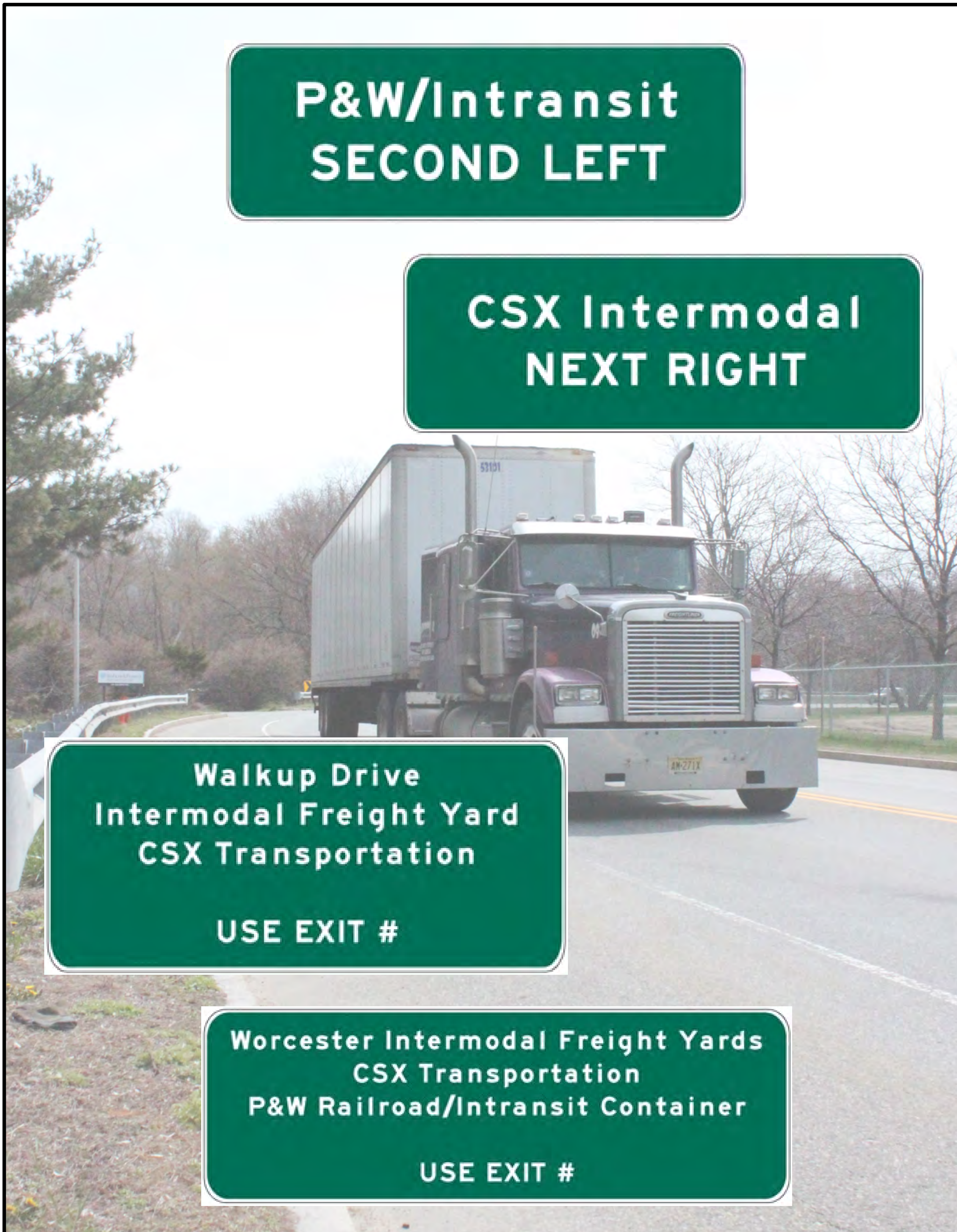


Figure VII-24 Supplemental Guide Sign Examples

Potential Future NHS Connectors
A number of other major highways within the planning region were also reviewed so as to be included in the consideration of potential Connectors that may obtain future official designation due to increasing volumes of freight moving over them. The other category considered, due to overall importance, was rural state numbered routes.

Potential future NHS Connector highways that have been identified in the planning region include the combination of state numbered Route 49 and U.S. Route 20 in the communities of Spencer, East Brookfield, and Sturbridge. This network of highways provides a link between state numbered Route 9 and the MassPike (I-90) interchange with I-84 in Sturbridge. These roadways serve the New England Automotive Gateway (NEAG) intermodal facility situated on the East Brookfield/Spencer town line.

Located on the CSX Boston Line, the NEAG site primary serves the automotive industry at the present time. Governed by the industry and captive to the economy, the distribution of new automotive products waned in both 2008 and 2009. However, a rebounded economy and the potential consideration of other freight types being distributed from this facility may eventually meet the thresholds for future NHS Connector designation.

Rural State Numbered Routes
State numbered routes in the town of Barre and adjoining communities have also been highlighted as part of this freight planning effort. Located in the northwest subregion, these highways, state numbered Routes 32, 62, 67 and 122, serve the primarily rural area in the vicinity of the South Barre village. The Wildwood Reload intermodal facility is located in South Barre at the site of a former woolen mill complex that is undergoing a revitalization effort. A new industrial park named Phoenix Plaza was recently established on this site. Rail transportation is provided by the MassCentral Railroad.

Site management has commented that they seek locally-hired trucking for “last mile” distribution services in this rural area. Although slowed by recent economic events, site management has indicated their intent to become established and expand as a break bulk, packaging, warehousing and distribution site for commodities such as agricultural supplies, rock salt and wood pellets. *Serving local needs in the Ware River Valley, this rurally-located, rail served intermodal distribution yard is of critical importance to this area of the region.*

C.6 Regional Airport

The New England Airport Regional System Plan - sponsored by the major New England airports, State transportation agencies and the FAA - was released in September of 2006. With regard to Worcester Airport, it recommended that essential aviation infrastructure be maintained and improved, including the rehabilitation of aging runway and taxiway pavements, installation of FAA compliant Runway Safety Areas on Runway 11-29, upgrade of the Category I Precision Approach to Category II/III standards, and [adding] an aircraft hold apron on the Runway 11 end. While not specifically recommending any non-airport projects, the plan did state that improved roadway access, additional signage and roadway infrastructure improvements would be of benefit to the airport.

Regardless, forecasts for Worcester passenger activity for the year 2020 range anywhere from a low of zero, to a moderate/most likely level of 275,000 passengers, to an aggressive one of nearly twice that. The majority of New England passengers will continue to travel through Boston. Although Worcester has a catchment area of significant size, airline financial problems as well as nearby competing catchment areas have conspired to severely limit growth. An alternative projection done in the NERASP that assumed no reluctance to duplicate service by the airlines indicated that up to 1.5 million passengers could make use of Worcester. Such an airline business choice is by and large a market one. In an ideal situation it would be beneficial to minimize leakage of passengers from Worcester and other regional airports to the Logan area, but again, this is a function of the services and products made available by the airlines and the prices assigned to them. The NERASP listed improved ground access as a specific challenge to the New England system in general, and noted that the City of Worcester had working with CMRPC and the CMMPO in order to address this need as part of recommended east-west travel improvements identified in the Worcester Regional Mobility Study. In the NERASP "moderate" Year 2020 projection, cutting access times by as little as ten minutes in the airport choice model resulted in an increase of 40% in Worcester passengers, to a total of about 400,000.

The airport Master Plan was released in March of 2008. It references the NERASP passenger projections and used them in its range of potential demand scenarios. The report noted that the following factors would strongly influence the airport's level of success:

- Investment in airport infrastructure
- Improved ground access
- Economic growth and vitality of the greater Worcester region
- Airline industry economics (cost of fuel, route structures, age and efficiency of planes)

It included a list of both maintenance and "demand-driven" projects to be undertaken, in the short- and long-term. Suggested "actions" for success include obtaining all possible infrastructure support funding, active marketing of the facility and its tenants, the continued pursuit of commercial service, pavement and instrument landing upgrades and an "access improvement strategy".

As the Worcester Regional Mobility Study (WRMS) moved into its final phases in early 2011, many of its listed and suggested options would result in such an access improvement strategy. One option in particular would add a new MassPike exit at Route 56 in Oxford, leading north to Leicester and then on to the northeast into Worcester. While in very preliminary conceptual form, its possible economic pluses and its feasibility, along with resultant enhanced access to the airport for travelers not familiar with Worcester, has left it on the short list of projects to be retained for future study. Overall, the WRMS recommendations focused on the fact that there is no single magic bullet to improve east-west travel. Given the built environment, coupled with the technology of GPS, improving east-west travel through the core of the region is highly dependent upon improving the many existing main routes. The WRMS defined and recommended improvements to a north, central and south corridor. Improvements to these corridors, coupled with the recent Massport signage improvement program, are likely to improve travel to the Airport. Additional study of the Route 56 / I-90 interchange alternative should also continue, incorporating the results of short- and mid-term east-west travel improvements.

C.7 Pavement Management System (PMS)

C.7.1 Existing Backlog

As noted in Chapter III-A Table III-4, as part of the pavement management program general costs per square yard were associated with each of the pavement condition bands. Staff based unit costs for each recommended action upon material and labor costs provided by MassDOT District 3 in 2010. The costs are found in Table VII-5 and represent pavement structure, police detail, and striping costs only. They do not include related repair costs for utilities, drainage, sidewalk, curbing, signals, and signs. Note that the cost per unit increases considerably from routine maintenance to base rehabilitation as the associated recommended action demands greater resources.

Table VII-5
Recommended Action Unit Cost

Recommended Action	Cost (in dollars) per square yard
Base Rehabilitation Arterial/Collector- Full depth Reconstruction	$50.00
Structural Improvement - Thick Overlay	$20.00
Preventive Maintenance - Thin Overlay or Surface Treatment	$8.00
Routine Maintenance - Crack Seal and/or Skin Patch	$.75

Using these costs in conjunction with the region wide pavement condition data collected, staff estimates that the Central Massachusetts planning region has a current “excellent pavement repair” cost of $267,200,000. This cost is the estimated funds necessary to repair all federal-aid eligible roads in the network in one year and bringing them to “excellent” condition (OCI range 88 – 100). The cost estimate includes $3,200,000 in routine maintenance, $58,300,000 in preventive maintenance, $127,700,000 in structural improvement, and $78,000,000 in base rehabilitation. Figure VII-25 displays the costs by treatment band and Table VII-6 provides further detail on the costs by functional classification and jurisdiction. Note that the base rehabilitation category accounts for over 25% of the repair dollars though it applies to only 7% of the total network miles, and that routine maintenance accounts for only 1% of the backlog but applies 20% of the total network miles.

Figure VII-25
Cost to Repair All Federal-Aid Eligible Roads by Treatment Band

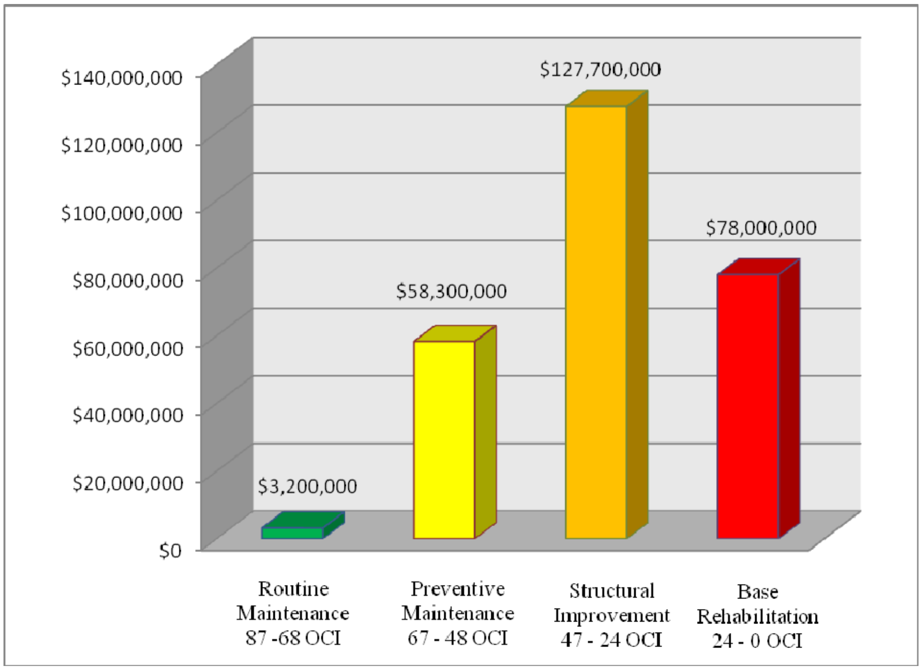


Table VII-6
Cost to Repair All Federal-Aid Eligible Roads by Treatment Band

Treatment Band	MassDOT Maintenance Arterials	Municipal Maintenance Arterials	MassDOT Maintenance Collectors	Municipal Maintenance Collectors
Routine Maint	$705,000	$315,000	$380,000	$1,800,000
Prevent Maint	$8,700,000	$4,900,000	$3,700,000	$41,000,000
Struct Improv	$23,600,000	$8,800,000	$7,500,000	$87,800,000
Base Rehab	$16,600,000	$5,700,000	$5,350,000	$50,350,000
Total Cost	$49,605,000	$19,715,000	$16,930,000	$180,950,000

C.7.2 Pavement Management Budget Analysis

In view of the large sum needed to improve the region wide pavement condition to “excellent” staff decided to evaluate the funding level required to maintain the existing network conditions for the next 25 years. As a starting point, the current condition was understood in terms of a 60.1 OCI score as well as a condition break down of approximately 1/3 of the roads in “good” condition, 1/3 of the roads in “fair” condition, and 1/3 of the roads in “poor” condition. To maintain the current condition, a budget must allocate funds to each of the recommended action categories above: routine maintenance, preventive maintenance, structural improvement, and base rehabilitation. It must also take into account that pavement management theory holds that “best first” treatment is the most effective, while also working to address roads that are in “poor” condition and in need of maintenance.

Based upon recommendations made by pavement management software, $750,000,000 investment over the next 25 years would maintain the existing OCI using “best first” practices. The investment necessary to *improve* the current network to a 78 OCI (the middle of the “good” category) is $850,000,000. However, these methods would not necessarily equally address the region’s needs in each recommended action category.

Using available target regional discretionary funds of $663,255,000, multiple potential future action plans were performed and reviewed using Cartegraph software. Out of all these potential plans, two future action plans were presented to the Central Massachusetts Metropolitan Planning Organization (CMMPO). Table VII-7 below details the percent of target funds allocated in pavement preservation in five-year increments until 2035 for each action plan. The first action plan (Plan 1) would invest an average of 70% of total target funds in pavement preservation. This action plan would result in an average overall condition index of 54. This is far less than the current OCI of 60. The second action plan (Plan 2) would invest 80% of target funds in pavement preservation. This plan would result in an average overall condition index of 55.3. This is slightly higher than the Plan 1. However, considering the minimum spending targets for Highway Safety Improvement Program (HSIP) and Congestion Mitigation and Air Quality (CMAQ) programs, only 4% of discretionary funding would be left for all other programs. Upon viewing the results of the analysis, the CMMPO voted to recommend investing 80% of target funds, a total of $519,056,000, in pavement preservation.

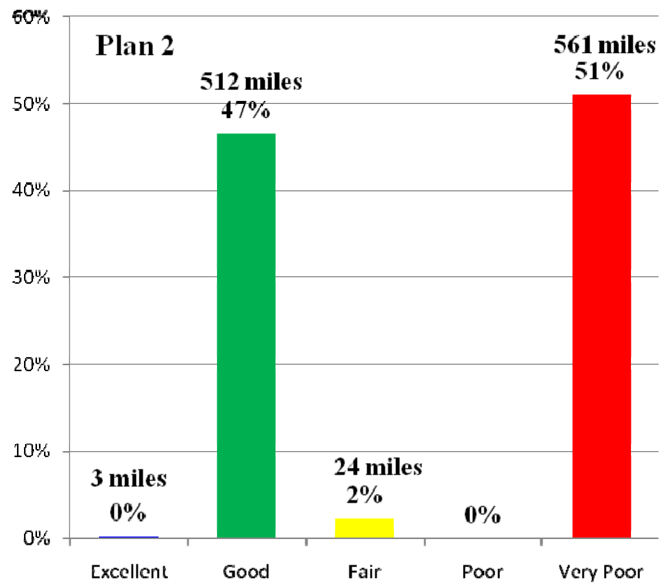
Table VII-7
Proposed Target Funds Investment for Pavement Preservation, 2011-2035

	Plan 1		**Plan 2**	
Years	% of Target Funds	Average 70% Target Funds	% of Target Funds	80% Target Funds
2011 - 2015	84%	$51,930,480	80%	$49,457,600
2016 - 2020	75%	$72,142,500	80%	$76,952,000
2021 - 2025	72%	$98,092,800	80%	$108,992,000
2026 - 2030	69%	$116,203,590	80%	$134,728,800
2031 - 2035	65%	$121,002,420	80%	$148,925,600

Figure VII-26
Plan 2 Funds Allocation by Treatment Band
& 2035 Federal-Aid Eligible Road Network Condition Summary

Treatment Band	Total Funds Allocated
Routine Maint.	$103,811,200
Preventive Maint.	$155,716,800
Structural Impr.	$155,716,800
Base Rehab.	$103,811,200
Total Funds	$519,056,000

Plan 2 2035 Network OCI – 55.3



We fully realize that the recommended available discretionary regional funding is simply not sufficient to even maintain the region's pavement at existing levels, let alone improve it to a state of "good condition." With the proposed target funding investment for pavement management detailed in Table VII-7 above, the federal-aid eligible network will likely lose 5 OCI points, dropping from 60 to 55. The percent of roads in very poor condition will increase from 7% to 51% as road conditions slip from the fair and poor categories. It is evident that in 25 years the federal-aid eligible road network will likely be half in "good" condition and half in "very poor" condition, assuming reliable funding sources.

It is important to note that the RTP planning horizons are 25 years out and the average life expectancy of any new pavement with some maintenance is between 20 and 25 years. This means that pavement updated or installed today will have reached the end of its life in 2035. The funding provided for pavement preservation is not sufficient to properly maintain all federal-aid eligible roads in Central Massachusetts. Without an increase in funding and proper maintenance activities, the region's road network will continue to lose ground.

C.7.3 Future Vision

Based on the input from various stakeholders and the priority preferences indicated by our Federal and State partners for pavement maintenance, a scenario that would come close to maintaining the existing condition was evaluated. This resulted in projected required funding of $30 million dollars annually. This scenario would allocate a total of:

- $150,000,000 on routine maintenance,
- $225,000,000 on preventive maintenance,

- $225,000,000 on structural improvements, and;
- $150,000,000 on base rehabilitation over the course of 25 years.

This amount of funding could raise the network OCI to 63 with a condition band split of approximately 75% in "good" condition and 25% in "poor" condition. Note that while the overall network OCI is raised 3 points, the percentage of roads in very poor condition still increases from 7% to 25%.

This is our first attempt at conducting such an extensive analysis of the system, and we anticipate refining this preliminary analysis in the future. The pavement management software, Cartegraph, assumes that all pavement analysis segments deteriorate to a "very poor" condition in a period of 20 years if no maintenance is performed. As such, the default values built into the analysis software may not be optimal for the purpose of long range planning efforts.

