2016

Regional Transportation Plan

for the Pioneer Valley Metropolitan Planning Organization

pvpc

Prepared by:
Pioneer Valley Planning Commission

2016 Update

to the

Regional Transportation Plan

Final Report – July, 2015

Prepared by the
Pioneer Valley Planning Commission

For the Pioneer Valley
Metropolitan Planning Organization

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Prepared in cooperation with the Massachusetts Department of Transportation, the U.S. Department of Transportation - Federal Highway Administration and Federal Transit Administration, and the Pioneer Valley Transit Authority. The views and opinions of the Pioneer Valley Planning Commission expressed herein do not necessarily state or reflect those of the U.S. Department of Transportation.

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CHAPTER 1

2016 UPDATE TO THE REGIONAL TRANSPORTATION PLAN FOR THE PIONEER VALLEY METROPOLITAN PLANNING ORGANIZATION

The Pioneer Valley Regional Transportation Plan (RTP) outlines the direction of transportation planning and improvements for the Pioneer Valley through the year 2040. It provides the basis for all state and federally funded transportation improvement projects and planning studies. This document is an update to the current RTP (last published in 2011) and is endorsed by the Pioneer Valley Metropolitan Planning Organization (MPO).

The long range plan concentrates on both existing needs and anticipated future deficiencies in our transportation infrastructure, presents the preferred strategies to alleviate transportation problems, and creates a schedule of regionally significant projects that are financially constrained - in concert with regional goals and objectives and the Moving Ahead for Progress in the 21st Century (MAP-21) legislation.

Although the RTP focuses on transportation, it is a comprehensive planning document that has been developed and coordinated with other non-transportation planning efforts in the region. The Pioneer Valley Plan for Progress presents a strong case for improving our transportation infrastructure to encourage growth and economic development. The plan also recognizes that the region's cities and towns are experiencing changes which will affect its people, landscape, economy, and governmental institutions for decades. Changes in land use and development patterns are transforming the traditional visual character and function of the region and there is an increased awareness of the role transportation plays in influencing regional growth and change.

Strategic planning is a continuing process that produces planning documents and agendas which decision-makers can use to prioritize local needs. A truly effective planning process relies upon the input of the chief elected official(s), city and town staff, and the general public. In addition, the strategic planning process is based on a realistic assessment of external forces - political, social, economic, and technological - that can affect Pioneer Valley communities and residents. All recommendations generated through the strategic planning process must have a real potential for implementation. By developing the RTP for the Pioneer Valley in such a manner, the region will be able to conduct successful transportation improvement programming through the year 2040.

A. REGIONAL VISION, GOALS, AND EMPHASIS AREAS

The Pioneer Valley Metropolitan Planning Organization developed a vision to provide a framework for the development of the RTP.

VISION

The Pioneer Valley region strives to create and maintain a safe, dependable, environmentally sound and equitable transportation system. We pledge to advance performance based strategies and projects that promote sustainable development, healthy and livable communities, provide for the efficient movement of people and goods and advance the economic vitality of the region.

1. Regional Goals

To support the realization of the Vision of the plan for the Pioneer Valley MPO, a series of thirteen transportation goals were developed that are consistent with MAP-21. Cooperation between federal, state, regional, and local decision makers will be necessary in order to achieve these goals. Through cooperative planning efforts the region can maintain a dependable transportation system and develop strategies to maximize the efficiency of transportation funding for the region.

Safety	To provide and maintain a transportation system that is safe for all modes of travel users and their property.
Operations and Maintenance	To provide a transportation system that is dependable and adequately serves users of all modes. To give priority to the repair of existing streets, roads and bridges.
Environmental	To minimize the transportation related adverse impacts to air, land, and water quality and strive to improve environmental conditions at every opportunity and incorporate green infrastructure.
Coordination	To collaborate the efforts of the general public with local, state and federal planning activities.
Energy Efficient	To promote the reduction of energy consumption through demand management techniques and increase the use of energy efficient travel modes.
Cost Effective	To provide a transportation system that is cost effective to maintain, improve and operate.

Intermodal	To provide access between travel modes for people and goods while maintaining quality and affordability of service.
Multimodal	To provide a complete choice of adequate travel options that are accessible to all residents, visitors and businesses.
Economically Productive	To maintain a transportation system that promotes and supports economic stability and expansion.
Quality of Life	To provide and maintain a transportation system that enhances quality of life and improves the social and economic climate of the region.
Environmental Justice	To provide an equitably accessible transportation system that considers the needs of and impacts on low-income, minority, elderly and disabled persons.
Land Use	To incorporate the concepts of Sustainable Development in the regional transportation planning process and integrate the recommendations of the current Regional Land Use Plan into transportation improvements.
Climate Change	To promote and advance transportation projects that reduce the production of greenhouse gasses, such as CO2, and advance new energy technologies consistent with the Pioneer Valley Clean Energy Plan.

2. Emphasis Areas

A total of five emphasis areas were identified to assist in the development of regional transportation needs and strategies to assist in the achievement of the regional goals. These emphasis areas are not intended to be a replacement for the regional transportation goals. Instead, they were established with the recognition that many of the transportation improvement strategies included as part of the RTP Update can meet multiple regional transportation goals. This coordination between the Regional Transportation Goals and Emphasis Areas is shown in Table 1-1.

Table 1-1 – Coordination of Regional Transportation Goals and Emphasis Areas

	Safety	Operations and Maintenance	Environmental	Coordination	Energy Efficient	Cost Effective	Intermodal	Multimodal	Economically Productive	Quality of Life	Environmental Justice	Land Use	Climate Change
Safety and Security	√			√		√	√	√		√	√		
The Movement of People	√	√	√	√	√	√	√	√	√	√	√	√	√
The Movement of Goods	√	√	√	√	√	√	√	√	√	√	√	√	√
The Movement of Information			√	√		√	√	√	√	√	√		√
Sustainability	√	√	√	√	√	√	√	√	√	√	√	√	√

The transportation emphasis areas consist of broad topics related to transportation planning that are related to each of the thirteen Regional Transportation Goals. Regional Transportation Needs, Strategies, and Improvements were developed for each emphasis area in this RTP Update to advance each of the thirteen goals without the need for repetitiveness. The following provides more information on each of the five emphasis areas:

a) Safety and Security

The safety and security of the regional transportation system are vital to the efficient movement of people and goods. It is important to ensure that the transportation system is safe for all users across all modes. The RTP will identify locations for additional study that may benefit from recommendations to improve safety. Similarly, the security of our transportation infrastructure and operations centers will rely on the development of sound planning for their safeguard. The RTP will be coordinated with ongoing Homeland Security efforts in disaster mitigation and evacuation for the region.

b) The Movement of People

The movement of people is generally what most people associate with the term “transportation.” This area consists of the identification of needs for all modes of transportation and how to increase their efficiency. Needs will be

identified to assist in reducing existing and anticipated future congestion in the region as well as improving the connections between the various transportation modes.

c) The Movement of Goods

The Pioneer Valley Region is strategically located at a geographic crossroads in which more than one third of the total population of the United States can be reached by an overnight delivery. The availability of an efficient, multimodal transportation network to move goods through the region is essential to maintain economic vitality. Several modes of transportation are available in the region to facilitate the movement of goods. These modes include truck, rail, air, and pipeline.

d) The Movement of Information

The movement of information consists of the ability to utilize technology to maximize the efficiency of the existing transportation system and to convey information to the traveling public. Intelligent Transportation Systems (ITS) technology can include devices that integrate with traffic signal systems, provide real-time schedule information, and electronic fare payment. In addition, information sharing between agencies can reduce duplicative data collection and assist in the completion of ongoing studies.

e) Sustainability

Sustainability considers both the environmental and social costs of the transportation system. A sustainable transportation system improves access and mobility while reducing environmental impacts such as the production of greenhouse gas emissions and increased air pollution. Sustainable transportation projects also have a positive impact on society through a reduction in single occupant vehicle use, the promotion of transportation modes that have lower impact on air quality, the promotion of fuel-efficiency, advancing healthy lifestyles, and supporting healthy walk able and livable communities. Sustainable transportation projects are also consistent with the principles of the Commonwealth's GreenDOT Initiative.