The cost to maintain existing conditions (present day) is approximately $750,000,000, and the total amount of discretionary funding available for pavement maintenance after HSIP and CMAQ requirements is $519,056,000. That leaves an approximate $230 million shortage to *at least maintain* the condition of the region's federal-aid eligible roadways. These realities reinforce the need for increased funding for pavement preservation and the importance of pavement management practice for Central Massachusetts. With a funding stream that cannot meet the region's needs, the region's network will inevitably lose ground, and it is all the more important to invest available resources into projects that will provide the greatest benefit for the region. Staff envisions the identification of "priority corridors for pavement rehabilitation" that could be considered as future year TIP programming options using a strategic and systematic approach.

C.8 Safety Planning

C.8.1 Statewide Top 200 Crash Cluster Locations

Annually, MassDOT releases a list of the top 200 high crash intersections throughout the Commonwealth for a three year period. There are 39 intersections in CMRPC listed on the statewide top 200 list for the period 2006-2008. By far the largest number of the top 200 intersections occurs in the City of Worcester which has 34. The Town of Shrewsbury has 2 and the Towns of Mendon / Spencer / Westborough all have 1 each. Figure VII-27 below illustrates the towns with top 200 intersections in the region. For more details on the exact location see Transportation Safety Planning Chapter V of the RTP for automobiles, pedestrian and bicycle clusters (Tables located at the end of the chapter). State Route 9 has several automobile crash clusters. 50% of the 34 intersections in the City of Worcester are located on State Route 9 from Lake Avenue to the intersection at Maywood Street.

C.8.2 The Region's Highest Ranked Crash Clusters

The region's highest ranked clusters all occur in the City of Worcester:

(a) AUTOMOBILE CLUSTERS

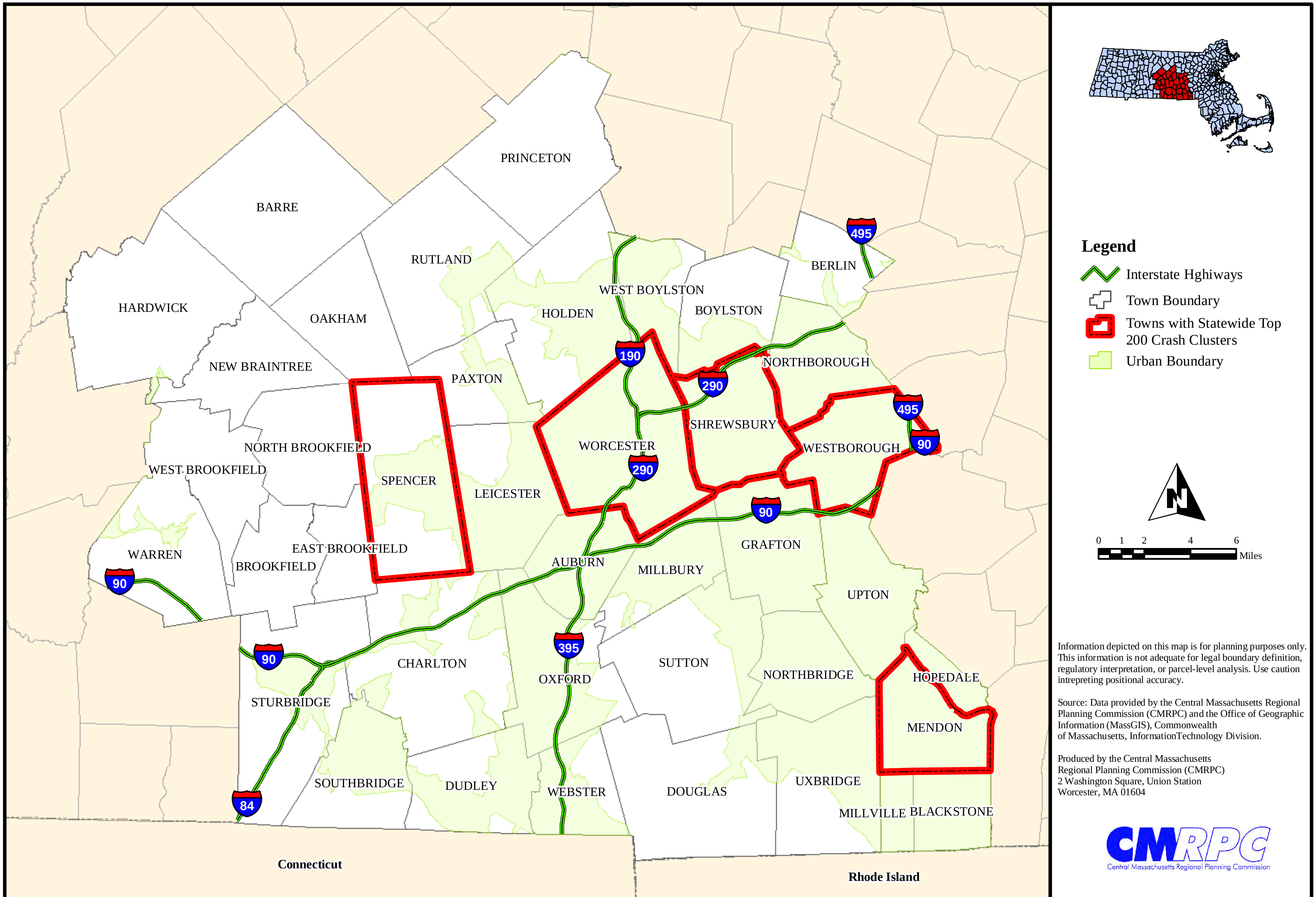
RANK 1- Lincoln Square / Main Street / Major Taylor Boulevard
RANK 2- Belmont Street / Oak Avenue

(b) PEDESTRIAN CLUSTERS

RANK 1- Main Street / Austin Street / Chandler Street
RANK 2- Main Street / Murray Avenue

(c) BICYCLE CLUSTERS

RANK 1- Interstate 290 / Belmont Street
RANK 2- Main Street / King Street



Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Source: Data provided by the Central Massachusetts Regional Planning Commission (CMRPC) and the Office of Geographic Information (MassGIS), Commonwealth of Massachusetts, InformationTechnology Division.

Produced by the Central Massachusetts Regional Planning Commission (CMRPC)
2 Washington Square, Union Station
Worcester, MA 01604

CMRPC Central Massachusetts Regional Planning Commission

Figure VII-27 CMRPC Towns with Statewide Top 200 Crash Clusters

C.8.3 High Priority Safety Locations in the Region

As described earlier in Chapter V, the top 5% of clusters in the region for each category (automobile/ pedestrian / bicycle) are eligible for Highway Safety Improvement Program (HSIP) funding. A list of HSIP eligible projects for CMRPC was generated by selecting the top 5% of each type of crash cluster (ranked by EPDO). 204 automobile, 7 pedestrian and 4 bicycle clusters were found eligible for HSIP funding. Communities that wish to pursue this method of funding to improve safety at these locations will need to perform a Road Safety Audit (RSA) which is described later in this document. Communities may wish to contact CMRPC for futher assistance.

Tables at the end of chapter V identify locations where safety improvement projects may be eligible for HSIP funding.

- Region's Top 5% Automobile Crash Clusters (Table V-1) (see end of chapter)
- Region's Top 5% Bicycle & Pedestrian Clusters (Table V-2)
- Region's Top Crash Corridors (Table V-3)

C.8.3.1 Top 5% Automobile Crash Clusters

Among automobile crash clusters, 75% are on State Routes and 25% on local roads. 60% are located in the City of Worcester, 23% are on Route 9, 12% on Route 20. Remarkably the two highest ranked crash clusters are located on either side of Interstate 290 along Belmont Street (Route 9). Clusters at this location include,

a) Rank 1- crash cluster at Lincoln Square / Major Taylor Boulevard
b) Rank 2- crash cluster at Belmont Street /Oak Avenue is located near the UMass Memorial
c) Rank 5 – crash cluster at Belmont / Goldsberry Street is flanked by Rank 1 and Rank 2 crash clusters
d) Overlapping clusters Rank 1- bike cluster, Rank 2 - crash cluster and Rank 3- pedestrian cluster are all located at Belmont Street /Oak Avenue
e) In 2009, the traffic-tracking agency INRIX, which culls information nationwide, found that the one mile section of I-290 westbound, which includes the Route 9/Exit 17 and Route 70/Exit 18 ranked among the top 100 bottlenecks nationwide with 9 hours of weekly congestion with travel speeds slowing down to 21 mph during peak periods [1]

High congestion also leads to increased carbon emissions resulting in lower air quality. The traffic problems here will continue to grow as population is expected to increase over the next decade. Given the confluence of automobile, bicycle, and pedestrian clusters along Belmont Street / I-290 intersection, coupled with the most congested road segment in the region it would be prudent to examine alternative proposals that increase safety, decrease congestion, improve air quality and increase the efficiency of the transportation links at this location. The City of Worcester may be able to combine funding sources from the Highway Safety Improvement Program, Intelligent Transportation System and Congestion Mitigation and Air Quality to improve safety and congestion.

[1] http://scorecard.inrix.com/scorecard/pdf/NTSC09%20Full%20Report.pdf

C.8.3.2 Top 5% Bicycle and Pedestrian Clusters

Bike and pedestrian in the top 5% are listed in Table V-2. Nine of ten HSIP eligible bike and pedestrian clusters in the region are located in the City of Worcester and one is located in the Town of Spencer.

C.8.3.3 Top Crash Corridors

35 of the region's top 5% automobile, bicycle and pedestrian clusters are located in the City of Worcester (Table V-2 & Table V-3). The locations where multi modal crashes occurred were in close proximity to each other along Route 9, Route 122 and Main Street in the central business district. The geographic distribution showed that combined clusters occurred along specific road segments. These safety issues could be addressed more efficiently if they were studied in conjunction with each other rather than separately. The regions highest ranked automobile, pedestrian and bicycle clusters including several of the statewide top 200 clusters are located along the following corridors in the City of Worcester.

a) RANK 1 Crash Corridor -Belmont Street From Everard Street To Main Street

b) RANK 2 Crash Corridor -Chandler Street / Madison Street From Piedmont S. to Gold Street

c) RANK 3 Crash Corridor -Park Avenue From Elm Street To May Street

d) RANK 4 Crash Corridor -Main Street From May Street To Madison Street

C.9 Data Integration

The goal of the Data Integration Program is: *to provide timely and comprehensive transportation data in an easily-accessible format to:*

1. *CMRPC Transportation staff for use in its work program in support of the CMMPO transportation planning process;*
2. *All CMRPC staff for use in their work activities in support of the agency's member communities; and*
3. *CMRPC/CMMPO member communities to enhance their local planning efforts.*

The program uses Geographic Information Systems (GIS) technology to maintain, map, and analyze information from the transportation management systems.

GIS provides the platform for the spatial organization and analysis of the transportation performance measures determined by the CMMPO Congestion Management, Pavement Management, Transportation Safety Planning, and Traffic Monitoring programs. Access to this information through a geographic interface was used to support the development of the Regional Transportation Plan.

Figure VII-28 below showing critical locations was developed using the above mentioned data. The locations in yellow represent roadway segments with poor pavement condition and traffic volume greater than 5000 vehicles. The locations in orange represent roadway segments that are heavily congested and are high crash locations. The locations in red are a combination of all the "four" criterion mentioned above. The map was used as a tool to lead the discussion during the public outreach process to depict existing needs in the region.

In it envisioned that moving forward this analysis will be used to proactively discuss the needs as the MPO solicits for projects for future Transportation Improvement programs and other funding streams that might be available for transportation projects in the region.

More recent data integration efforts have begun to link multi-modal data, particularly transit demand data, in order to support an overall integrated multi-modal planning program. These efforts will continue to expand in the coming years.

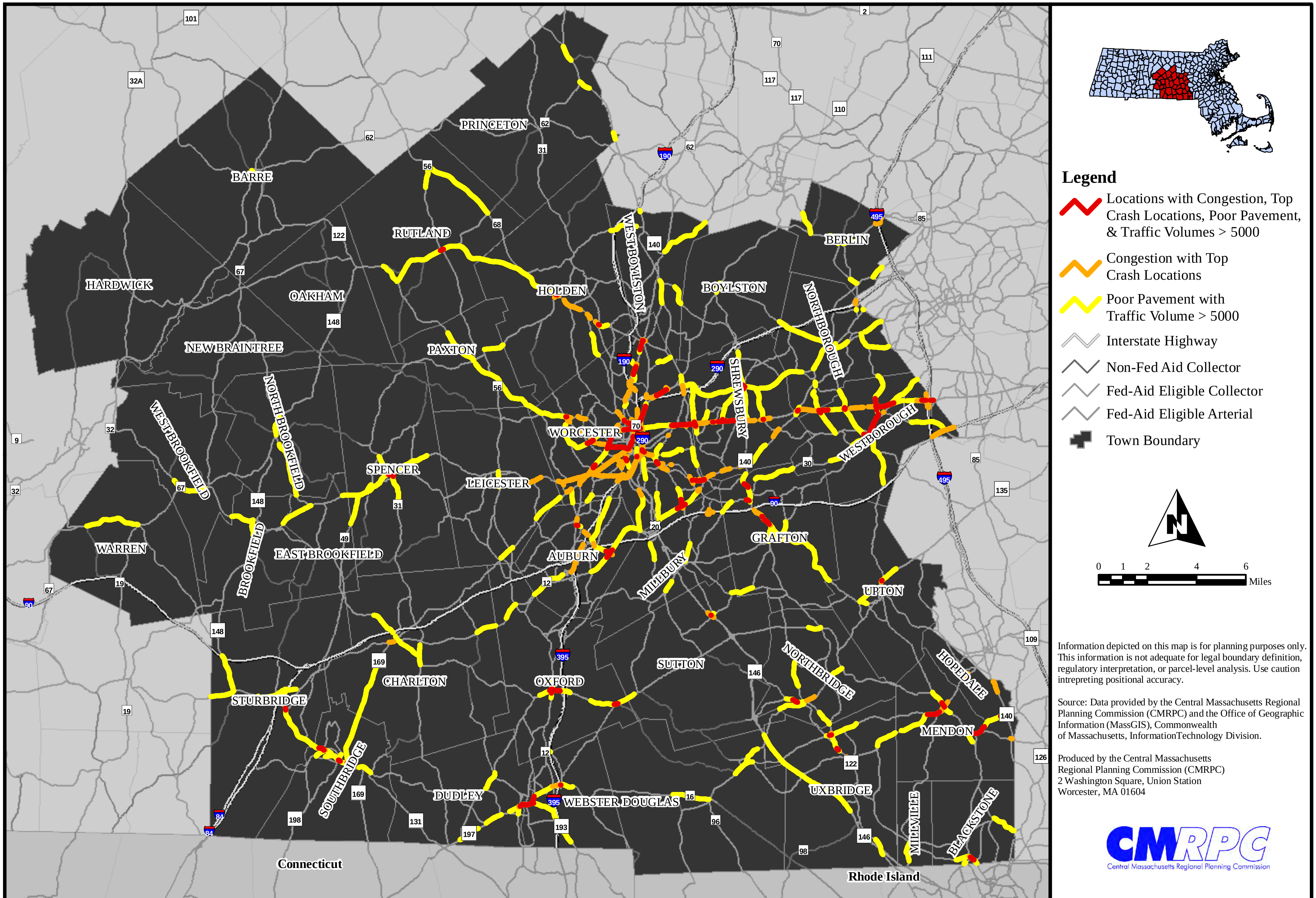


Figure VII-28 Central Massachusetts Regional Management Systems Coordination

D. OPERATIONS AND MAINTENANCE

D.1 Highway Operations and Maintenance

Maintenance is a key component of maintaining the Commonwealth's roadway infrastructure. As documented in the needs assessment of the MassDOT's capital investment plan the Highway Division estimates funding gaps in all the categories below

- ***Interstate Pavement Needs***: $128 million is needed annually over the next five years to achieve a Pavement Serviceability Index rating of 4.0 (excellent) on the Interstate System. Based upon funding included in the FFYs 2011-2013 existing STIP and extrapolating for FFYs 2014 and 2015, MassDOT expects to commit roughly $70 million per year over the five years of the plan. The annual funding gap between the identified need and available funding is, approximately $58 million per year.

- ***Non-Interstate (MassDOT maintained) Pavement Needs:*** $185 million annual over the next five years. At this level of commitment the Highway Division would achieve a target condition of 3.5 PSI (excellent) on Non-Interstate roadways. Based upon funding included in the FFYs 2011-2013 existing STIP and extrapolated for FFYs 2014 and 2015, MassDOT expects to commit roughly $18 million per year over the five years of the plan. The annual funding gap between the identified need and available funding is, approximately $167 million per year.

- ***Non-Federal Aid (MassDOT maintained) Maintenance Needs:*** $200 million is needed annually over the next five years for routine maintenance of the highway system. This includes emergency bridge repairs, distressed pavement replacement, safety upgrades, facility maintenance and upkeep, and miscellaneous activities. Based upon historic levels of funding, MassDOT expects to commit roughly $100 million per year over the five years of the plan. The annual funding gap between the identified need and available funding is, approximately $100 million per year.

Table VII-8 below provides the summary of operating and maintenance expenditures by MassDOT highway division in the Central Massachusetts region

Also as mentioned in the pavement needs assessment conducted by CMRPC on all federal aid eligible roadways in the region, approximately $30 million is needed annually over the next twenty-five years (2035) to maintain the current condition of the pavement in the region. Understanding the need for investment in maintaining the existing system, The CMMPO has committed to 80% of the available funding in the plan to address the pavement maintenance needs. This still leaves a funding gap of approximately $10 million per year.

In conclusion, the realities mentioned in the above paragraph reinforce the importance of pavement management practice for Central Massachusetts, as well as the need for increased funding for pavement preservation. With a funding stream that cannot meet the region's needs, it is all the more important to invest available resources into projects that will provide the greatest benefit for the region. In the upcoming year, CMRPC staff will work to establish criteria to prioritize pavement maintenance projects. This list will establish the target projects for investing the region's limited pavement rehabilitation resources in strategic and systematic ways.