3. Problem Statements

In order to advance the vision and goals of the RTP, a series of problem statements were developed. Problem statements are concise descriptions of the overarching issues that must be addressed through the implementation of the RTP. Each problem statement was developed based on the input received during the public outreach process for the Draft RTP. This process is described in detail in Chapter 3. The framework for the problem statements was developed early on in the update of the RTP through a series of five regional focus groups. Focus groups consist of a group of representatives

that participated in a 2 hour discussion to assist in the development of the goals and objectives of the RTP.

Table 1-2 – RTP Focus Groups

Focus Group Topic	Meeting Date
Bicycle and Pedestrian	October 8, 2014
Transit	November 5, 2014
Environment, Sustainability and Climate Change	November 6, 2014
Infrastructure	November 12, 2014
Freight	November 20, 2014

Chapter 14 of the RTP identifies a series of transportation needs, strategies, and projects that also assist in advancing a solution to each problem statement. A total of seven problem statements were identified through RTP outreach efforts and are summarized below.

a) There are insufficient resources to support the maintenance requirements of the regional transportation system.

This update to the RTP identifies a number of critical transportation improvement projects for the Pioneer Valley region, but in short, there are not enough resources to fund all the necessary improvements to keep the transportation system in a state of good repair. Chapter 14 of the RTP documents several needs and strategies geared towards identifying additional sources of revenue.

Table 1-3 – Needs and Strategies Advocating for Additional Revenue

Need	Strategy
Secure adequate funding for a balanced regional transportation system	Invest in the repair and maintenance of the existing transportation system.
Identify dependable and equitable funding sources for the Pioneer Valley Transit System	Identify and advocate for additional revenue sources to bring the regional transportation system into a state of good repair.
	Identify sources of revenue for local transportation projects.

Poor pavement condition on East Street in South Hadley, MA.

One obstacle is the disconnect between transportation revenue and the rising cost of transportation improvements. For the purpose of this RTP a 1.5% per year increase in transportation revenue is assumed versus a 4% per year increase in the cost of transportation projects. This is not sustainable. The rising cost of transportation improvement projects has resulted in many projects being pushed back into future years for construction. It also results in the development of several phased projects that can be constructed at a more manageable cost. Ultimately, this is a poor use of transportation funds as any cost savings in the short term are offset by inflated long term project cost.

Many communities have stated they no longer consider the TIP as a viable funding source for anything but the most expensive transportation improvement projects as the process from design to construct takes too long, the cost for project design is too expensive, and unforeseen project changes can create the need to reapply for necessary permits and acquire right-of-way.

On the national scale, the federal Highway Trust Fund is not able to keep pace with the current pace of transportation spending. The trust fund relies on federal gasoline taxes (18.4 cents per gallon of gasoline and 24.4 cents per gallon of diesel) yet the federal gasoline tax has not been adjusted in over 20 years. It is estimated that the federal government spends approximately $54 billion on highway and transit projects every year but only $35 billion is generated in revenue through the federal gasoline tax.[1]

Route 116 Bridge from Holyoke to Chicopee closed for repairs

[1] Ryan Alexander, "Bumps Ahead for the Highway Trust Fund," *US News and World Report*, 1 July 2014, http://www.usnews.com/opinion/economic-intelligence/2014/07/01/congress-needs-a-long-term-solution-for-the-highway-trust-fund, Web, 15 May 2015.

Recently, Massachusetts voters repealed a law that would have increased the state gas tax at a rate consistent with inflation. While this repeal does not mean the state gas tax cannot be increased, it does mean future increases will need to be tied to legislative action. As a result, future gas tax revenue cannot be considered for long range planning purposes.

At the local level, communities rely on Chapter 90 funding to advance necessary maintenance projects. Distributed on a formula basis, the Chapter 90 funding is tied to the passing of a Transportation Bond Bill by the state legislature. Massachusetts Governor Charlie Baker recently approved $300 million in Chapter 90 funds for local communities. This funding is critical to maintain local roads which are not eligible for federal transportation dollars. However a 2012 survey completed by the Massachusetts Municipal Association estimated that a total of $562 million/year would be required to keep roadways in a state of good repair. A complete breakdown of the need for additional transportation revenue is presented in Chapter 15 of the RTP.

b) Residents desire expanded regional passenger rail service.

In 2014, construction was completed on the upgrade to the existing railroad track infrastructure for the Knowledge Corridor line. These improvements allowed passenger rail service via the “Vermonter” to return to this line and save nearly 40 minutes in travel time over the previous route alignment. The return and future expansion of this rail service is by far one of the most popular topics raised by local officials and residents during opportunities for public participation. This is a major focal point of the RTP and is addressed in the needs and strategies summarized in Table 1-4.

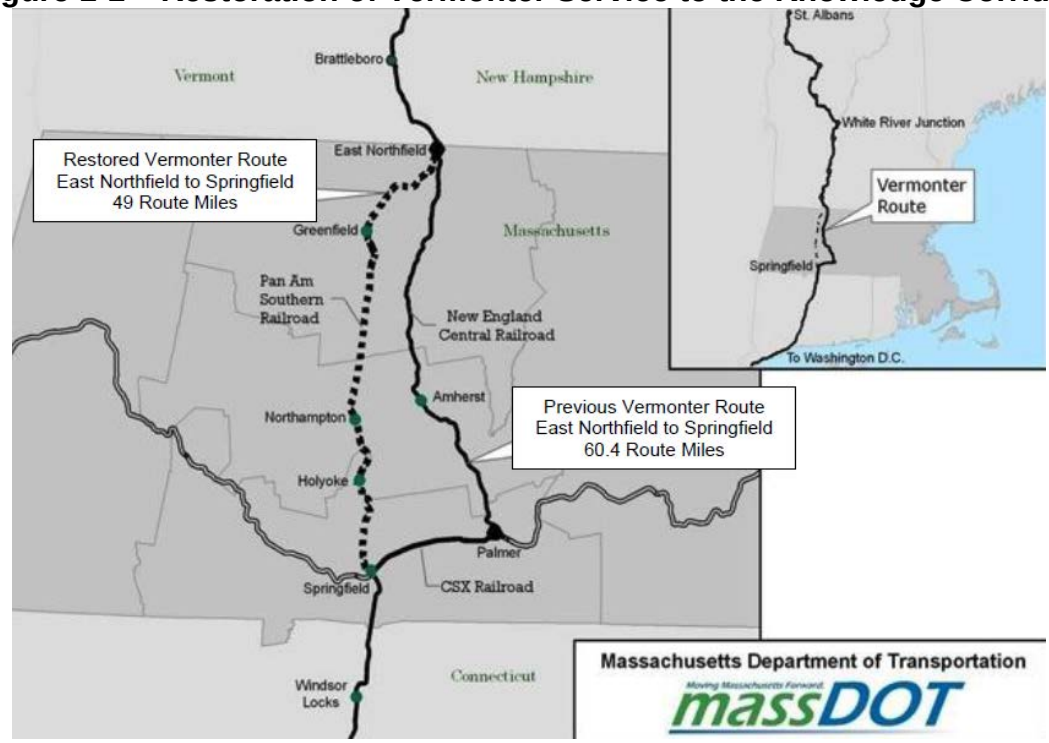
Table 1-4 – Passenger Rail Service Needs and Strategies

Need	Strategy
Maintain and increase access to national passenger rail service in the Pioneer Valley.	Develop a comprehensive commuter rail network.