Table VII-8

Massachusetts Department of Transportation - Highway Division
Summary of Operating and Maintenance Expenditures
Central Mass - Part 1: Non-Federal Aid

Section I - Non Federal Aid Maintenance Projects - State Bondfunds

7/12/2011

Program Group/Sub Group	SFY 2009 NFA Expenditures	SFY 2010 NFA Expenditures	SFY 2011 NFA Expenditures
01 - Bridge Repair & Replacement			
New Bridge (Excluded)	n/a	n/a	n/a
Bridge Replacement (Excluded)	n/a	n/a	n/a
Bridge Reconstruction/Rehab	$329,885	$784,350	$9,920,554
Drawbridge Maintenance	$202,250	$314,069	$339,614
Structure Maintenance	$2,806,785	$5,966,693	$4,832,931
02 - Bridge Painting			
Painting Structural	$110,721	$0	$0
03 - Roadway Reconstruction			
Hwy Relocation (Excluded)	n/a	n/a	n/a
Hwy Recon. - Added Capacity (Excluded)	n/a	n/a	n/a
New Construction (Excluded)	n/a	n/a	n/a
Hwy Reconstr. Restr and Rehab	$130,918	$19,623	$8,949
Hwy Reconstr. No Added Capacity	$180,397	$0	$140,043
Hwy Reconstr - Minor Widening	$468,352	$0	$0
Hwy Reconstr - Major Widening	$781	$0	$0
04 - Roadway Resurfacing			
Resurfacing	$1,176,203	$0	$959,954
05 - Intersection & Safety			
Impact Attenuators	$0	$0	$26,135
Safety Improvements	$627,113	$101,956	$0
Traffic Signals	$25,101	$0	$63,437
06 - Signs & Lighting			
Lighting and Electrical	$94,725	$105,998	$54,413
Sign Installation / Upgrading	$45,554	$0	$95,039
Structural Signing	$27,503	$0	$288
07 - Guardrail			
Guard Rail and Fencing	$65,153	$0	$282,864
08 - Maintenance			
Catch Basin Cleaning	$188,809	$0	$442,618
Crack Sealing	$134,515	$0	$39,597
Landscape and Roadside Develop	$105,344	$28,966	$73,187
Mowing and Spraying	$135,823	$316,228	$11,322
Pavement Marking	$221,454	$0	$257,959
Sewer and Water	$38,181	$0	$37,481
Process/Recycle/Trnsprt Soils	$0	$0	$0
Contract Hwy Maint.	$0	$0	$416,703
09 - Facilities			
Chemical Storage Sheds	$10,647	$283,936	$18,896
Vertical Construction			$245,940
10 - Bikeways (Excluded)	n/a	n/a	n/a
11 - Other			
Miscellaneous / No Prequal	$39,972	$0	$113,169
Asbestos Removal	$0	$0	$0
Demolition	$0	$0	$0
Drilling and Boring	$0	$0	$9,425
Hazardous Waste Remediation	$0	$0	$2,601
Utilities	$0	$0	$0
Change in Project Value	$0	$0	$0
Highway Sweeping	$0	$0	$0
Intelligent Transportation Sys	$0	$0	$0
Unknown	$0	$0	$24,430
Underground Tank Removal Replace	$0	$0	$0
Section I Total:	**$7,174,187**	**$7,921,819**	**$18,417,548**

Section II - Non Federal Aid Highway Operations - State Operating Budget Funding

12 - Snow and Ice Operations & Materials	$5,304,754	$3,408,023	$3,863,468
13 - District Maintenance (Mowing, Litter Management, Sight Distance Clearing, Etc.)	$1,173,255	$825,318	$904,738
Section II Total:	**$6,478,009**	**$4,233,341**	**$4,768,206**

Grand Total NFA:	$13,652,196	$12,155,160	$23,185,754

Massachusetts Department of Transportation - Highway Division
Summary of Operating and Maintenance Expenditures
Central Mass Region - Part 2: Federal Aid

Section I - Federal Aid Maintenance Projects

7/12/2011

Program Group/Sub Group	SFY 2009 Federal Aid Expenditures	SFY 2010 Federal Aid Expenditures	SFY 2011 Federal Aid Expenditures
01 - Bridge Repair & Replacement			
New Bridge (Excluded)	n/a	n/a	n/a
Bridge Replacement (Excluded)	n/a	n/a	n/a
Bridge Reconstruction/Rehab	$5,209,771	$1,023,236	$541,135
Structure Maintenance	$280,964	$0	$665,246
02 - Bridge Painting	$73,206	$0	$0
Painting - Structural			
03 - Roadway Reconstruction			
Hwy Relocation (Excluded)	n/a	n/a	n/a
Hwy Recon. - Added Capacity (Excluded)	n/a	n/a	n/a
New Construction (Excluded)	n/a	n/a	n/a
Hwy Reconstr - Restr and Rehab	$1,785	$0	$315,903
Hwy Reconstr - No Added Capacity	$25,539,835	$4,736,585	$735,855
Hwy Reconstr - Minor Widening	$1,335,221	$4,522,240	$5,107,528
Hwy Reconstr - Major Widening	$0	$0	$0
04 - Roadway Resurfacing			
Resurfacing	$11,585,484	$14,621,210	$23,447,504
05 - Intersection & Safety			
Impact Attenuators	$7,660	$0	$0
Safety Improvements	$0	$0	$0
Traffic Signals	$3,704,871	$2,827,893	$2,159,141
06 - Signs & Lighting			
Lighting and Electrical	$818,081	$0	$0
Sign Installation / Upgrading	$99,915	$401,922	$0
Structural Signing	$0	$0	$0
07 - Guardrail			
Guard Rail and Fencing	$119,881	$0	$233
08 - Maintenance			
Contract Highway Maintenance	$2,711	$0	$5,192
Landscape and Roadside Develop	$81,451	$0	$0
Pavement Marking	$78	$0	$0
Catch Basin Cleaning	$0	$0	$0
09 - Facilities			
Vertical Construction	$190,829	$0	$810
10 - Bikeways (Excluded)	n/a	n/a	n/a
11 - Other			
Intelligent Transportation Sys	$150,576	$0	$272,443
Miscellaneous / No prequal	$71,316	$0	$6,607
Reclamation	$162,550	$1,000,357	$558,328
Drilling & Boring	$0	$0	$1,074
Unknown	$0	$0	$29,557
Demolition	$0	$0	$0
Utilities	$0	$0	$0
Marine Construction	$0	$0	$5,911
Section I Total	**$49,436,182**	**$29,133,443**	**$33,852,467**

Section II - Federal Aid Highway Operations

Program Group/Sub Group	SFY 2009 Federal Aid Expenditures	SFY 2010 Federal Aid Expenditures	SFY 2011 Federal Aid Expenditures
11 - Other			
ITS Operations - I-93 HOV Lane Operation and Towing	$0	$0	$0
ITS Operations - Traffic Operations Center (South Boston)	$0	$0	$0
Section II Total	**$0**	**$0**	**$0**

Grand Total Federal Aid:	**$49,436,182**	**$29,133,443**	**$33,852,467**

D.2 Transit Operations and Maintenance

The most pressing need that the WRTA currently faces is providing funding for maintaining operations of the existing bus and paratransit system. The WRTA, similar to transit authorities throughout the country, operates at a substantial deficit. An issue facing the WRTA on a yearly basis is how to limit net operating costs such that the WRTA doesn't end the year with an unfunded net cost. Operations related inflation is the primary cause of fixed route and paratransit cost increases. Given that federal operating subsidies have been eliminated over time (although federal capital funds can be used for preventive maintenance and ADA) and the fact that local subsidies are constrained by Proposition 2 ½, there has been an increasing reliance on State Contract Assistance to fund WRTA operations. State Contract Assistance is typically capped between 50 and 75 percent, and is determined by the state legislature in arrears of the current fiscal year. Because an additional fiscal year goes by before operations are funded, predictable estimates for WRTA operating costs is extremely difficult to achieve.

The WRTA has faced continual reductions in service since the late 1990s. Since 2004, the WRTA has cut a total of 10 routes from its system due to lack of funds, and cut night-time and weekend services to bare minimum levels. Frequency of service has also been severely affected. Most of these cuts were the result of State Contract Assistance either declining or level funded. While state dollars have been more stable over the past couple of years, the system is still damaged in terms of route coverage, service hours and service frequency. Additional revenue is needed to meet the needs of second and third shift workers and to expand both frequency and route coverage to make the service more attractive to new and occasional users, whose demand for services has increased over the past several years. By acquiring additional operating dollars, either through existing or new funding sources that are forwarded funded, the WRTA system will be preserved and potentially expanded to meet regional transit demands while achieving a more fiscally constrained budget and control over increasing operational costs.

Table VII-9 below provides the Operations and Maintenance summary table for the Worcester Regional Transit Authority.

Table VII-9

Central Massachusetts Metropolitan Planning Organization
Operations & Maintenance Summary Table
Worcester Regional Transit Authority

The numbers below represent actual numbers for 2012 and projections for the out-years as used in the Program Preview meetings with the State. The figures provided are estimates and a forecast of projected funds necessary to meet the operating needs of the WRTA.

Operating Revenue	**Fiscal Year 2012**	**Fiscal Year 2013**	**Fiscal Year 2014**	**Fiscal Year 2015**
Farebox	3,371,410	3,438,838	3,507,615	3,577,767
Section 5307	4,126,923	4,197,003	4,527,876	4,698,625
Section 5311	43,597	43,597	43,597	43,597
Job Access Reverse Commute	200,000	225,000	250,000	275,000
New Freedom	42,678	42,678	42,678	42,678
Advertising & Interest Income	179,960	183,560	187,230	190,975
State Contract Assistance	8,698,546	8,829,024	8,961,460	9,095,881
Local Assessment	3,598,214	3,688,169	3,780,374	3,874,883
Other	133,924	134,536	135,160	135,797
Total Operating Revenue	**$20,395,252**	**$20,782,405**	**$21,435,990**	**$21,935,203**
Total Operating Expenses	**$20,395,252**	**$20,782,405**	**$21,435,990**	**$21,935,203**

E. REGIONAL INTELLIGENT TRANSPORTATION SYSTEMS (ITS) ANALYSIS

During the update to the Central Massachusetts Regional ITS Architecture in 2011, the regional transportation stakeholders identified key regional needs. These needs, specific to Central Massachusetts, are:

- Congestion Management
- Transit Efficiency
- Efficient Use of Existing Infrastructure
- Economic Development
- Safety and Security
- Communications Infrastructure
- Traveler Information
- Use of ITS Data

Multi-function Program Areas were also developed as part of the ITS Architecture Implementation Plan and they include:

- Event Reporting System – Currently in the early stages of deployment within the MassDOT system. Expected to expand to non-MassDOT entities.
- Video Integration System – A future initiative for traffic and transit management purposes.
- Roadway Monitoring – Future initiative to deploy devices to monitor traffic conditions, particularly along the I-290 corridor between I-90 and I-495, and also in other key locations experiencing roadway congestion.
- Roadway Control – Future initiative of centralized signal control for communities.
- Electronic Toll Collection Integration for Parking – Future initiative for MassDOT, MBTA, and community parking facilities that have controlled access.
- Regional Fare Card Integration for Parking – Future initiative for MassDOT, MBTA, and community parking facilities that have controlled access.
- CAD/AVL (Computer Aided Dispatch/Automated Vehicle Locator) for Transit Vehicles – Currently being deployed by the Worcester Regional Transit Authority (WRTA)
- Traffic Signal Priority – A future initiative for reducing congestion delays for WRTA buses.
- Regional Fare Card – A planned initiative for the WRTA and MBTA, expected to be deployed late 2011.
- 511 Traveler Information System – An existing initiative by MassDOT which can be expanded to include partnering agencies.
- Traffic Signal Preemption – Already in use by many communities for emergency vehicles.
- Planning Data Archive – A future planned initiative.

It is expected that the recently formed Regional ITS Planning and Coordinating Committee will be actively working to prioritize and explore implementation strategies for these Multi-function Program Areas.

E.1 CMMPO ITS Highway Analysis

CMMPO staff mapped and analyzed various available transportation data to determine areas that might benefit from implementation of ITS technology. In particular, the analysis focused on areas where there is a concentration of activity by emergency vehicles, freight trucking, special events, and major employment. Figure VII-29 below identifies the initial ITS "Triangle of Influence", a triangular area encompassed by Shrewsbury Street, Belmont Street and Major Taylor Boulevard, which includes three major hospitals, a central fire station, a central police station, a major freight rail yard, an event arena/convention center, major employers (including the bio-technology area), and major congested roadways.

Figure VII-30 shows the expanded area that might be considered for roadway ITS applications, including I-290, Cambridge Street, Park Ave and Highland Street to the South and the West, and Route 122 to Route 20 to the Southeast and I-290 and Route 70 to the Northeast. This potential expansion is based on the second step in the analysis process. Transportation data was overlaid on land use data, including travel time data to determine major delay, congestion data, and top crash location data (vehicle, bike, and pedestrian data) as can be seen in Figures VII-31 and VII-32.

E.2 ITS Roadway Priority Recommendations

As identified in the recently completed Worcester Regional Mobility Study, Transit Signal Priority (TSP) and Roadway Variable and Dynamic Message Signs (V/DMS) are valuable Intelligent Transportation Systems options for Central Massachusetts' urban core. Both TSP and V/DMS would help reduce vehicle emissions through more efficient bus system operations and added potential for drivers to avoid congested routes. More efficient (and potentially more expansive) bus service provides a benefit to EJ populations along routes where TSP is implemented. There are currently roadway segments in Worcester such as Park Avenue with limited to no bus service because of congestion. Businesses along these corridors could benefit from TSP implementation through added transit service.