The Massachusetts State Legislature recently identified expansion of passenger rail in the Pioneer Valley region as a priority and secured $30 million in the Transportation Bond Bill to support this effort. These funds could be used to initiate service between Greenfield and Springfield. A 2015 Action Plan for enhanced passenger rail service examined three service options. The plan recognizes this is not just a transportation enhancement but an economic driver that requires collaboration between RPAs, Chambers of Commerce, Regional Tourism Councils, individual communities, and other stakeholders to develop and promote a marketing plan. Another important element will be the development of a mode shift plan in cooperation with major employers and other transportation stakeholders. Finally, enhanced

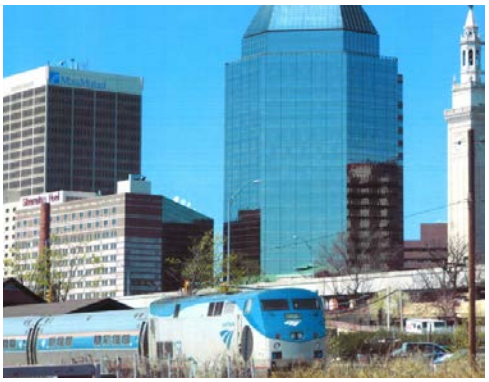
service will require permanent rail platforms to access the trains at all rail stations.

Figure 1-1 – Restoration of Vermonter Service to the Knowledge Corridor



In addition to enhanced passenger rail service along the Knowledge Corridor, there is a strong desire to expand passenger rail service in the east-west direction between Springfield and Boston. MassDOT and the Vermont Agency of Transportation, in collaboration with the Connecticut Department of Transportation, are conducting a study to examine the opportunities and impacts of more frequent and higher speed intercity passenger rail service on two major rail corridors known as the Inland Route and the Boston to Montreal Route. This Northern New England Intercity Rail Initiative is expected to be complete by 2015 and includes the following key elements:

- Service Levels and Service Development Plans
- Tier 1 Environmental Assessment and Documentation
- Infrastructure Provisions
- Ongoing Stakeholder Engagement and Public Meetings
- Methodology for Service and Infrastructure Provisions



Amtrak service in downtown Springfield

c) There is a need for innovative, cost-effective solutions independent of the regional transit authorities to provide services to rural areas.

The RTP focuses on a number of strategies to increase transit ridership however this can be difficult in rural areas that may not have the population density to support traditional fixed route transit service. Transportation for Massachusetts has identified the lack of public bus transportation in most rural communities as one of its top transportation challenges for Western Massachusetts. Table 1-5 summarizes the needs and strategies included as part of this RTP update that support the enhancement of regional transit service.

Table 1-5 – Rural Transit Service Needs and Strategies

Need	Strategy
Enhance opportunities for inter-city, inter-regional passenger trips.	Seek innovative ways to increase transit ridership, including express routes and flex vans.
Increase the number of riders using transit to commute to work and school.	Identify locations for park and ride lots and supporting express transit service.

Route 112 in Worthington

While enhanced services are desired, existing transit service models may not be cost effective. MassDOT has formed a series of Regional Coordinating Councils (RCC) to allow transit stakeholders to work together to identify and address transportation needs in their region. More information on the two RCCs in the Pioneer Valley region is provided in Chapter 5, section C.

Innovation is the key in the development of new rural transit service. This can consist of the identification of overlapping duplicative services, adaptation of existing underutilized services, and the development of partnerships with local business to provide new services. It will be important to continue to work with the newly established RCCs, the existing transportation providers, and human service providers to identify opportunities to develop cost effective and replicable models to provide rural transit service in the Pioneer Valley.

d) A new intermodal facility is necessary to support and enhance ongoing transportation services in the City of Northampton.