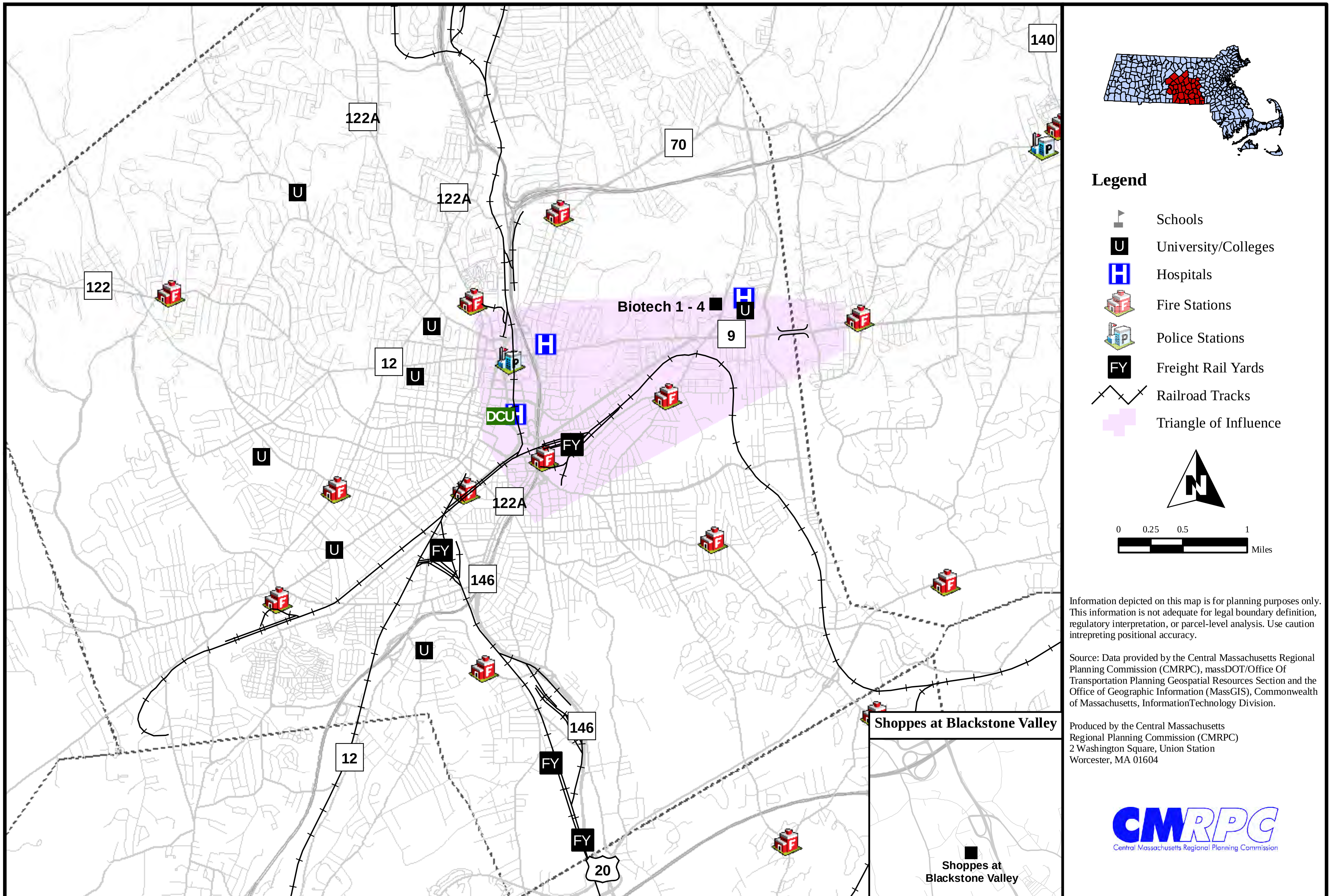


Figure VII-29 Triangle of ITS Influence

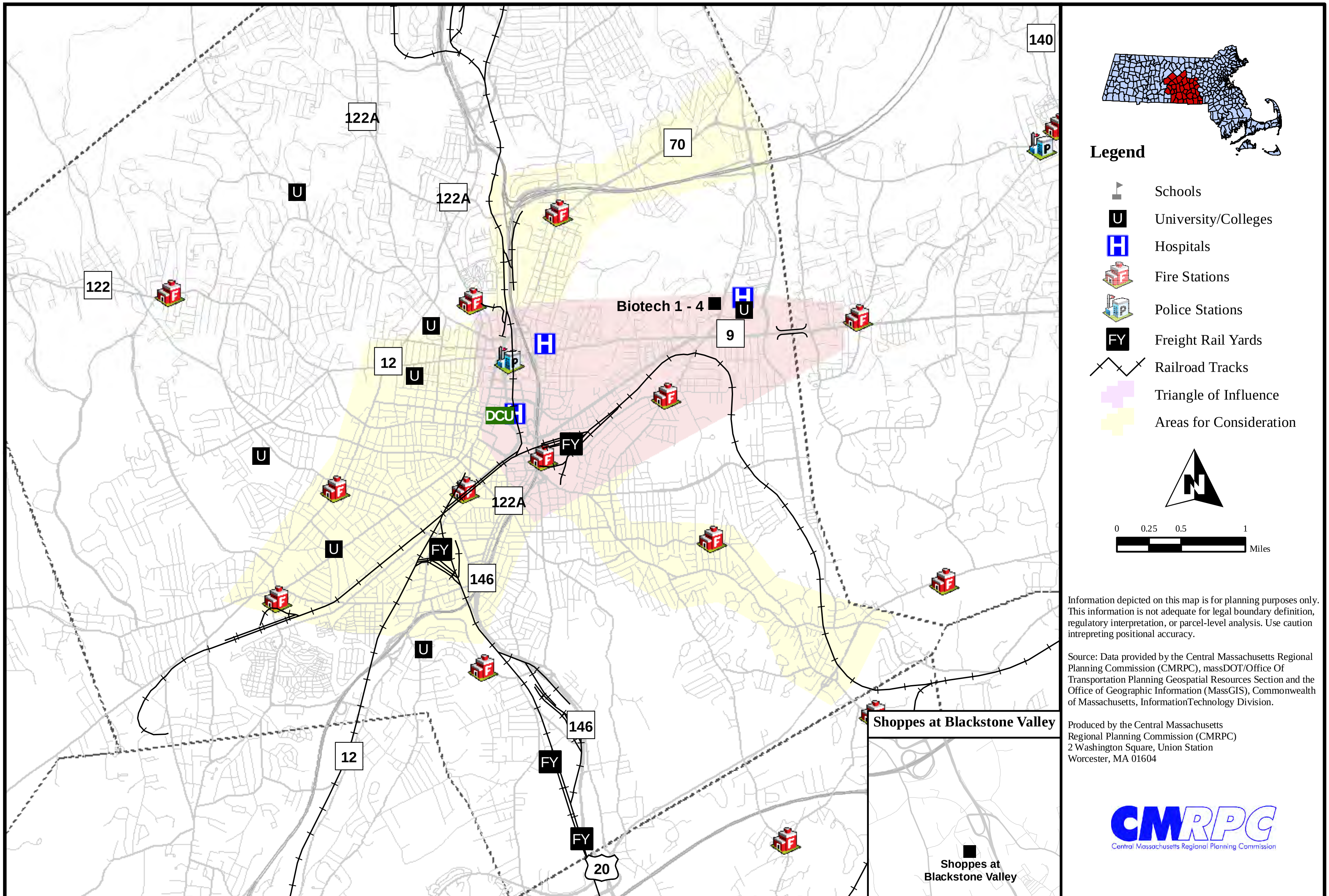


Figure VII-30 ITS Focus Area - Potential ITS Corridor

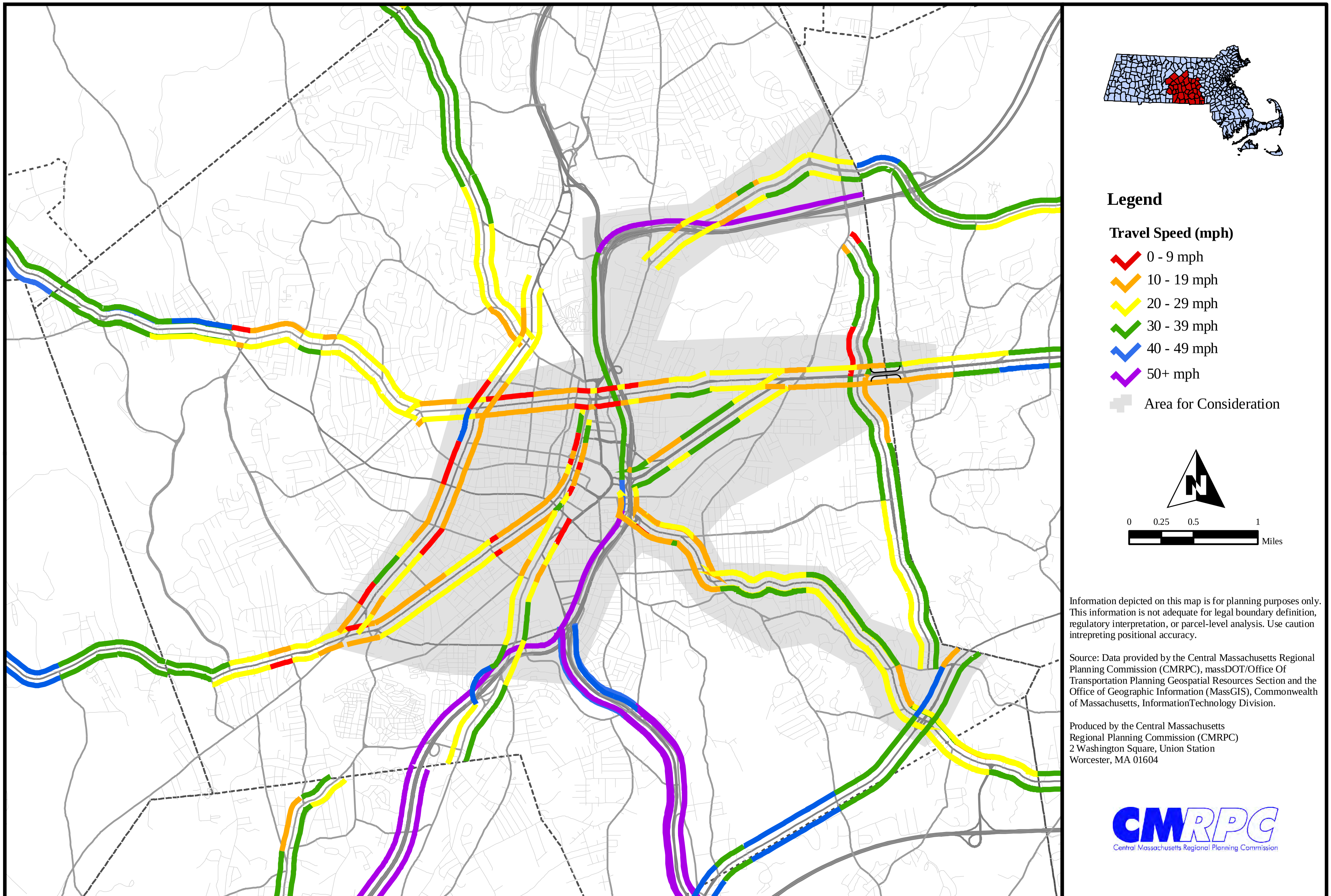


Figure VII-31 Available Travel Speed Data

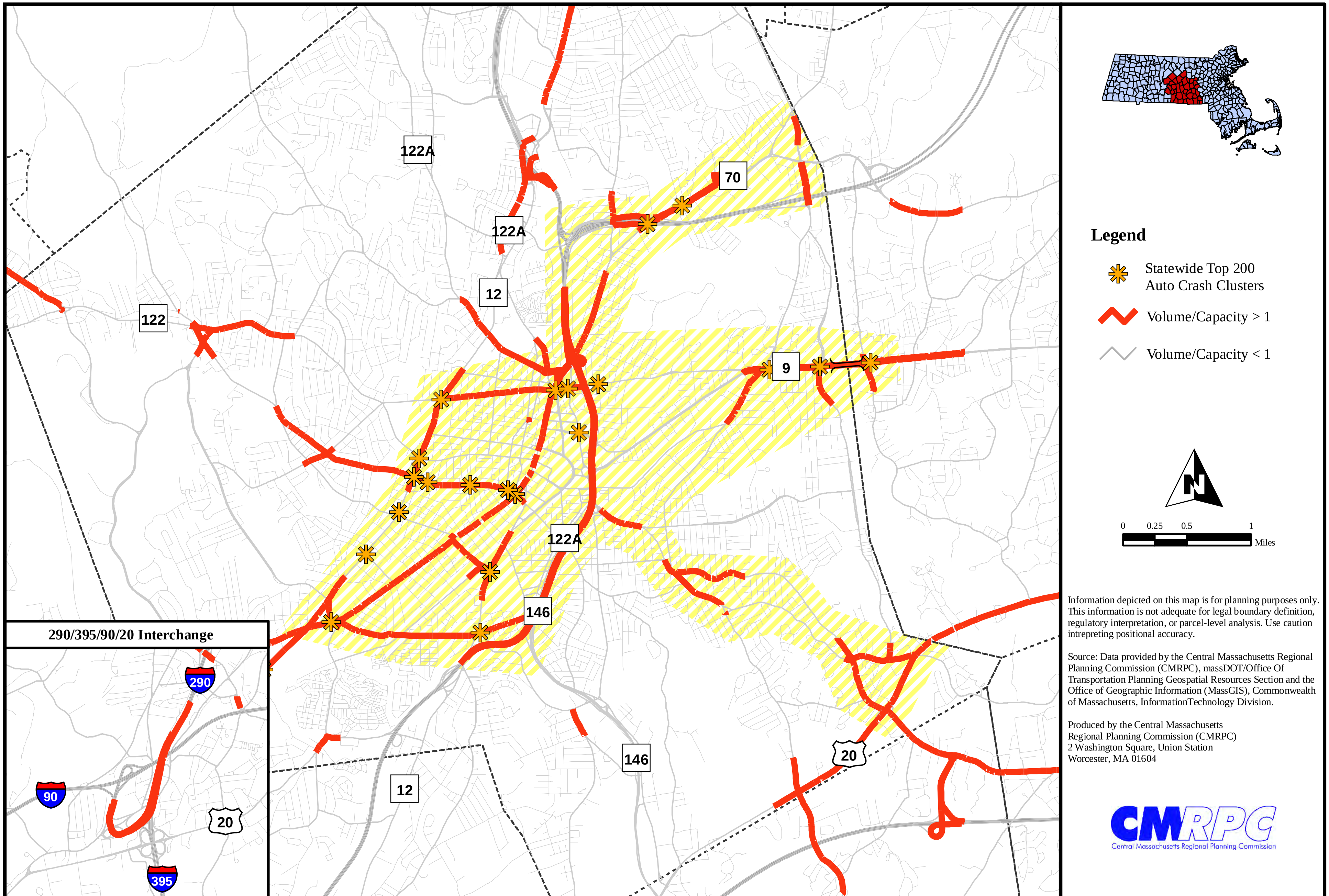


Figure VII-32 Volume to Capacity & Top Crash Cluster Locations

E.2.1 Variable Dynamic Message Signs

V/DMS are electronic traffic signs placed at strategic locations used to provide commuters with up-to-date information about special traveling circumstances, such as traffic congestion, accidents, road work, etc. By allowing drivers to divert, V/DMS can reduce the duration of congestion. Research has indicated that up to 30 percent of drivers are inclined to divert from their intended route when a V/DMS displays an incident or congestion ahead[2].

The Worcester Regional Mobility Study recommends that responsible parties identify candidate locations, communication methods, sign technology, and power options for overhead V/DMS in the short-term (0 to 5 years). Studies show that the existing V/DMS signs on I-290 are not positioned to adequately inform motorists of congestion at route decision points. An updated V/DMS system will dynamically display messages concerning delays, congested areas, and alternate route information to drivers on key roadways in the urban core with a focus on I-290. The system will be controlled by MassDOT, requiring improved coordination between Highway Operations Center and local officials, and would complement the statewide 511 system, which provides real-time traffic updates for major Massachusetts roadways, including routes and highways in Western Mass, Central Mass, and the South Coast. Current smart phone and GPS technology data sources would be used to help inform the V/DMS displays which provide drivers up-to-date information about the extent of the delay. The recommended V/DMS system needs to be partially automated, easily programmed, and low maintenance. In the mid-term (5 to 10 years), responsible parties should initiate design and construction for the V/DMS communication methods and sign structures (foundations and sign supports).

E.2.2 Transit Signal Priority Technology

TSP technology provides bus service the green light priority at signalized intersections using devices that communicate with each other. As a bus approaches an equipped signal, the green light time is extended or the red light time is reduced to minimize the time the bus is stopped at the signal. Signal priority can reduce bus travel times and open congested corridors for future transit service consideration.

Implementation of TSP in Central Massachusetts' urban core will reduce bus travel times and open congested corridors up for consideration of new bus service. Recently completed before-after evaluations of TSP systems[3] revealed a reduction of bus travel times of 6 to 13 percent. On-time arrival rates at bus stops improved by 5 percent[4].

As recommended in the Worcester Regional Mobility Study, responsible parties should consider implementing TSP technology on WRTA buses and retrofit traffic signal equipment along the following corridors in the next five years: Shrewsbury Street (Worcester), Main Street (Worcester), Route 9 (Leicester), and Route 9/Park Avenue (Worcester). Park Avenue which may have potential for high ridership has limited to no transit service due to congestion. TSP technology could be used to introduce new bus routes along this corridor. However, more detailed corridor-level transit modeling is needed on

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[2] *Investigating Limits of Benefits Provided by Variable Message Signs in Urban Network;* Transportation Research Record, A. Richards, M. McDonald; November 2007.

[3] *JTA ITS Signal Priority Program Study*; Jacksonville Transportation Authority; December 2007. *Transit Signal Priority Research Tools*; Federal Transit Administration; May 2008. ITE *Journal – Evaluation of TSP Using Observed and Simulated Data*; J. Zheng, et al; November 2009.

[4] *Transit Signal Priority Research Tools*; Federal Transit Administration; May 2008.

Park Avenue in Worcester to gauge the ridership gains from improved/new transit service along this corridor.

E.3 ITS Transit Priority Recommendations

The Regional Transportation Plan also envisions a public transportation system that uses state-of-the-art technologies to provide passengers with the latest information, improved service operations and enhanced passenger data collection to provide more reliable and predictable service. The ongoing WRTA ITS implementation addresses the needs and problems identified below and will promote the realization of the vision:

E.3.1 Technologies Related to Information Dissemination

Assuring that WRTA passengers are kept informed with the latest information and service updates is crucial to maintaining good public relations and attracting new passengers. These technologies will provide improved information dissemination to bus passengers and include the following:

- Automatic Vehicle Announcements (AVA) – AVA provides clear audio and visual messages for specific stops and locations along a bus route. These announcements can be broadcasted in multiple languages and assist passengers with hearing or visual impairments when riding the bus.
- Variable and Dynamic Message Signs (V/DMS) – The signs located at specific bus stops throughout the system provide real-time bus arrival notices to passengers waiting for a bus.
- Automatic Vehicle Locator (AVL) – The AVL system allows users with mobile device applications to see where their next bus is located on its route and when it will be arriving at their specific stop

E.3.2 Technologies Related to Improved System Operations

Passengers expect on-time service when using the WRTA. These technologies will provide for improved bus operations, on-time performance and reduction in passenger boarding times:

- Transit Signal Priority (TSP) – TSP technology, as previously noted, provides bus service green light priority at signalized intersections using devices that communicate with each other. TSP can reduce bus travel times, improve on-time performance and open congested corridors for future transit service consideration.
- Contactless Fare Collection – Contactless fare collection technology, known locally as “Charlie Card” technology, allows passengers to use pre-paid “smartcards” that can be read by a bus fare box to pay the fare, thereby reducing waiting times to board buses at stops.
- Automatic Vehicle Monitoring (AVM) – AVM measures, monitors, and reports the status of critical systems and components for every bus in the WRTA fleet, allowing the WRTA to meet increased ridership demands through greater operational efficiency.

In addition to the above, AVL technology can also improve operations performance. AVL allows dispatchers to see where buses are in relation to their schedule and dispatchers can then interact with drivers to help them maintain schedule.

E.3.3 Technologies Related to Passenger Data Collection

Obtaining data about the number of passengers on a bus is a crucial performance measure of a specific route. Obtaining this data manually is time consuming and labor intense. Using the following ITS technologies will allow the WRTA to obtain more accurate data more quickly, allowing for enhanced planning for improved bus operations:

- Automated Passenger Counting (APC) – APC technology counts the number of passengers that board or alight from a bus at a given stop along the route. APC data will allow WRTA planners and operations staff with more accurate passenger information by route over a daily, weekly, monthly and yearly period, as well as provide accurate passenger information for National Transit Database (NTD) reporting. This information, along with AVL and other operations data, will be used to determine the performance of a given route and where adjustments may need to occur.

E.3.4 Specific Locations for These Technologies

Most of the technologies outlined above will be installed on the WRTA's fleet of 47 buses by the end of 2012. These include AVA, AVL, AVM, APC and "Charlie Card" technologies. V/DMS technologies will be installed at the new Union Station "bus hub" when that project is completed and at specific location yet to be determined.

TSP has a longer planning horizon. Within the next five years, the WRTA, City of Worcester, the CMMPO and others will examine TSP implementation. A number of corridors in the region have been identified as potential candidates for TSP including:

- Shrewsbury Street (Worcester)
- Main Street (Worcester)
- Route 9/Park Avenue (Worcester)
- Route 9 (Leicester)

F. REGIONAL SECURITY PLANNING

In coordination with the Homeland Security council, in the coming years CMRPC will work with Montachusett Regional Planning Commission to develop the Worcester County Evacuation plan. Currently the scope for the first phase of the plan is being developed. The goal of phase one of the plan is to "Develop a data assessment/SWOT Analysis of existing conditions, to be used for the ultimate development of a county-wide evacuation plan".

This project will inventory and assess current data and conditions. A final report will identify data gaps and other information needs appropriate to a Phase II. Phase II is anticipated to include identification of evacuation scenarios, modeling of evacuation impacts against current conditions, and identification of recommendations for prioritization and implementation of a County-Wide Evacuation Plan. Phase III is anticipated to be development of a County-wide Evacuation Plan based on Phase II data and recommendations, as well as involvement of stakeholders. Phase III would include identification of routes, establishment of communications protocol, and implementation of publicity of such outcomes, including perhaps coded signage and development of standard messaging systems.

Phase I is primarily a data gathering experience. The project has been broken into several steps (Steps 1 through 3) as described below, and begun to articulate the data sets and considerations that lie within each task. This listing is intended to provide context and is not intended to be comprehensive.

The tasks will be conducted in a fairly linear manner. However, it is anticipated that the stakeholders identified in Task/Step 1 and a Stakeholder Group/Steering Committee may operate through this Phase I and even throughout the subsequent phases.

Step 1 – Stakeholders

- Identify key stakeholders
    - Homeland Security Council
    - American Red Cross
- Identify the role of the Stakeholder Group
- Identify key milestones for the stakeholder group

Step 2 – Inventory

- Assess Key demographics
    - Populations
        a) Identify and describe daytime and nighttime populations
        b) Population densities
        c) Special populations such as group quarters and EJ populations
    - Major employment centers
    - Hospitals
    - Natural Features such as Flood Plains and Critical Dams
- Assess Transport Systems
    - Overall Current Travel Patterns (to assess change needed in specific scenarios)
    - Private auto
        a) Roadway characteristics
        b) Congestion (Volume-to-capacity; Intersection Ratings)
        c) Bridge characteristics such as constraints and major water bodies
    - Transit (bus/rail/charter)
        a) Capacity
        b) Lines (rail has fixed routes)
        c) Private operators/charters
    - Communication Systems
        a) Inventory message boards, cameras, ITS

Step 3 - Data Analysis: Assessment of Significance for Evacuation Plan

- Shelter locations (Capacities/Vulnerabilities)
- Key travel corridors (Capacities/Vulnerabilities)

The data and analysis of all the three steps of Phase 1 mentioned above will be presented to the Homeland Security Council and the stakeholders identified as part of Step 1 of the process and working closely with the members potential evacuation scenarios would be identified and evacuations routes will be developed through travel demand modeling and GIS methods during the Phase 2 and 3 in the upcoming years.

G. PERTINENT STUDIES

Apart from the recommended federal programs and activities, various planning studies were performed in the last three years as part of the regular work program to assess various needs and provide recommendations to specific corridors in the region. Also, to address the mobility issues in the urban core of the Central Massachusetts region, an extensive study through a partnership between CMRPC, CMMPO and MassDOT called the Worcester Regional Mobility Study was performed. The following are some of the highlights and the recommendations of the studies mentioned above.

G.1 Worcester Regional Mobility Study

The Worcester Regional Mobility Study (WRMS) is a partnership between the Central Massachusetts Metropolitan Planning Organization (CMMPO), the Central Massachusetts Regional Planning Commission (CMRPC), and the Massachusetts Department of Transportation (MassDOT). It is a comprehensive state-sponsored study of the transportation network within the greater Worcester area which includes the city of Worcester and the surrounding communities. The study's goal is to improve the movement of people and goods through the urban core of Central Massachusetts through:

- Reduced congestion;
- improved safety;
- improved transportation mode choice (transit, walking, bicycling opportunities);
- solutions that are environmentally-sensitive;
- strategies that support economic development;
- an open and inclusive study process;
- development of recommendations that target demonstrated needs; and
- development of a range of project-specific recommendations for priority areas that have long-term benefits.

Through analysis of existing and future demographic, land use, environmental, socioeconomic and transportation conditions, the study identified areas of the transportation network that require improvements, either infrastructure or system management improvements. A total of 21 alternatives were developed as part of this study to enhance regional mobility, out of which 13 were proposed for further consideration/study. These improvement alternatives were grouped as follows:

Group 1 – Regional Mobility Improvements

- **Alternative 4 -** New I-90/MassPike Interchange at Route 56 that follows Stafford Street
- **Alternative 7 -** Worcester "Central Corridor"
- **Alternative 8 -** Worcester "South Corridor"
- **Alternative 9 -** Route 9 Corridor Access Management

Group 2 – Solutions to Localized Intersection/Interchange Problem Areas

- **Alternative 13 -** Webster Square Improvements
- **Alternative 14 -** I-90/MassPike Interchange 10 Improvements
- **Alternative 15 -** I-290 Improvements
- **Alternative 16 -** Synchronize Traffic Signals along Key Corridors

Group 3 – Multimodal Improvements

- **Alternative 17 –** ITS Initiatives (Roadway and Transit)
- **Alternative 18 -** Commuter Rail Enhancements/Extensions
- **Alternative 19** - On-road Bike Lanes and Regional Bicycling Connections
- **Alternative 20** - Improved Pedestrian Mobility
- **Alternative 21 -** Freight System Enhancements

These alternatives are summarized in the Table VII-10 and map (Figure VII-33) below.
The study has also developed an operations and management plan to identify the recommended next steps for each of the varying types of improvements. The recommended list of projects was divided into two categories: transportation systems management and operations (TSM&O) and major infrastructure projects (MIP) (see "Comment" column in Table VII-10). TSM&O projects allow transportation agencies and municipalities to enhance the safety, reliability and operations of transportation systems in the *near term* without incurring the high cost associated with major infrastructure projects. Alternatives classified as major infrastructure projects will require significant more time and resources to proceed from inception to implementation. To varying degrees, each will need to progress through the environmental review process, as established by Federal and State agencies.