Intermodal transportation facilities encourage the use of alternative transportation modes through the coordination of a variety of transportation modes at a strategic location. Amenities such as waiting areas, restrooms, and food service may also be provided. Larger facilities are often incorporated into developments that may include residential units as well as retail and office space. The Holyoke Transportation Center opened in 2010. Construction on the Union Station Intermodal Center in Springfield is scheduled to be completed in 2016. The Westfield Elm Street Urban Renewal Plan includes an intermodal center that could begin construction in the next few years. Table 1-6 summarizes the needs and strategies on regional intermodal facilities included in the RTP.

Table 1-6 – Regional Intermodal Facilities Needs and Strategies

Need	Strategy
Promote transit oriented development and pedestrian friendly development.	Develop transportation facilities to support and promote smart growth in and around existing city and town centers.

Springfield Union Station Intermodal Center - Source: Springfield Redevelopment Authority

The City of Northampton is served by fixed route transit service that pulses out of a bus stop located in front of the Academy of Music. Passenger rail service returned to the City of Northampton in 2014 at their Union Station site. Intercity bus services are provided by Peter Pan Bus Lines near the city's Roundhouse parking lot. There is limited coordination between the passenger rail and transit service and all three modes are located in different sections of the downtown. These transportation nodes are shown on Figure 1-2.

Figure 1-2 – Existing Transportation Nodes in the City of Northampton

The city has discussed the need to move its existing transit pulse point at the Academy of Music further east along Main Street. The relocation of this pulse point or the creation of a secondary pulse point closer to the heart of the city could assist in enhancing transit ridership and future connections to passenger rail service at Union Station. As a long term downtown improvement, the City of Northampton has discussed the need to evaluate locations for a multi-modal facility near the railroad tracks which could include an indoor train station, bus connections, and commuter parking. Additional analysis is necessary prior to the advancement and implementation of changes to existing transportation service in downtown Northampton. The identification of an appropriate site for an intermodal transportation center in the City of Northampton would improve the efficiency of existing transportation services and provide opportunities to enhance the local economy through transit oriented development.

e) Increased and comprehensive resources and policies to improve sustainability in the transportation sector are necessary if the region is to meet its fair share of GHG reductions to comply with the Massachusetts Global Warming Solutions Act.

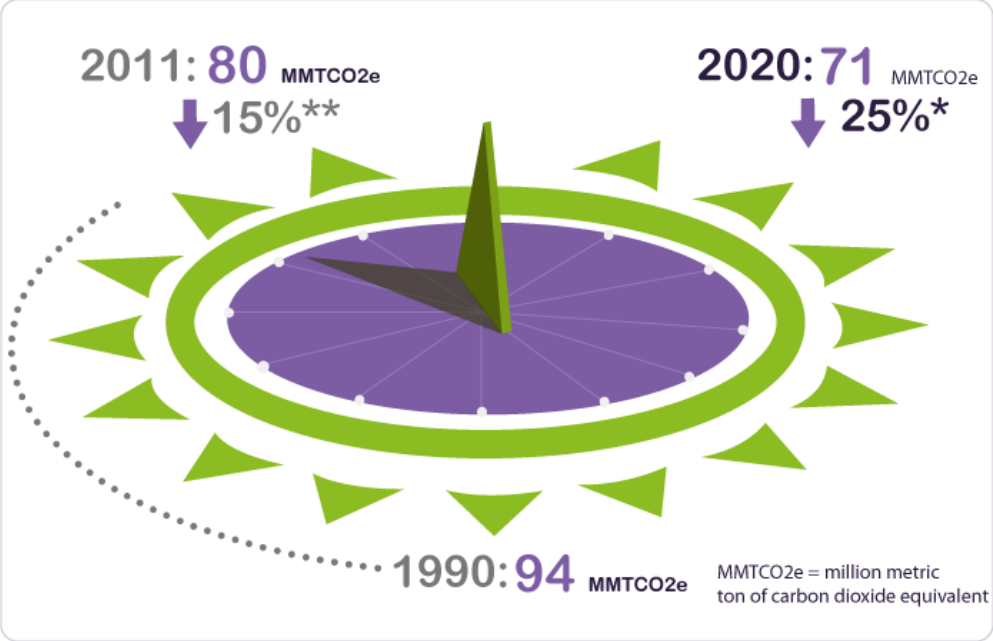
The Massachusetts Global Warming Solutions Act (GWSA) identifies a number of measures to assist the Commonwealth in achieving Greenhouse Gas emissions reduction goals. The GWSA is summarized in Chapters 2 and 16 of the RTP. A summary of the needs and strategies included in the RTP to assist in the implementation of the GWSA is shown in Table 1-7.