It is acknowledged that the recommendations presented herein represent a significant (greater than $100 million) investment in potential transportation-related infrastructure. These projects represent an investment in total that currently far exceeds available funding as presently programmed. The advancement of the recommendations developed as part of this study will require prioritization by regional planning organizations in order to address current fiscal constraints as related to transportation improvements.

Table VII-10 Summary of WRMS Recommendations

Short-term (0 to 5 years)	Mid-term (5 to 10 years)	Long-term (over 10 years)	Cost (2010)*	Comment
		Alternative 4 New I-90/ MassPike Interchange at Route 56 that follows Stafford Street	$60-75M	**MIP** -** Under a phased approach, Alternative 4 would be preceded by a series of short and mid-term alternatives while additional environmental review and community vetting occurs to determine the viability and need for this project given the significant investment that would be required
	Alternative 7 Worcester "Central Corridor"		$12-15M	**MIP -** Alternative 7 compliments Alternatives 16, 20, and 21
	Alternative 8 Worcester "South Corridor" Excluding the I-290/Hope Avenue Interchange	**Alternative 8** Worcester "South Corridor" I-290/Hope Avenue Interchange	$10-12M	**MIP -** Alternative 8 compliments Alternative 13; Engineering design is needed for the reconfigured I-290/Hope Avenue interchange and corridor upgrades to Hope Avenue and Webster Street
Alternative 9 Route 9 Corridor Access Management	**Alternative 9** Route 9 Corridor Access Management		$1-2M	**TSM&O*** -** Alternative 9 compliments Alternative 16 where traffic signals on Route 9 would be upgraded and synchronized.
	Alternative 13 Webster Square Improvements		$1.5-3M	**MIP -** Alternative 13 compliments Alternative 8; Engineering design and refinement of Alternative 13 is needed to account for the reconfigured I-290/Hope Avenue interchange recommended under Alternative 8
Alternative 14 I-90/MassPike Interchange 10 Improvements			$1M	**MIP -** Options considered to improve Interstate-to- Interstate connections and I-290 U-turns all involved additional elevated structures and were therefore not carried forward
Alternative 15 I-290 Traffic Flow/Safety Improvements			N/A	**MIP** -** During the fall of 2010, MassDOT implemented the restriping recommended under Option 15-3b; Mainline widening and ramp elimination is not recommended

*Construction cost estimates based on 2010 pricing **MIP - Major Infrastructure Project
***TSM&O - Transportation Systems Management and Operations Project

Table VII-10 (cont.) Summary of WRMS Recommendations

Short-term (0 to 5 years)	Mid-term (5 to 10 years)	Long-term (over 10 years)	Cost (2010)*	Comment
Alternative 16 Synchronize Traffic Signals along Key Corridors			Varies by corridor ~ $30-50k per signal	**TSM&O*** -** Identify priority corridors and then inventory signal equipment (controllers and signal heads/mast arms) to develop synchronized timing/phasing plans (refinements to the corridors and limits are expected)
Alternative 17 ITS Initiatives (Roadway and transit)	**Alternative 17** ITS Initiatives (Roadway and transit)		Varies	**TSM&O -** Early action items can be initiated in the short-term, including the TSP implementation and the planning phase of the ITS elements, with construction of the VMSs following in the mid- term; Detailed transit modeling is recommended in the near-term on Park Ave in Worcester to gauge the ridership gains from improved/new transit service
		Alternative 18 Commuter Rail Enhancements/ Extensions	Further study needed	**MIP -** Additional trains between Worcester and Boston are expected to occur with the planned expansion of the CSX intermodal facility on Franklin Street; the feasibility of extending the existing commuter rail service further west should be revisited over the long-term as the region grows
Alternative 19 On-road Bike Lanes and Regional Bicycling Connections	**Alternative 19** On-road Bike Lanes and Regional Bicycling Connections		Individual projects vary Blackstone Bike Path Segment 7 $1.2 – 1.5M	**TSM&O -** The development of a comprehensive bike plan for each College/University in the Study Area and an updated City-wide bicycle plan for the City of Worcester could be initiated in the short-term; prioritize high crash areas
Alternative 20 Improved Pedestrian Mobility			Individual projects vary	**TSM&O -** Many of the priority areas could be addressed with low-cost improvements; others may require a longer-term approach
Alternative 21 Freight System Enhancements (Truck signage plan to complement CSX plans)	**Alternative 21** Freight System Enhancements (Kelley Square Bypass/Tandem- truck lot expansion)		Further study needed	**MIP -** Includes truck signage plan, Kelley Square bypass, and I-90/MassPike Interchange 11 Tandem-truck Lot Expansion

*Construction cost estimates based on 2010 pricing **MIP - Major Infrastructure Project ***TSM&O - Transportation Systems Management and Operations Project

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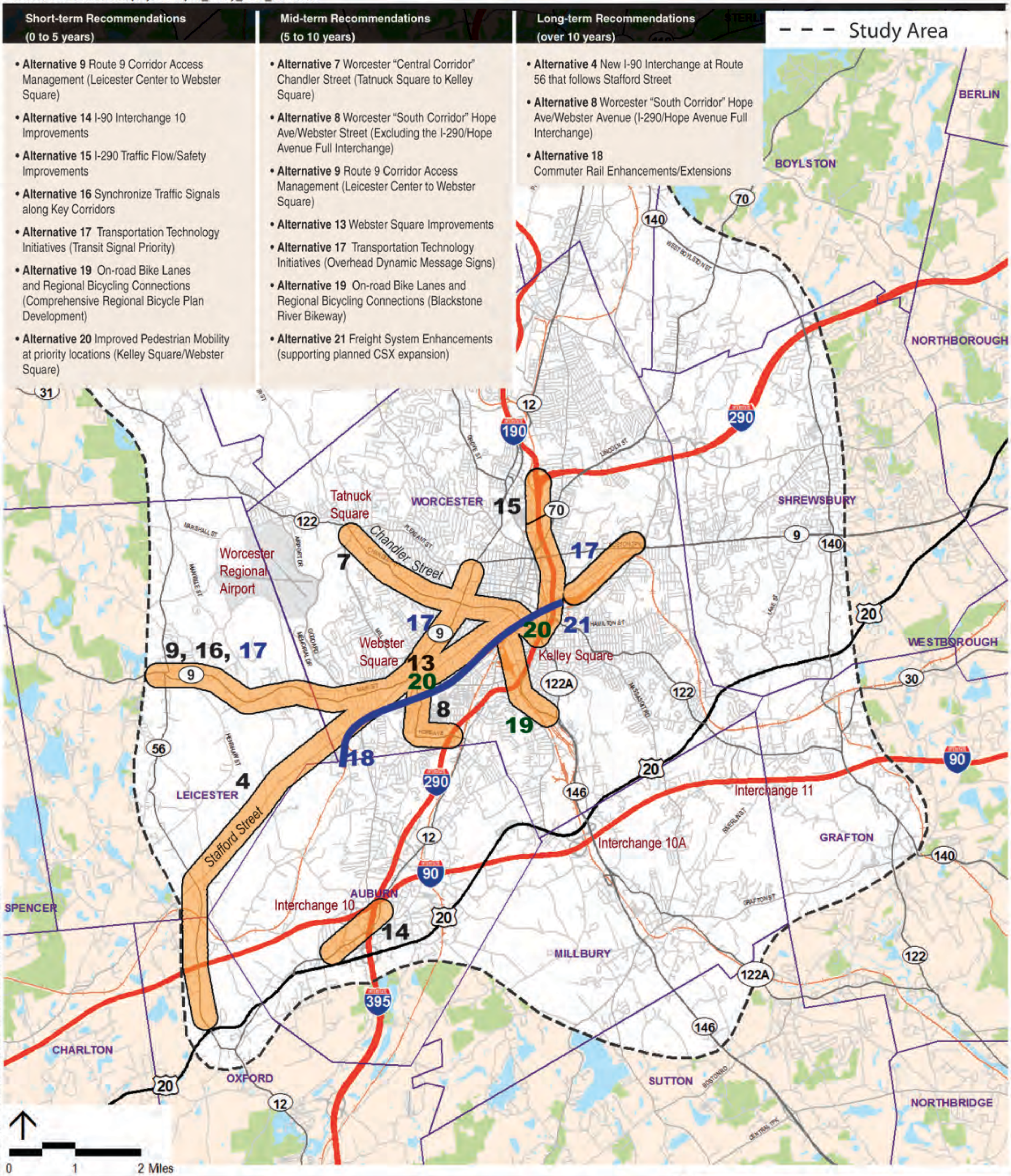

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Figure VII-33

Study Recommendations

Source:
Office of Geographic and Environmental Information (MassGIS),
Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs

G.2 Corridor Profile - Transportation Management System

A *Corridor Profile* correlates the information generated by the transportation Management Systems along a particular highway corridor and analyzes performance-based data, suggests both operational and physical improvements, and may identify candidate projects for further study. Utilizing the range of data and analyses produced by the various transportation Management Systems maintained in an ongoing manner by the CMRPC staff and overseen by the CMMPO, Corridor Profile efforts allow for the comprehensive integration and consideration of a wide range of transportation planning factors along CMMPO selected segments of the region's federal-aid highway system. Ultimately, a number of suggested improvement options are compiled for the consideration of the host communities and MassDOT-Highway Division. When consensus is reached, proposed improvement projects have the potential to be selected by the CMMPO for programming in the annual Transportation Improvement Program (TIP) document.

Corridor Profile efforts include the analysis of a range of Management System data, including the following:

Traffic Counting: Daily Automatic Traffic Recorder (ATR) counts on roadway segments and MassDOT Permanent Count Station data and associated historical growth rates calculated in-house using the regional travel demand model

Congestion Management Process (CMP): Historical and current Travel Time & Delay studies; historical and current peak-hour Turning Movement Counts (TMCs) at focus intersections and associated Level of Service (LOS) analyses

Transportation Safety Planning Program: In-depth vehicle crash research in cooperation with local Police Departments utilizing a three-year history of reported crashes and subsequent analysis, including the compilation of collision diagrams and the calculation of crash rates

Freight Planning: Daily percentage of heavy vehicles utilizing the studied roadway segments and peak hour percentage of heavy vehicles utilizing focus intersections

Pavement Management System (PMS): Observation of pavement surface distress and extent in the field along with subsequent analysis and calculated Overall Condition Index (OCI) rating

Bridge Management System (BMS): Bridge condition data available through MassDOT, a GIS-based inventory of roadway drainage culverts as well as local observations in the field

Environmental Consultation: Recently added as another Corridor Profile component, the compilation of "Environmental Profile" maps using data provided by the Massachusetts Department of Conservation & Recreation (DCR), the Massachusetts Department of Environmental Protection (DEP) and the National Heritage & Endangered Species Program (NHESP) has proven useful in the identification of a range of environmental constraints and challenges. Focusing ½ mile on each side of the roadway corridor, the Environmental Profile maps allow major natural features to be viewed as systems, not simply as features adjacent to the roadway

Alternative Mode Analysis: A review of existing transit, bicycle and pedestrian conditions is provided, as well as an assessment of the potential to improve availability of alternative modes.

Depending on local sentiment and available funding, the technical work necessary to compile a Corridor Profile is supplemented by a proactive public outreach effort. This can range from basic meetings with local officials to the formation of a Task Force to guide the study and gauge the sentiment of the host community in a range of venues. All proceedings are documented in order to guide potential future design efforts.

The first *Corridor Profile* was prepared as part of the CMMPO's Transportation Management Systems program during the 2005 Program Year. Corridor Profile efforts completed to date are summarized in Table VII-11 and are also presented on a color coded map shown in Figure VII-34. As can be seen, Corridor Profile work has been completed in each of the CMRPC defined planning subregions. It should also be pointed out that work on the Route 122 Scenic Byway study was conducted with the Montachusett Regional Planning Commission (MRPC) and Franklin Regional Council of Governments (FRCOG). Similarly, the Route 140 Corridor Profile was managed cooperatively with the MRPC transportation staff. The Routes 12/16/197 Corridor Profile was also presented to the Northeastern Connecticut Council of Governments (NECCOG) for there use and reference.

Table VII-11
Integration of the Management Systems:
Recent "Corridor Profile" Studies

Route 9 East Corridor Profile: Shrewsbury-Northborough-Westborough (2005)

Route 20 West Corridor Profile: Auburn-Oxford (2006)

Route 9 West Corridor Profile: Worcester-Leicester-Spencer (2007)

Routes 12/16/197 Corridor Profile: Douglas-Webster-Dudley & Thompson, CT (2008)

Route 122 Scenic Byway Corridor Management Plan: Paxton to Petersham (2009), transportation sectional materials, *conducted with Montachusett Regional Planning Commission (MRPC) and Franklin Regional Council of Governments (FRCOG)*

Route 140 Corridor Profile: Princeton-Sterling-Westminster (2009-2010), *conducted with MRPC*

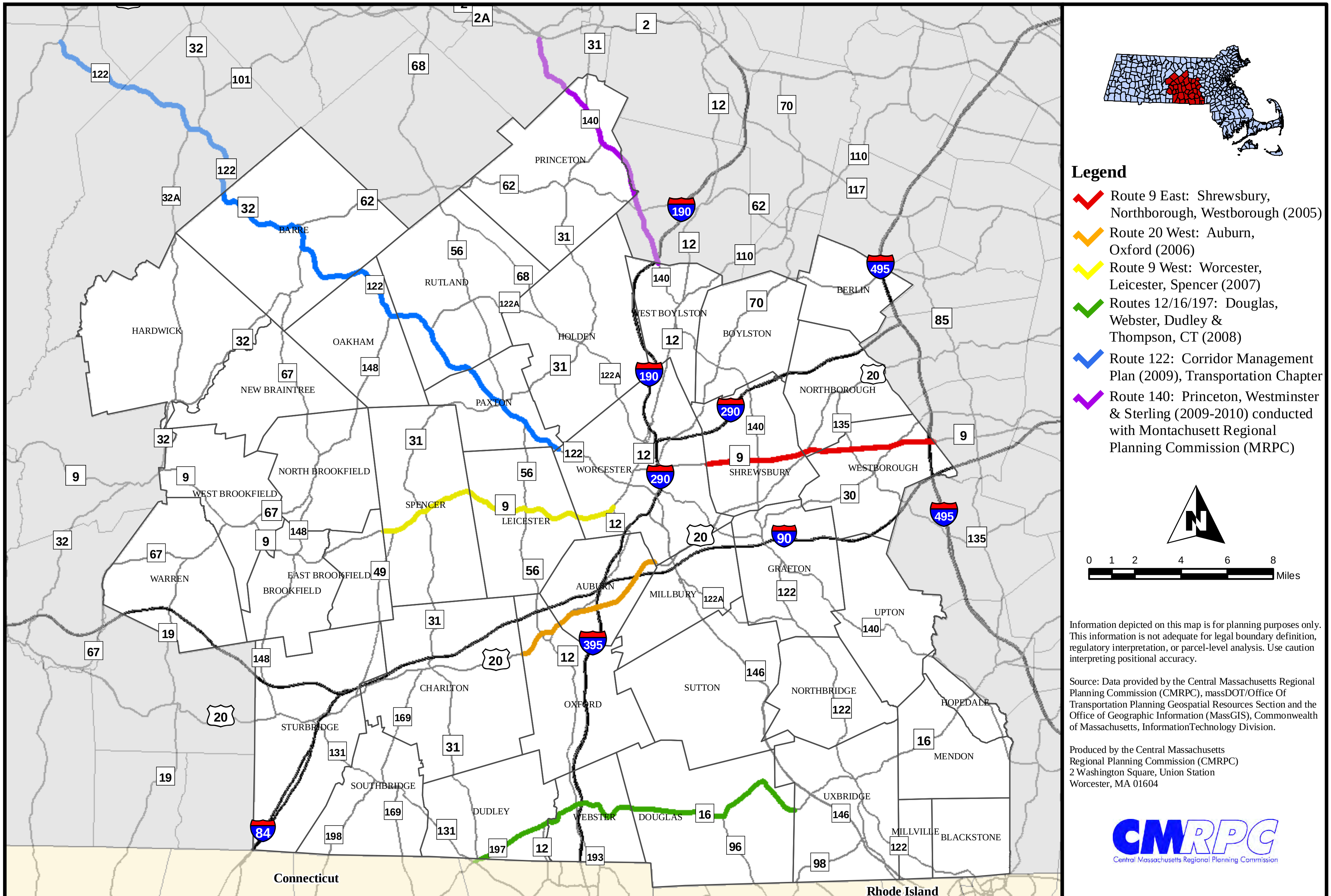

Figure VII-34 Recent Corridor Profile Studies

G.3 Access Management

In an effort to integrate transportation and landuse, access management plans were developed in three different corridors as discussed previously. Evaluation of the ability to safely access the existing or proposed land uses from the roadway and/or from adjacent parcels was done. The site design standards currently in place and their ability to provide for efficient vehicle, transit, bicycle, and pedestrian movement were reviewed. Guidelines and recommended standards are being developed to help ensure that communities and other regulating authorities consider both internal and external vehicle, transit, bicycle, and pedestrian access in the planning, design, permitting, and project approval stages. Some of the highlights and recommendations of the access management plans are listed below:

Highlights of previous work

- Access Consolidation and Elimination
  - Conducted site visits of the study corridor (Route 122A) in the town of Holden and selected parcels that had a potential to implement access consolidation and/or elimination. Discussed the observations and feasibility of each case with town officials and made mid-term improvement recommendations.

- Frontage Road
  - Identified the constraints for a potential frontage road in the eastbound commercial area on Route 9 in the town of Westborough and recommended an alternative frontage road.
  - Analyzed a potential frontage road on the westbound side of Route 9 between Route 135 and Lyman Street in the town of Westborough. During the study, CMRPC staff made recommendation of using Oak Street as a possible frontage road for Route 9.

- Land Development and Access Management
  - Studied existing and future land use pattern of study corridors and provided some sample policies that can be adapted to town zoning bylaw, subdivision regulations, site plan approval and development review.

- Interchange Area
  - Indentified access issues near the Route 9/Route 30 interchange area in the town of Westborough and provided both regulatory and non-regulatory methods that can be used to achieve access management objectives for interchange areas.

- Other Access Management Techniques
  - Median treatments, including two-way left-turn lanes and raised medians.
  - Access spacing, including spacing between signalized intersections and distance between driveways.
  - Driveway design elements (width & radii) based on driveway classifications.
  - Driveway throat lengths based on land use.
  - Transit and Bicycle/Pedestrian accommodations.

H. NEXT STEPS

H.1 Recommended Major Infrastructure Projects

As indicated earlier in the Regional Transportation Plan, priority areas were developed in cooperation with various decision makers and the stakeholders to address the Federal and State emphasis areas and locally based transportation issues. Suggested major infrastructure projects derived through the public process were evaluated using a evaluation matrix shown in Table VII-12. The priority areas of the matrix are listed below along with the questions each attempts to answer:

- ***Maintenance:*** Does the project aid in the preservation of existing systems (highway/transit/railroads)?
- ***Equity:*** Does the project distribute funds across various modes, communities and populations?
- ***Security:*** Does the project help to make the transportation system more secure? Is the project a vital link for evacuation in the event of an emergency?
- ***Congestion:*** Does the project alleviate congestion and delays?
- ***Safety:*** Does the project make the multi-modal system, safer for passengers?
- ***Access & Connectivity:*** Does the project fill a notable the gap in the transportation network or missing connection across various modes?
- ***Livability:*** Does the project provide access to multi-modal uses and promote sustainability through the coordination of economic development, housing, environment, and health?
- ***Climate Change:*** Does the project reduce green house gas (GHG) emissions or relate to facilities that would be affected by global climate change?
- ***Planning:*** Does the project involve public participation and foster sub-regional dialogue?
- ***Technology:*** Does the project involve use of technology to improve safety and efficiency of the transportation network?

As shown in the matrix all projects selected for inclusion by the CMMPO on the recommended major infrastructure projects listing rate favorably under the established priority criterion. The *WRTA – Transit Hub and the Commuter Rail Expansion* projects have an overall positive impact on all or most of the established criterion. On the other hand, widening of existing facilities such as *Route 20 widening* have a negative impact on air quality.

Table VII-12
Priority Areas Evaluation Matrix

Recommended Major Infrastructure Projects / Priority Areas	Maintenance	Equity	Security	Congestion	Safety	Access & Connectivity	Livability	Climate Change	Planning	Technology
Worcester - Route 20 Widening to 4 lanes	☑	⊖	⊖	☑☑	☑☑	☑☑	☑☑	☒	⊖	☑
Sutton - Route 146/Boston Rd Intersection improvements	⊖	⊖	⊖	☑☑	☑☑	⊖	☑	☑	⊖	⊖
Charlton, Oxford - Route 20 Widening to four lanes	☑☑	⊖	⊖	☑	☑	☑☑	⊖	☒	⊖	⊖
I495/Turnpike and I-495/Route 9 Intechange improvements	☑	☑	⊖	☑☑	☑☑	☑☑	☑☑	☑☑	☑☑	☑
Worcester - East/West Central Corridor. Rte 122/122A Madison/Chandler Street Intersection improvements	⊖	☑☑	⊖	☑	☑☑	☑☑	☑☑	☑	☑	☑
Worcester - East/West South Corridor. Full interchange at Hope Ave and related roadway improvements	⊖	☑☑	⊖	☑☑	☑☑	☑☑	☑☑	☑	☑	☑
Sutton - Route 146/Boston Rd New Interchange	⊖	⊖	☑☑	☑☑	☑☑	☑☑	⊖	☑	⊖	⊖
WRTA - Transit Hub	⊖	☑☑	☑☑	☑	☑☑	☑☑	☑☑	☑☑	☑☑	☑☑
WRTA - New Management & Operations Facility	☑☑	⊖	☑	⊖	☑	☑	☑	☑	☑☑	☑☑
Boston/Worcester Communter Rail Expansion	☑☑	☑☑	☑	☑☑	☑	☑☑	☑☑	☑☑	☑☑	☑

Key

- ⊖ Neutral Impact
- ☑☑ Very Positive Impact
- ☑ Positive Impact
- ☒ Negative Impact

H.2 Future Studies

Supplementing the major infrastructure needs previously described, a listing of potential planning studies and projects that the CMMPO anticipates to study/implement during the upcoming years. Capacity additions will be difficult to fund, and thus there is a need to reduce demand through implementation of new Transportation System Demand Management strategies.

Low cost strategies that reduce the need for larger capital projects will become more important. Such low cost strategies might be identified through Safety Audits, planning studies, or through greater use of technology. The CMMPO supports the use of target funding to perform engineering analyses that can lead to low cost strategy implementation, such as traffic synchronization analyses to mitigate congestion. Identification of a wide-range of implementation strategies for low cost improvements will be a major focus in the coming years.

In order to address some of the issues described above and to work on the new thrusts from Federal Highway Administration and MassDOT, the following studies/projects will be performed in the upcoming years.

- ***Park and Ride Study:*** Investigate the potential for park and ride lots at strategic locations in the region, serving to reduce Single Occupancy Vehicle (SOV) trips.

- ***Trucking (Freight) Analysis:*** Analysis of preferred highway trucking routes and intermodal connectivity.

- ***Worcester Regional Mobility Study:*** Implementation or further study of the Worcester Regional Mobility Study recommendations as appropriate.

- ***Livability/Sustainability/Climate Change/Greenhouse Gas Reduction strategies:*** Multi-faceted approach.

- ***Previous Annual Work Program Studies:*** Catalogue past recommended improvements for low cost options and facilitate implementation of recommendations.

- ***MassCentral Railroad Capital Improvement:*** **As deemed necessary, i**nvestigate the possibility of funding MassCentral Railroad track rehabilitation between Palmer and South Barre to keep the line serviceable (track also located in Pioneer Valley Metropolitan Planning Organization).

- ***ITS Technology Studies/Implementation:*** Work with regional ITS coordinating committee to effect implementation of regional ITS priorities, including I-290 congestion monitoring.

- ***Bicycle/Pedestrian Plan:*** Implementation of recommendations.

- ***Transit:*** Continue to investigate the ability to serve new employment markets and develop creative ways to serve lower density areas.

- ***Low cost Strategic Improvements:*** Identification of a wide-range of implementation strategies for low cost improvements (signal synchronization, signage plans, Roadway Safety Audits recommendations).

AIR QUALITY CONFORMITY

VIII

VIII. AIR QUALITY CONFORMITY

A. INTRODUCTION

The 1990 Clean Air Act Amendments (CAAA) require Metropolitan Planning Organizations within ozone nonattainment areas to perform air quality conformity determinations prior to the approval of Regional Transportation Plans (RTPs) and Transportation Improvement Programs (TIPs). Conformity is a way to ensure that federal funding and approval goes to those transportation activities that are consistent with air quality goals. This section presents information and analyses for the air quality conformity determination for the 2012 Regional Transportation Plan of the Central Massachusetts MPO, as required by Federal Regulations 40 CFR Parts 51 and 93, and the Massachusetts Conformity Regulations (310 CMR 60.03). This information and analyses include: regulatory framework, conformity requirements, planning assumptions, emissions budgets, and conformity consultation procedures.

B. BACKGROUND

The Commonwealth of Massachusetts is classified as serious nonattainment for ozone, and is divided into two nonattainment areas. The Eastern Massachusetts ozone nonattainment area includes Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Suffolk, and Worcester counties. Berkshire, Franklin, Hampden, and Hampshire counties comprise the Western Massachusetts ozone nonattainment area. With these classifications, the 1990 Clean Air Act Amendments (CAAA) required the Commonwealth to reduce its emissions of volatile organic compounds (VOCs) and nitrogen oxides (NOx), the two major precursors to ozone formation to achieve attainment of the ozone standard.

In April 2002, the cities of Lowell, Waltham, Worcester and Springfield were re-designated to attainment for carbon monoxide with EPA-approved limited maintenance plans. In April 1996, the communities of Boston, Cambridge, Chelsea, Everett, Malden, Medford, Quincy, Revere, and Somerville were classified as attainment for carbon monoxide (CO). Air quality conformity analysis must still be completed in these communities, as they have a carbon monoxide maintenance plan approved into the state implementation plan (SIP). The year 2010 carbon monoxide motor vehicle emission budget established for the Boston CO attainment area with a maintenance plan is 228.33 tons of carbon monoxide per winter day.

A prior conformity determination for all RTPs occurred in 2007, when the Federal Highway Administration (FHWA) – in consultation with the Environmental Protection Agency (EPA New England) and the Massachusetts Department of Environmental Protection (DEP) – confirmed that all 13 of the RTPs for the year 2007 in Massachusetts were in conformity with the Massachusetts State Implementation Plan (SIP). A summary of major conformity milestones in recent years is as follows:

Between 2003 and 2006, several new conformity determinations were made that were triggered by various events, including: The 2003 regional transportation plans, a change in designation from the one-hour ozone standard to an eight-hour ozone standard, and various changes to regional TIPs that involved reprogramming transportation projects across analysis years.
In 2007, air quality analyses were conducted on behalf of all the 2007 Regional Transportation Plans

(RTPs), the purposes of which were to evaluate the RTPs' air quality impacts on the SIP. Conformity determinations were performed to ensure that all regionally significant projects were included in the RTPs. The Massachusetts Department of Transportation found the emission levels from the 2007 Regional Transportation Plans to be in conformance with the SIP.

On April 2, 2008, EPA found that the 2008 and 2009 motor vehicle emissions budgets (MVEBs) in the January 31, 2008 Massachusetts 8-hour ozone State Implementation Plan revision were adequate for transportation conformity purposes. The submittal included 2008 and 2009 MVEBs for the Boston-Lawrence-Worcester (Eastern Massachusetts) and Springfield (Western Massachusetts) 8-hour ozone nonattainment areas. Massachusetts submitted these budgets as part of the 8-hour ozone attainment demonstration and reasonable further progress plan for both nonattainment areas, and as a result of EPA's adequacy finding, these budgets were required to be used for conformity determinations. EPA later determined (in 2010) that only the most recent MVEBs - 2009 - be used for future conformity determinations.

In 2010, air quality analyses were conducted on behalf of all the 2011-2014 Regional Transportation Improvement Programs (TIPs), the purposes of which were to evaluate the TIPs' air quality impacts on the SIP. Conformity determinations were performed to ensure that all regionally significant projects were included in the TIPs. The Massachusetts Department of Transportation found the emission levels from the 2011-2014 TIPs to be in conformance with the SIP. On November 15, 2010, EPA confirmed that both the Eastern and Western Massachusetts Non-Attainment areas collectively demonstrated transportation conformity, with concurrence from Massachusetts DEP on 11/23/10. On December 22, 2010, FHWA and FTA determined that the TIPs were in conformity with the Clean Air Act and the EPA conformity regulations (40 CFR Part 51).

C. CONFORMITY REGULATIONS

The CAAA revised the requirements for designated MPOs to perform conformity determinations by ozone non-attainment area for their RTPs and TIPs. Section 176 of the CAAA defines conformity to a State Implementation Plan to mean conformity to the plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of the standards. The Central Massachusetts MPO must certify that all activities outlined in the 2012 Central Massachusetts Regional Transportation Plan:

- *will not cause or contribute to any new violation of any standard in any area*
- *will not increase the frequency or severity of any existing violation of any standard in any area*
- *will not delay the timely attainment of any standard or any required interim emission reductions or other milestones in any area*

The federal conformity regulations from EPA set forth requirements for determining conformity of Transportation Plans, Transportation Improvement Programs, and individual projects. The requirements of the conformity analysis are summarized below and will be explained in detail in this conformity determination:

- ♦ Conformity Criteria
    - *Horizon Years*

- *Latest planning assumptions*
- *Latest emission model used*
- *Timely implementation of transportation control measures (TCMs)*
- *Conformity in accordance with the consultation procedures and SIP revisions*
- *Public Participation Procedures*
- *Financially Constrained Document*

♦ Procedures for Determining Regional Transportation Emissions

♦ The Conformity Test

- *Consistent with emission budgets set forth in SIP*
- *Contribute to reductions in CO nonattainment areas*

In addition, the regulations set specific requirements for different time periods depending on the timeframe of the Commonwealth's SIP submittals to EPA. These periods are defined as follows:

> ***Control Strategy Period:*** Once a control strategy SIP has been submitted to EPA, EPA has to make a positive adequacy determination of the mobile source emission budget before such budget can be used for conformity purposes. The conformity test in this period is consistency with the mobile source emission budget.
>
> ***Maintenance Period*** is the period of time beginning when the Commonwealth submits and EPA approves a request for redesignation to an attainment area, and lasting for 20 years. The conformity test in this period is consistency with the mobile source emission budget.

C.1 Horizon Year Requirements

Horizon years for regional and state model analyses have been established following 40 CFR 93.106(a) of the Federal Conformity Regulations. The years for which the regional and state transportation models were run for ozone precursor emission estimates are shown below:

- 2010: Milestone Year – This year is now being used by the statewide travel demand model as the new base year for calculation of emission reductions of VOCs and NOx.

- 2016: Milestone Year and Analysis Year: This year is used to show conformity with the existing emission budgets for ozone precursors in Western Massachusetts.

- 2020: Analysis Year

- 2025: Analysis Year

- 2035: Horizon Year – last forecast year of the regional transportation plan

C.2 Latest Planning Assumptions

C.2.1 Population, Employment and Traffic Assumptions

Section 93.110 of the Federal Conformity Regulations outlines the requirements for the most recent planning assumptions that must be in place at the time of the conformity determination. Assumptions must be derived from the estimates of current and future population, households, employment, travel, and congestion most recently developed by the MPO. For the 2012 Central Massachusetts Regional Transportation Plan and other regional plans, the MassDOT developed a series of forecasts – in cooperation with all the MPOs – that represent the most recent planning assumptions for all of Massachusetts.

In spring of 2010, MassDOT-Planning released draft future demographic control totals for all of the State's subregions. The Central Massachusetts region's population and employment totals as released were in keeping with the demographic trends the region was experiencing in the past decade. In December 2010, MassDOT released the final regional control totals for population, households and employment for the key future years. Municipal household and population data for the years 2000 and 2010 were taken from the US Census Bureau. Employment data for the years 2000 through 2009 were derived based on tabulations done by the Massachusetts Executive Office of Labor and Workforce Development. CMRPC staff then distributed the control totals for the future years mentioned above to the town level based upon past growth trends, land use and infrastructure capacity, planned future projects, and stakeholder input, including that of the CMMPO and CMMPO Advisory Committee.

C.2.2 Transit Operating Policy Assumptions

For the Central Massachusetts MPO, the operating policies and assumed transit ridership have not changed since the conformity determination prepared for the 2007 Transportation Plan.

C.3 Latest Emissions Model

Emission factors used for calculating emission changes were determined using MOBILE 6, the model used by DEP in determining motor vehicle emission budgets. Emission factors for motor vehicles are specific to each model year, pollutant type, temperature, and travel speed. MOBILE 6 requires a wide range of input parameters including inspection and maintenance program information and other data such as anti-tampering rates, hot/cold start mix, emission failure rates, vehicle fleet mix, fleet age distribution, etc. The input variables used in this conformity determination were received from DEP and approved by EPA.

C.4 Timely Implementation of Transportation Control Measures

Transportation Control Measures (TCMs) have been required in the SIP in revisions submitted to EPA in 1979 and 1982. All SIP TCMs have been accomplished through construction or implementation of ongoing programs.

DEP submitted to EPA its strategy of programs to show Reasonable Further Progress of a 15% reduction of VOCs in 1996 and the further 9% reduction of NOx toward attainment of the National Ambient Air Quality Standards (NAAQS) for ozone in 1999. Within that strategy there are no specific TCM projects. The strategy does call for traffic flow improvements to reduce congestion and, therefore, improve air quality. Other transportation-related projects that have been included in the SIP control strategy are listed below:

- *Enhanced Inspection and Maintenance Program*
- *California Low Emission Vehicle Program*
- *Reformulated Gasoline for On- and Off-Road Vehicles*
- *Stage II Vapor Recovery at Gasoline Refueling Stations*
- *Tier I Federal Vehicle Standards*

C.5 Consultation Procedures

The final conformity regulations require that the MPO make a conformity determination according to consultation procedures set out in the federal and state regulations, and the MPO must also follow public involvement procedures established under federal metropolitan transportation planning regulations. The consultation requirements of both the state and federal regulations require that the (Region) MPO (and all other MPOs), MassDOT, Mass. DEP, US EPA - Region 1 and FHWA – Massachusetts Division, consult on the following issues:

- *Selection of regional emissions analysis models including model development and assessment of project design factors for modeling*
- *Selection of inputs to the most recent EPA-approved emissions factor model*
- *Selection of CO hotspot modeling procedures, as necessary*
- *Identification of regionally significant projects to be included in the regional emissions analysis*
- *Identification of projects which have changed in design and scope*
- *Identification of exempt projects*
- *Identification of exempt projects that should be treated as non-exempt because of adverse air quality impacts*
- *Identification of the latest planning assumptions and determination of consistency with SIP assumptions*

These issues have all been addressed through consultation among the agencies listed above.

C.6 Public Participation Procedures

Title 23 CFR Section 450.322 and 310 CMR 60.03(6)(h) require that the development of the Regional Transportation Plan, TIP, and related certification documents provide an adequate opportunity for public review and comment. Section 450.316(b) also establishes the outline for MPO public participation programs. The Central Massachusetts MPO's public participation program was formally adopted in January 1995, is reviewed annually and has been periodically revised as needed. The latest revision is in process and is due to be approved in August of 2011. The development and adoption of this program conforms to the requirements of the sections cited above. It guarantees public access to the RTP and all supporting documentation, provides for public notification of the availability of the RTP and the public's right to review the document and comment thereon, and provides a 30-day public review and comment period prior to the adoption of the RTP and related certification documents by the

MPO.

In July of 2011 a legal notice was placed in the Worcester *Telegram & Gazette* informing the public of its right to comment on this document. During the 30-day public comment period, any comments received were incorporated into this Plan. This allowed ample opportunity for public comment and MPO review of the draft document. In addition, an Open Public Meeting on the Draft Plan was scheduled for August 17, 2011. Subsequently, the Central Massachusetts MPO endorsed the 2012 Regional Transportation Plan on August 24, 2011. These procedures comply with the associated federal requirements.

C.7 Financial Consistency

Title 23 CFR Section 450.322 and 40 CFR 93.108 require the 2012 Central Masachusetts Regional Transportation Plan to "be financially constrained by year and include a financial plan that demonstrates which projects can be implemented using current revenue sources and which projects are to be implemented using proposed revenue sources."

The 2012 Plan is financially constrained to projections of federal and state resources reasonably expected to be available during the appropriate time frame. Projections of federal resources are based upon the estimated apportionment of the most recent federal authorizations, as allocated to the region by the state or as allocated among the various MPOs according to federal formulae or MPO agreement. Projections of state resources are based upon the allocations contained in the current Transportation Bond Bill and historic trends. Therefore, the 2012 Plan substantially complies with the federal requirements relating to financial planning.

D. PROCEDURES FOR DETERMINING REGIONAL TRANSPORTATION EMISSIONS

40 CFR Part 93.111 of the federal regulations outlines requirements to be used in the network-based transportation demand models. These requirements include modeling methods and functional relationships to be used in accordance with acceptable professional practice and reasonable for purposes of emission estimation. MassDOT, on behalf of the Central Massachusetts MPO, has used the methods described in the conformity regulations in the analysis of this 2012 Regional Transportation Plan.

D.1 Highway Performance Monitoring System Adjustments

As stated in EPA guidance, all areas of serious ozone and carbon monoxide nonattainment must use FHWA's Performance Monitoring System (HPMS) to track daily vehicle-miles of travel (VMT) prior to attainment to ensure that the state is in line with commitments made in reaching attainment of the ambient air quality standards by the required attainment dates. MassDOT provided HPMS information to DEP. DEP used this information in setting mobile-source budgets for VOC, NOx, and CO in all SIP revisions prior to 1997. DEP has since revised its VOC and NOx budgets using transportation-demand model runs. However, the models must still be compared to HPMS data since HPMS remains the accepted tracking procedure as outlined in the regulations.