Table 1-7 – Global Warming Solutions Act Needs and Strategies

Need	Strategy
Reduce vehicle miles traveled in the region to minimize impacts on air quality, green house gas emissions and energy consumption	Encourage local fleets to use clean fuel alternatives.
	Enforce idling reduction programs in major activity centers.

The transportation sector is one of the largest contributors to greenhouse gas pollution. As of 2011, the Commonwealth has made measurable progress towards meeting its goal of a 25% reduction in GHG emissions by 2020.

Figure 1-3 – Massachusetts' Progress towards Reaching GHG Emissions by 2020



** Percentage Reduction below 1990 baseline level*
*** Source: MassDEP (2014). Massachusetts Annual Greenhouse Gas Inventory*

While regional specific targets are not included as part of the GWSA, the PVPC has developed a series of specific planning initiatives to assist in the documentation and reduction of GHG emissions. "Our Next Future" was created to chart a course for a more vibrant, competitive, sustainable and equitable region. This is a regional plan, designed to achieve success through promoting collaboration between communities on a regional basis. With this plan, we are seeking to build a sustainable prosperity in the Pioneer Valley. This includes a clean environment, safe and walkable neighborhoods, options for healthy exercise and play, and viable transportation alternatives. The plan

ultimately seeks to promote the sustainability of the world at large, by reducing our reliance on foreign oil, increasing our energy efficiency, cutting our greenhouse gas emissions and preventing water and air pollution. Specific elements include:

- A Climate Action and Clean Energy Plan to move towards a carbon neutral future.
- An Environment Plan to grow vibrant communities in our watershed.
- A Green Infrastructure Plan to promote clean water and the greening of our streets and neighborhoods.
- A Sustainable Transportation Plan to improve mobility while promoting bicycling, transit and walking.
- The Pioneer Valley Land Use Plan - Valley Vision 4 to grow in a logical manner while advancing initiatives to revitalize our community centers.

PVPC GHG Monitor

PVPC also uses a mobile GHG monitor to collect emissions as part of on-going planning activities. The monitor is currently used as part of on-going regional travel time data collection to identify the level of GHG emissions produced at various locations in the region. GHG reduction has also been incorporated into transportation project evaluation criteria used to prioritize projects for funding as part of the TIP.

f) The regional transportation infrastructure does not sufficiently accommodate the needs of the trucking industry.

Trucking is the dominant mode for freight transportation in the Pioneer Valley due to its flexibility to provide both short and long haul connections to facilities that may lack convenient access to other freight modes. As a result, it is important to have appropriate design elements in the regional transportation system to safely and efficiently accommodate truck movements. Table 1-8 summarizes the needs and strategies included in the RTP to support the trucking industry.

Table 1-8 – Trucking Needs and Strategies

Need	Strategy
Improve and coordinate the logistics of freight movement in the Pioneer Valley	Incorporate appropriate design measures in roadway improvement projects to accommodate freight movements.
Promote the efficient use of the highway network by freight carriers.	

Truck movements are often hindered due to route restrictions as a result of poor bridge conditions, inadequate vertical clearance, oversize loads, hazardous cargo, and municipal regulations. Many intersections also lack the proper turning radii to safely accommodate truck movements.

Truck stuck under a low clearance underpass in West Springfield

Truck navigating a narrow intersection in Ware

Projects that include design elements to reduce freight congestion are awarded points under the region's Transportation Evaluation Criteria. Planning and safety studies completed as part of the UPWP identify measures to improve freight mobility through improvements to roadway geometry, clearance, and improved guide signs.