The conformity regulations require that all model-based VMT be compared with the HPMS VMT to ensure that the region is in line with VMT and emission projections made by DEP. An adjustment factor that compares the 2010 HPMS VMT to the 2010 transportation model VMT has been developed. This adjustment factor is then applied to all modeled VOC and NOx emissions for the years 2016 through 2035 to ensure consistency with EPA-accepted procedures.

$$\frac{\text{2010 HPMS VMT}}{\text{2010 Modeled VMT}} = \text{Adjustment factor for VOC and NOx} = 1.221 \text{ for Central Massachusetts}$$

HPMS adjustment factors, calculated on a regional basis, are applied to the model output of future scenarios, and they change as base-year models are updated or improved, or as HPMS data is revised or updated. The latest factors for Eastern Massachusetts are shown in Table VIII-1 below:

Table VIII-1
HPMS/Model VMT Conversion Factors

REGION	2010 HPMS VMT (miles)	Travel Demand Model VMT (miles)	HPMS/Model Conversion Factor
Cape Cod	6,869,000	4,456,118	1.541
Central Massachusetts	14,564,000	11,924,422	1.221
Martha's Vineyard	266,000	224,944	1.183
Merrimack Valley	9,353,000	9,143,834	1.023
Boston	60,751,000	71,225,035	0.853
Montachusett	5,015,000	4,392,193	1.142
Nantucket	153,000	71,899	2.128
Northern Middlesex	6,523,000	6,735,326	0.968
Old Colony	6,883,000	6,549,927	1.051
Southeastern Massachusetts	14,710,000	13,745,040	1.070
Eastern MA	125,087,000	128,468,738	0.974
State Total	148,937,000	142,159,733	1.048

D.2 Changes in Project Design since the Last Conformity Determination Analysis

The Commonwealth requires that any change in project design from the previous conformity determination for the region is identified. Changes that have occurred since the last conformity determination in 2010 are as follows:

- The modeled base year has changed from 2007 to 2010.
- A new analysis year has been included in the conformity determination. An air quality analysis has been completed for 2016. This complies with EPA's Transportation Conformity Rule Restructuring Amendments (40 CFR Part 93.118, expected to become effective August 2011) which states that "if the attainment date has not yet been established, the first analysis year must be no more than five years beyond the year in which the conformity determination is being made." (2011 base to 2016 analysis year).
- Emission factors have been developed for 2010, 2016, 2020, 2025, and 2035 using Mobile 6.2 with inputs approved by MassDEP and US EPA.
- New HPMS adjustment factors have been developed for the new 2010 base year.

D.3 Procedures for Determining Regional Transportation Emissions

The federal conformity regulations set specific requirements for determining transportation emissions, which are estimated from a combination of emission rates, HPMS volume data, and travel demand model projections. Travel demand models use estimates of population, households, and employment to project future travel volumes and patterns. Chapter II of the Plan presents these estimates as part of the existing and future regional transportation system.

Only "regionally significant" projects are required to be included in the travel demand modeling efforts. The final federal conformity regulations define regionally significant as follows:

> ***Regionally significant:*** *a transportation project (other than an exempt project) that is on a facility which serves regional transportation needs (such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sport complexes, etc., or transportation terminals as well as most terminals themselves) and would be included in the modeling of a metropolitan area's transportation network, including at a minimum all principal arterial highways and all fixed guideway transit facilities that offer an alternative to regional highway travel.*

In addition, specific classes of projects have been exempted from regional modeling emissions analysis. The categories of exempt projects include:

- *Intersection channelization projects*
- *Intersection signalization projects at individual intersections*
- *Interchange reconfiguration projects*
- *Changes in vertical and horizontal alignment*
- *Truck size and weight inspection stations*
- *Bus terminals and transfer points*

Previous conformity amendments now allow traffic signal synchronization projects to be exempt from conformity determinations prior to their funding, approval or implementation. However, once they are implemented, they must be included in conformity determinations for future plans and TIPs

The milestone and analysis year transportation model networks are composed of projects proposed in this RTP. Projects in these networks consist of all in-place regionally significant projects that can reasonably be expected to be completed by a given analysis/horizon year with consideration of available funding commitments. This project group would include, but not be limited to, regionally significant projects where at least one of the following steps has occurred within the past three years:

- Comes from the first year of a previously conforming TIP,
- Completed the NEPA process, or
- Currently under construction or are undergoing right-of-way acquisition

A complete listing of future regionally significant projects for the entire Eastern Massachusetts Ozone Non-Attainment Area is provided in Table VIII-2 below:

Table VIII-2
Regionally Significant Projects Included in the Regional Transportation Models for the Eastern Massachusetts Ozone Non-Attainment Area

Analysis Year	**Community**	**Description of Projects Under Construction – Boston Region**
2016	Bedford, Burlington	Middlesex Turnpike Improvements Phases 1and 2
2016	Bellingham	Pulaski Boulevard
2016	Boston	Fairmount Line Improvements, including new stations
2016	Boston	East Boston Haul Road/Chelsea Truck Route (new grade separated roadway)
2016	Concord, Lincoln	Route 2/Crosby's Corner (grade separation)
2016	Danvers	Route 128/Route 35 and Route 62
2016	Hudson	Route 85 (capacity improvements from Marlborough TL to Rt 62)
2016	Marshfield	Route 139 Widening (to 4 lanes between School St. and Furnace St.)
2016	Quincy	Quincy Center Concourse, Phase 2 (new roadway: Parking Way to Hancock
2016	Randolph to Wellesley	Route 128 Additional Lanes
2016	Somerville	Assembly Square Orange Line Station
2016	Somerville	Assembly Square Roadways (new and reconfigured)
2016	Weymouth, Hingham, Rockland	South Weymouth Naval Air Station Access Improvements
2016	Regionwide	1000 Additional Park and Ride Spaces
Analysis Year	**Community**	**Description of Recommended Plan Projects– Boston Region**
2016	Beverly	Beverly Station Commuter Rail Parking Garage
2016	Boston	Conley Haul Road
2016	Salem	Salem Station Commuter Rail Parking Garage Expansion
2016	Somerville, Cambridge, Medford	Green Line Extension to Medford Hillside/Union Square
2016	Weymouth	Route 18 Capacity Improvements
2020	Bedford, Burlington, Billerica	Middlesex Turnpike Improvements Phase 3 – widening Plank St. to Manning
2020	Boston	Sullivan Square/Rutherford Avenue Improvements
2020	Hanover	Route 53 Final Phase (widening to 4 lanes between Rt 3 and Rt 123)
2020	Salem	Bridge Street (widening to 4 lanes between Flint and Washington St.)
2020	Somerville, Medford	Green Line Extension to Mystic Valley Parkway (Route 16)
2025	Canton	I-95 (NB)/Dedham Street Ramp/Dedham Street Corridor (new ramp with widening on Dedham St. from I-95 to University Ave.)
2025	Canton	I-95/I-93 Interchange (new direct connect ramps)
2025	Newton, Needham	Needham Street/Highland Avenue (includes widening Charles River Bridge)
2025	Woburn	Montvale Avenue (widening between Central St. to east of Washington St.)
2025	Woburn	New Boston Street Bridge (reestablish connection over MBTA Lowell line)
2035	Braintree	Braintree Split - I-93/Route 3 Interchange

2035	Framingham	Route 126/135 Grade Separation
2035	Reading, Woburn, Stoneham	I-93/I-95 Interchange (new direct connect ramps)
2035	Revere, Malden, Saugus	Route 1 (widening from 4 to 6 lanes between Copeland Circle and Rt. 99)
2035	Wilmington	Tri-Town Interchange (new "Lowell Junction" interchange on I-93 between Route 125 and Dascomb Rd.)
Analysis Year	**Community**	**Project Description - Cape Cod Region**
2020	Barnstable	Yarmouth Rd. /Rt 28 (widening to 4 lanes) with Hyannis Access Improvements
2025	Bourne	Route 6 Exit 1 WB on-ramp changes and interchange improvements
2035	Bourne	Route 25 Access Ramp widening / Belmont Circle two-way travel
2035	Capewide	Daily Passenger Rail Service: Hyannis to Buzzard's Bay, Middleborough
2035	Mashpee	Mashpee Rotary Ring Roads (connectors, Great Neck Rd, Routes 28 and151)
Analysis Year	**Community**	**Project Description - Central Massachusetts Region**
2016	Northborough	Rt 20 Church to South, signal coordination in corridor
2016	Shrewsbury/Worcester	Rt 9 Bridge over Lake Quinsigamond: widening, additional lane each direction
2016	Auburn	Rt 12/20 to Auburn TL capacity improvements and raised median
2016	Worcester	Lincoln/Highland/Pleasant Streets intersection corridor improvements, minor widening, select signal coordination
2016	Worcester	Route 20 Widening to a consistent 4 lanes
2020	Charlton, Oxford	Route 20 Widening to a consistent 4 lanes
2025	Westborough, Hopkinton	I-90/I-495 and I-495/Rt 9 Interchange Improvements (CD or frontage roads)
2035	Worcester	Route 122/122A Madison St/Chandler St. Kelley Square to Pleasant St: various improvements and signal coordination
2035	Worcester	I-290 Hope Ave. (to full interchange and roundabout at Webster and Hope)
2035	Millbury, Sutton	Route 146 Improvements: Route 122A to Central Turnpike
Analysis Year	**Community**	**Project Description – Martha's Vineyard Region**
n/a	n/a	none
Analysis Year	**Community**	**Project Description – Merrimack Valley Region**
2016	Amesbury	Route 110 from I-495 to I-95 (widen from 2 lanes to 4)
2020	Newburyport, Amesbury	I-95 over Merrimack River (Whittier Bridge widening from 6 to 8 lanes)
2020	Methuen	Route 110/113 (Methuen Rotary – new interchange ramps at I-93)
2025	Lawrence, North Andover	Route 114 (widening from I-495 to Waverly Road)
2035	Andover	Tri-Town Interchange (new "Lowell Junction" interchange on I-93 between Route 125 and Dascomb Rd.) and I-93 widening to 4 lanes in each direction from new interchange/current "lane drop" area to I-495.
Analysis Year	**Community**	**Project Description – Montachusett Region**
2016	Fitchburg/Westminster	New Wachusett Commuter Rail Station
2016	Ayer to South Acton	Fitchburg Line Commuter Rail Improvements (double track)
2020	Leominster	Route 13 Hawes St. to Prospect St. (some widening, new signals, etc)
2025	Athol	New Interchange on Route 2 at South Athol Road
Analysis Year	**Community**	**Project Description – Nantucket Region**
n/a	n/a	none
Analysis Year	**Community**	**Project Description – Northern Middlesex Region**
2016	Westford	Route 110 Minot's Corner to Nixon widen to 4 lanes
2020	Billerica	Middlesex Turnpike Improvements Phase 3 – widening Plank St. to Manning
2035	Tewksbury	Tri-Town Interchange (new "Lowell Junction" interchange on I-93 between Route 125 and Dascomb Rd.) and I-93 widening to 4 lanes in each direction from new interchange/current "lane drop" area to I-495.
2035	Westford	I-495 at Boston Road (Exit 32) widening of on and off ramps

2035	Lowell, Tewksbury, Chelmsford, and Westford	I-495 Additional travel lane each direction between Exits 32 and 35 and between Exits 37 and 40
2035	Lowell	Wood Street, Rourke Bridge: new bridge, widening and corridor improvements
Analysis Year	**Community**	**Project Description – Old Colony Region**
2016	Abington	Route 18 - Widening to 4 Lanes from Route 139 to Highland Rd.
2020	Brockton	Route 123 - Widen from Route 24 to Angus Beaton Drive
2020	Bridgewater	Route 24 - Add Northbound Slip Ramp from Route 104 WB to Route 24 NB
2020	Plymouth	Route 3 - Add Northbound on-Ramp at Long Pond Road (Exit 5)
2020	Plymouth	Long Pond Road Bridge widening (Exit 5)
2025	Brockton	Main Street,Warren Avenue,Spring Street,West Elm Street,Belmont Street - Reestablish Two-Way Circulation
2025	West Bridgewater	Route 106 - Widening from 2 to 4 Lanes between Route 24 and Route 28
2035	Plymouth	Route 3 – Add NB Off-ramp to Plimouth Plantation Hwy (Exit 4)
2035	Plymouth	Route 25 - Add New Interchange Before Exit 1 and connect to Bourne Road
2035	West Bridgewater	Route 28, Route 106, Central Square Signal and intersection coordination
Analysis Year	**Community**	**Project Description – Southeastern Massachusetts Region**
2016	Fall River, Somerset	New Brightman Street Bridge - capacity improvements to 4 lane divided facility
2016	Fall River	Route 79/Davol Street (interchange improvements and new traffic circulation)
2016	Freetown	Route 24 - New Interchange (Exit 8 ½)
2016	Mansfield	Route 140 / I-495 New Southbound On-Ramp
2020	Dartmouth	Route 6 (Faunce Corner Rd) / I-195 Interchange - Bridge Widening to 5 Lanes
2035	Taunton	Route 24 / 140 - Interchange Reconstruction

E. AIR QUALITY CONFORMITY ANALYSIS

The emissions from the following MPOs have been combined to show conformity with the SIP for the Eastern Massachusetts Ozone Nonattainment Area:

- Cape Cod MPO
- Central Massachusetts MPO
- Merrimack Valley MPO
- Boston MPO
- Montachusett Region MPO
- Northern Middlesex MPO
- Old Colony MPO
- Southeastern Region MPO
- Martha's Vineyard Commission*
- Nantucket Planning and Economic Development Commission*

* These regions do not contain any official urbanized areas, but are considered to be MPOs for planning purposes.

Using the latest planning assumptions, the Massachusetts Department of Transportation, Office of Transportation Planning, in coordination with MPO staff, estimated the emissions for VOC and NOx for all MPOs in Eastern Massachusetts through a combination of the statewide and Boston Region travel demand models. The VOC mobile source emission budget for 2009 and beyond for the Eastern Massachusetts Nonattainment Area has been set at 63.50 tons per summer day and the 2009 (and beyond) mobile source budget for NOx is 174.96 tons per summer day. As shown in Tables VIII-3 and VIII-4, the results of the air quality analysis demonstrate that the VOC and NOx emissions from all Action scenarios are less than the VOC and NOx emissions budgets for the Eastern Massachusetts Nonattainment Area:

TABLE VIII-3
VOC Emissions Estimates for the Eastern Massachusetts Ozone Non-Attainment Area
(all emissions in tons per summer day)

Year	Central MA Action Emissions	Eastern MA Action Emissions	Budget	Difference (Action – Budget)
2010	n/a	64.974	n/a	n/a
2016	4.1967	36.232	63.50	-27.268
2020	3.7363	32.386	63.50	-31.114
2025	3.4856	30.988	63.50	-32.512
2035	3.6479	31.063	63.50	-32.437

TABLE VIII-4
NOx Emissions Estimates for the Eastern Massachusetts Ozone Non-Attainment Area
(all emissions in tons per summer day)

Year	Central MA Action Emissions	Eastern MA Action Emissions	Budget	Difference (Action – Budget)
2010	n/a	178.925	n/a	n/a
2016	7.5141	66.219	174.96	-108.741
2020	4.9128	45.188	174.96	-129.772
2025	3.6744	36.521	174.96	-138.439
2035	3.2209	29.038	174.96	-145.922

F. CONCLUSION

The Central Massachusetts MPO has conducted an air quality analysis of the 2012 Central Massachusetts Regional Transportation Plan and its latest conformity determination. The purpose of the analysis is to evaluate the air quality impacts of the Plan on the SIP. The analysis evaluates the change in ozone precursor emissions (VOCs, and NOx) due to the implementation of the 2012 Central Massachusetts Regional Transportation Plan. The modeling procedures and assumptions used in this air quality analysis follow guidance from EPA and the Commonwealth and are consistent with all present and past procedures used by the Massachusetts DEP to develop and amend the SIP.

MassDOT has found the emission levels from all MPOs in Eastern Massachusetts – including from the 2012 Central Massachusetts Regional Transportation Plan – to be in conformance with the SIP according to conformity criteria. Specifically, the following conditions are met:

- The VOC emissions for the Action (build) scenarios are less than the 2009 VOC motor vehicle emission budget for analysis years 2016 through 2035.
- The NOx emissions for the Action (build) scenario are less than the 2009 NOx motor vehicle emission budget for analysis years 2016 through 2035.

In accordance with Section 176(c)(4) of the Clean Air Act as amended in 1990, the MPO for the Central Massachusetts Region has completed its review and hereby certifies that the 2012 Central Massachusetts Regional Transportation Plan and its latest conformity determination satisfies the conformity criteria where applicable, and therefore conditionally conforms with 40 CFR Parts 51 and 93, and 310 CMR 60.03, and is consistent with the air quality goals in the Massachusetts State Implementation Plan.

FINANCIAL PLAN

IX

IX. FINANCIAL PLAN

A. INTRODUCTION

Federal SAFETEA-LU regulations require that the long-range Regional Transportation Plan be a financially-constrained document. To ensure financial constraint, it is necessary to estimate the costs of all projects recommended in the Plan and to assess the amount of funds that are expected to be available over the course of the planning horizon. Ultimately, the costs of the proposed projects should not exceed that of the expected funding. Because there is not enough expected revenue to meet all the need, it means that not all the projects that are identified in the needs analysis section can be included in the Financial Plan.

B. ROAD AND BRIDGE PROGRAM

B.1 Projected Revenue

The major source of funding for highway-related projects is apportionments provided through the Federal Highway Administration (FHWA). These funds typically provide 80% of project funds, with the remaining 20% coming from a state match. Federal funds are usually derived from gasoline tax revenues, and state funds from the Transportation Bond bill which is paid through either gasoline tax revenues or general tax funds.

SAFETEA-LU provided federal transportation funding from 2005 to 2009 and now, through Continuing Resolutions to September 2011. To estimate federal funds beyond 2011, the MassDOT-Office of Transportation Planning (OTP) developed programming assumptions based on guidance from FHWA, and provided these estimates to each MPO region in Massachusetts.

Table IX-1
FFY 2011-2035 Estimated Regional Transportation Plan Highway Funding Available

	2011-2015 (Programmed in TIP)	2016-2020	2021-2025	2026-2030	2031-2035	Total
Total Highway Revenue Available for Programming	**$298,964,000**	**$351,798,000**	**$492,493,000**	**$600,574,000**	**$696,230,000**	**$2,440,058,000**
Recommended Maximum for Major Infrastructure Projects	$14,143,000	$19,008,000	$28,717,000	$35,089,000	$40,677,000	$137,634,000
Recommended Minimum for Bridge Projects	$81,663,000	$89,973,000	$134,627,000	$164,228,000	$190,385,000	$660,877,000
Recommended Minimum for NHS/IM Projects	$47,543,000	$50,948,000	$76,475,000	$93,340,000	$108,207,000	$376,514,000
Statewide Maintenance	$93,794,000	$95,677,000	$116,433,000	$137,025,000	$158,850,000	$601,779,000
Regional Discretionary Funding (O&M)	$61,822,000	$96,190,000	$136,240,000	$170,892,000	$198,110,000	$663,255,000

As can be seen in Table IX-1 above, a total of $2,440,058,000 is anticipated to be available for highway-related transportation improvements within the Central Massachusetts region between 2012 and 2035. This figure includes adjustments for inflation. The first line of the table provides the total funding expected to be available and the remaining lines show the MassDOT recommended split for programming purposes. The lines colored yellow and green are within the programming purview of the CMMPO.

These estimates include the following assumptions:

- Federal funding and state matching funds (core programs plus High Priority Project amounts) for the period of 2011 – 2014 reflect current allocations and funding for FFY 2015 is assumed to be equal to estimates for FFY 2014.
- Funding availability is inflated three percent per year, beginning in 2016.
- Deductions for statewide items that cannot be allocated individually to the MPOs -- Central Artery GANs repayment, Statewide Planning, and Extra Work Orders/Cost Adjustments -- are taken from total available funding, leaving the remaining amount for allocation in the regional plans.
- Assumed funding for Major Infrastructure Projects, the NHS/IM Programs, the Federal Aid Bridge Program, and Infrastructure Maintenance mirrors the assumptions made for federal funding - 2011-2015 reflect STIP amounts, and thereafter programs are adjusted by a rate of 3% per year.
- The Balance Available for the Statewide Road and Bridge Program is a function of the other assumptions made in the financial plan and represents federal funding after deducting statewide line items and GANS repayments. For 2011-2015, this amount reflects the regional targets provided in the STIP; from 2016 to 2021 it fluctuates based upon the assumed 3% growth in revenue and programs costs, as well as the repayment schedule of the ABP GANs; in 2022, the amount balloons to reflect the end of GANs repayments and thereafter it grows at a rate of 3% per year.
- The Non-Federal-Aid Program is based upon the existing program and held constant at current STIP amounts for 2012 - 2015. Beginning in 2016 and thereafter, NFA funding is adjusted by a 3% annual inflation factor.
- With the exception of funds for the NHS/IM and Bridge Programs, the estimated funding is allocated among the MPOs based upon the existing MARPA TIP targets.
- Funding assumed for the NHS/IM Program is allocated based upon the regional share of National Highway System mileage.
- Amounts assumed for the Bridge Program are allocated based upon each region’s percentage of federal-aid eligible bridges.
- The estimated MPO allocations for Major Infrastructure Projects and the NHS/IM and bridge programs are included to provide order-of-magnitude guidance, but can be adjusted by MPOs, within the overall financial constraint provided in the table, on an as-needed, agreed-to basis.
- The Major Infrastructure Program is provided to account for projects of a significant cost that would not normally be expected to be included in an MPO’s target component of the TIP. While this program would typically be the source of funding for projects that are regionally significant for air quality, it may also be used to fund large cost non-expansion projects. Most bridge projects, regardless of cost, should be accommodated within the Bridge Program; however, depending upon the magnitude of the project, it may be necessary for a region to fund a particular bridge project under the Major Infrastructure Program.

- The funding available should be allocated to operating, maintaining, and improving the highway-funded transportation system. In addition to road projects, this may include bicycle, pedestrian, enhancement, CMAQ, ITS, or any other program for which federal highway funding is expected to be used.

B.2 Projected Expenses

The CMMPO deliberated extensively on what major highway-related projects to recommend in the 2012 Regional Transportation Plan, given the need to remain within the constraints of estimated funding available. This task was made more difficult for projects in the later years of the plan because it was often necessary to estimate costs on projects that are in the early concept stages. The process of estimating costs began with the Stakeholder Consultation interviews conducted as part of the RTP early public outreach. As the process continued, CMMPO staff discussed the scope and estimated costs of potential major infrastructure projects with MassDOT District #3. This coordination continued to take place throughout the development of the RTP with input from MassDOT-OTP staff. All estimated costs were inflated at 4% per year after the year 2012. The following Tables IX-2 and IX-3 represent the CMMPO recommendations. Refer to Figure IX-1 for the location of all major infrastructure projects recommended in the RTP.

Table IX-2
Major Infrastructure Project Expenses

(Amounts in millions)	**Community**	**2011-2015**	**2016-2020**	**2021-2025**	**2026-2030**	**2031-2035**	**Total**
I-90/I-495/Rte 9	Westborough, Hopkinton, Southborough			25.31			
Route 20	Charlton, Oxford		19.008				
Route 20	Worcester	6.00					
Worcester E-W (Central)	Worcester				20.78		
Worcester E-W (South)	Worcester				16.79		
Route 146/Boston Road	Sutton	7.00				52.63	
Total Cost Estimate		**13.00**	**19.008**	**25.31**	**37.57**	**52.63**	
Total Available (estimate)	**from table IX-1*	***14.143***	***19.008***	***28.717***	***35.089***	***40.677***	***137.634***
Total Needed from Targets	**See table IX-3*				***2.481***	***11.953***	***14.434***

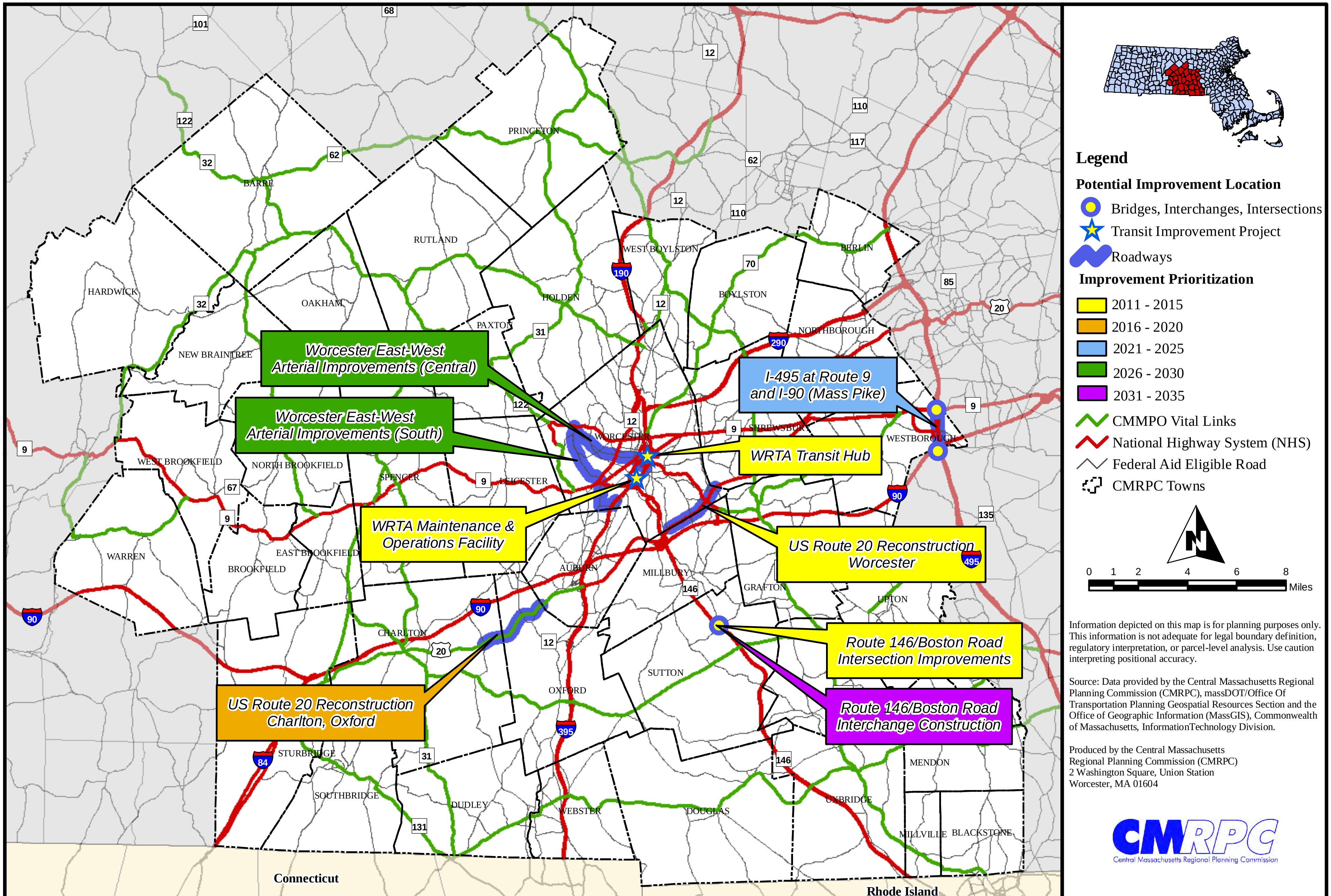

Figure IX-1   Recommended Major Infrastructure Improvement Projects

Table IX-3
Operations & Maintenance (O&M):

Category	**2011 – 2015 Costs (Anticipated 12-15 TIP years)**	**Expected Cost 2016-2020**	**Expected Cost 2021-2025**	**Expected Cost 2026-2030**	**Expected Cost 2031-2035**	**Total Cost***
Safety	*$4,327,540*	$6,733,300	$9,536,800	$11,788,770	$13,030,990	$45,417,400
Congestion	*$5,563,980*	$8,657,100	$12,261,600	$15,156,990	$16,754,130	$58,393,800
Pavement	*$49,457,600*	$76,952,000	$108,992,000	$134,728,800	$148,925,600	$519,056,000
Park-and-Ride	*$618,220*	$961,900	$1,362,400	$1,684,110	$1,861,570	$6,488,200
Pedestrian/Bike	*$618,220*	$961,900	$1,362,400	$1,684,110	$1,861,570	$6,488,200
ITS-Technology	*$618,220*	$961,900	$1,362,400	$1,684,110	$1,861,570	$6,488,200
Railroad Improvements	*$618,220*	$961,900	$1,362,400	$1,684,110	$1,861,570	$6,488,200
Moved to Major Infrastructure	**from Table IX-2*			*$2,481,000*	*$11,953,000*	*$14,434,000*
					Total Cost of Identified Needs	**$663,254,000**
					*Amount Assumed to be Available*from Table IX-1*	**$663,255,000**

Given the competing priorities and limited funding available, the MPO understands the need to preserve existing infrastructure. As detailed in Chapter VII, Section C 7.2, the CMMPO voted to allocate a major portion of the available discretionary funding to pavement maintenance. Only the minimum required spending targets for Highway Safety and Congestion Mitigation were considered, along with four percent that reflects a token amount of spending toward identified regional priorities. The costs above represent the following breakdown recommended by the CMMPO after extensive public consultation and deliberation:

Regional Discretionary Funding Allocation

7%	Safety
9%	Congestion
80%	Pavement
1%	Park and Ride
1%	Pedestrian/Bicycle
1%	ITS –Technology
1%	Railroad Improvements

As noted earlier, the anticipated revenues are not enough to meet all the needs of the region. With this in mind, CMMPO recognized several evolving issues that may affect the allocations within the timeframe of this plan:

- The desire of the public for a more multi-modal system with more alternative mode options and interconnectivity between modes;
- Capacity additions will be difficult to fund, and thus there is a need to reduce demand through implementation of new Travel Demand Management strategies;
- Low cost strategies that reduce the need for larger capital projects will become more important. Such low cost strategies might be identified through Safety Audits, planning studies, or through greater use of technology. The CMMPO supports the use of target funding to perform engineering analyses that can lead to low cost strategy implementation, such as traffic synchronization analyses to mitigate congestion. Identification of a wide-range of implementation strategies for low cost improvements will be a major focus in the coming years; and
- While significant need exists for preservation of existing systems, and that has been reflected in the high percentage of funds allocated to pavement needs, climate change and the reduction of greenhouse gases has become a major federal and state emphasis area, and there is ongoing discussion about how to accommodate that concern and to balance both needs.

C. TRANSIT PROGRAM

C.1 Projected Revenue

Estimates of available federal and state transit revenue were provided by the MassDOT-OTP and Transit Division. Typically, federal funds are used for capital expenses, although some funds are available for preventive maintenance and programs for rural areas, low-income commuters, and services for elders and people with disabilities. Capital funds are provided at 80% levels and operating funds are provided at 50% levels. Massachusetts provides approximately 72% of the net cost of operating regional transit authority services, with member communities contributing the remaining 28%. A summary of projected revenue is presented in Table IX-4 below.

Table IX-4
FFY 2011-2035 Estimated Regional Transportation Plan Transit Funding

	2012-2015 (Anticipated from TIP)	2016-2020	2021-2025	2026-2030	2031-2035	Total
Total Transit Revenue Available for Programming	**$169,315,476**	**$148,214,056**	**$170,405,786**	**$196,074,050**	**$225,784,588**	**$909,793,956**
Urbanized Area Formula (5307)						
WRTA	$45,151,903	$50,559,918	$58,612,802	$67,948,302	$78,770,705	$301,043,630
Conn DOT	$22,587	$25,293	$29,321	$33,991	$39,405	$150,597
RTA Capital Assistance Program	$3,350,256	$4,294,290	$4,723,719	$5,196,091	$5,715,700	$23,280,056
Capital Fixed Guideway Program (5309)	$7,755,875	$7,989,000	$8,229,000	$8,476,000	$8,730,000	$41,179,875
Section 5310 (Fed. $ for Elders & Disabled)	$1,173,319	$1,353,000	$1,556,000	$1,791,000	$2,066,000	$7,939,319
Mobility Assistance Program (State $ for Elders & Disabled)	$967,097	$1,115,000	$1,280,000	$1,471,000	$1,693,000	$6,526,097

Job Access Reverse Commute (JARC-5316)	$1,218,213	$1,406,000	$1,615,000	$1,858,000	$2,141,000	$8,238,213
New Freedom (5317)	$874,160	$1,003,000	$1,151,000	$1,321,000	$1,518,000	$5,867,160
Fed. Rural Funding (5311)	$231,462	$260,000	$285,000	$310,000	$338,000	$1,424,462
FTA State of Good Repair grant	$39,000,000					
	2012-2015	**2016-2020**	**2021-2025**	**2026-2030**	**2031-2035**	**Total**
State Contract Assistance for Operations	$45,090,016	$51,970,000	$60,233,000	$69,816,000	$80,930,000	$308,039,016
Community Operating Subsidies	$17,535,006	$20,210,555	$23,423,944	$27,150,666	$31,472,778	$119,792,949
Statewide Federal Programs for Competitive Bid						
RTAP	$542,519	$620,000	$701,000	$800,000	$915,000	$3,578,519
Private non-profits (vehicles & related equipment)	$4,802,297	$5,560,000	$6,435,000	$7,445,000	$8,617,000	$32,859,297
Councils on Aging (vehicles & related equipment)	$1,600,766	$1,848,000	$2,131,000	$2,457,000	$2,838,000	$10,874,766

These estimates include the following assumptions:

- Federal Program and State Operating Assistance increase 3% each year from current levels to adjust for inflation.
- State Capital reflects amount actually programmed through 2016 with 10% increase every fifth year to adjust for inflation. Forecasts outside of 2016 are rounded to the nearest hundredth.
- The Central Massachusetts region has been appropriated the amounts specified for the JARC (Job Access Reverse Commute) and New Freedom programs
- Costs for 2011 and beyond are inflated at 4% per year.
- Federal rural funds (Section 5311) are also available for distribution by the state. The Commonwealth has three Regional Transit Authorities (Franklin, Martha's Vineyard and Nantucket) which do not receive 5307 Urban Formula funds and therefore rely on 5311 Rural Grant funds as their sole source of federal funding.
- RTACAP was distributed based on total fleet value.

C.2 Projected Expenses

The major transit capital efforts anticipated over the planning horizon of the Regional Transportation Plan is the continued replacement of the WRTA fixed route fleet, the replacement of the WRTA Maintenance and Operations facility, the construction of a WRTA Hub Transfer facility at Union Station Intermodal facility, and the expansion of the number of trains on the MBTA Worcester Commuter Rail line. As noted in the Public Transportation chapter, the average age of the current fleet is approximately 7 years old, which is down from 10 years old as reported in the 2007 RTP. The WRTA is expecting to continue to replace the fleet over the next three years. The replacement program will need to begin again in 2021.

The WRTA has received a $39M federal grant to relocate the Maintenance & Operations facility. This facility will be constructed over the next 3 years. Acquisition of the property has begun and the facility is expected to be completed in 2014. The WRTA is also in the process of designing a downtown Hub Bus Transfer facility. The facility is funded with 5307 funds, and construction is expected to be

completed by the end of 2012. The WRTA is also considering establishing satellite mini hubs to house vehicles fleet and serve as connection and transfer facilities. It is expected that 5307 funds will be adequate to fund these following the initial period of fleet replacement. Ongoing capital expenditures associated with the existing operations are expected to equate with projected capital funds in later years.
Other needed improvements to transit include implementation of Intelligent Transportation Systems (ITS) technology to improve efficiency and ease of passenger use, improved access to bus stops through sidewalk construction and crosswalk installation, and use of Transit Signal Priority technology to improve the use of transit in congested areas.

Improvements will be made to the Worcester commuter rail line to reduce travel time between Worcester and Downtown Boston and improve reliability as well as frequency. The number of train round trips is expected to increase from 12 trips per day to 20 trips per day from Worcester to Boston. The existing stations will remain, however improvements will be made to Yawkey Station to make that station fully functional from its existing status. Improvements to the Worcester line are also dependent upon the completion of the expansion/reconstruction of the CSX Intermodal freight rail yard in Downtown Worcester and procurement of additional MBTA locomotives and coaches. Additional improvements to enhance this project may also include the following:

- Installation of third tracks segment between Worcester and Framingham along designated segments of the line
- Reconstruction of the Grand Junction branch from Brighton through Cambridge to North Station to allow some Worcester Line trains to terminate at North Station
- Replacement/installation of new system signals

While this project is expected to occur within the next several years, the costs and revenue source have not yet been identified.

The following Table IX-5 presents the expected expenses associated with transit.

Table IX-5
Projected Expenses Associated with Transit

	2011-2015	2016-2020	2021-2025	2026-2030	2031-2035	Total
Fleet replacement (5307)	$8,249,382	$9,325,215	$10,767,208	$12,434,546	$14,362,688	$55,139,039
Ongoing Capital Expenses(5307)	$40,252,777	$45,528,993	$52,569,313	$60,709,847	$70,123,717	$269,184,647
Capital Fixed Guideway Program (5309) (rail-related)	$7,755,875	$7,989,000	$8,229,000	$8,476,000	$8,730,000	$41,179,875
Elderly & Disabled expenses	1,173,319	$1,353,000	$1,556,000	$1,791,000	$2,066,000	$7,939,319
Mobility Assistance Program	$967,097	$1,115,000	$1,280,000	$1,471,000	$1,693,000	$6,526,097
Job Access Reverse Commute	$1,218,213	$1,406,000	$1,615,000	$1,858,000	$2,141,000	$8,238,213
New Freedom	$874,160	$1,003,000	$1,151,000	$1,321,000	$1,518,000	$5,867,160
Fed. Rural Program (5311)	$231,462	$260,000	$285,000	$310,000	$338,000	$1,424,462
ConnDOT (5307)	$22,587	$25,293	$29,321	$33,991	$39,405	$150,597

Ongoing Operations & Maintenance	$62,625,022	$72,180,555	$83,656,944	$96,966,666	$112,402,778	$427,831,965
Maintenance & Operations Facility	$39,000,000					$39,000,000
Total	$162,369,894	$140,186,056	$161,138,786	$185,372,050	$213,414,588	$862,481,374

The WRTA is operating under less than ideal conditions, given operational funding cuts experienced in the late 1990s and early 2000s. Further exacerbating the situation is the current and projected funding situation in which state and local revenues are effectively constrained to a 2.5-3% increase each year. Not only will this annual increase does adequately restore lost service or allow the WRTA to respond to increasing demand, but it will also not keep pace with annual fuel, labor, and heathcare increases and could result in continued degradation of service at a time when the public is demanding more service.

D. FINANCIAL CONSTRAINT

The financial analysis provided above has addressed the revenue sources reasonably expected to be available and the costs associated with operations and maintenance needs of the existing transportation system, as well as a limited number of potential major infrastructure projects selected by the CMMPO. These identified costs have been compared to estimates of reasonably expected funding from both federal and state sources. Based on the funding priorities established by the CMMPO, the 2012 Regional Transportation Plan has been determined to meet the federal requirement for financial constraint.

Central Massachusetts Regional Planning Commission
Member Communities

- Auburn
- Barre
- Berlin
- Blackstone
- Boylston
- Charlton
- Douglas
- Dudley
- East Brookfield
- Grafton
- Hardwick
- Holden
- Hopedale
- Leicester
- Mendon
- Millbury
- Millville
- New Braintree
- North Brookfield
- Northborough
- Northbridge
- Oakham
- Oxford
- Paxton
- Princeton
- Rutland
- Shrewsbury
- Southbridge
- Spencer
- Sturbridge
- Sutton
- Upton
- Uxbridge
- Warren
- Webster
- West Boylston
- West Brookfield
- Westborough
- Worcester

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