Truck stops and rest areas are also an important element of the highway system as drivers must comply with hours of service regulations set by the Federal Motor Carrier Safety Administration. MassDOT's 2010 Freight Plan identifies the need to develop safe and efficient truck stops along the Interstate system to reduce idling and provide for adequate locations for truck staging.

Truck Stop in Chicopee

g) The built environment for bicycling and walking is hampered by significant barriers that include; narrow road and bridge cross sections, disjointed off-road trail networks, a lack of sidewalks, and maintenance issues.

It is important to provide for the needs of bicycles and pedestrians as part of the regional transportation network. The region has greatly expanded its network of on and off-road bicycle and pedestrian facilities over the last 20 years. GreenDOT also requires that bicycles and pedestrians be accommodated in all roadway improvement projects. The challenge lies in balancing the needs of the maintenance of the existing infrastructure while continuing to expand the bicycle and pedestrian system in a logical manner. The needs and strategies for the regional bicycle and pedestrian system are summarized in Table 1-9.

Table 1-9 – Bicycle and Pedestrian Needs and Strategies

Need	Strategy
Promote Complete Streets	Promote the implementation of bicycle lanes where practical.
Maintain and expand the regional bike network connectivity.	Provide accommodations for pedestrians, transit users, and bicyclists in roadway and bridge design and the maintenance of existing facilities.
Increase opportunities for non-motorized transportation use.	
Identify deficiencies to make major routes more suitable for non-motorized traffic and transit users.	

Non ADA compliant pedestrian crossing

Many existing roadways do not encourage bicycle and pedestrian activity. Wide travel lanes with narrow shoulders can encourage higher travel speeds and do not provide an adequate buffer between bicycles and vehicles. Many existing sidewalks are in need of repair, do not conform to current ADA standards for accessible design, and can abruptly end at inconvenient locations. It is critical to maintain the regional infrastructure to safely accommodate bicycles and pedestrians. This must be done in a manner that will also allow for additional connectivity to encourage more people to walk or bike instead of driving.

Figure 1-4 – Complete Street Concept for Main Street in West Springfield

PVPC advocates for a "Complete Streets" approach as part of its transportation planning activities. Complete Streets is an approach to configure local roads to better balance the needs of all people who use a street: motor vehicle drivers, public transit riders, pedestrians, bicyclists, people with disabilities, shoppers, school children, and others. A "Complete Street" improves livability by improving public safety, increasing usable public space, and making it easier to share the street. It also creates a more welcoming environment for local businesses.

New pedestrian crossing in Brimfield

New bike lane on Route 5 in Holyoke

The identification of gaps in the bicycle and pedestrian network is a critical task to identify existing barriers and eliminate gaps that restrict travel options. Proper maintenance ensures the continued expansion of bicycle and pedestrian travel options in the future.

CHAPTER 2

TRANSPORTATION PLANNING PROCESS

A. REQUIREMENTS

1. Moving Ahead for Progress in the 21st Century (MAP-21)

On July 6, 2012, the President signed into law the MAP-21 legislation authorizing highway, highway safety, transit and other surface transportation programs. MAP-21 replaced the SAFETEA-LU legislation and is the first long-term federal transportation legislation since 2005. The legislation has since been temporarily extended. MAP-21 creates a performance-based program that is intended to streamline the existing transportation process.

Significant features of MAP-21 include:

- Metropolitan planning organizations (MPOs) will be required to establish and use a performance-based approach to transportation decision making and the development of the RTP through the establishment of regional performance targets.
- Establishes a new requirement for regular updates to State Strategic Highway Safety Plans.
- The creation of the Transportation Alternatives Program (TAP). TAP replaces the funding from pre-MAP-21 programs including Transportation Enhancements, Recreational Trails, and Safe Routes to School, to combine them into a single funding source.
- Expands the National Highway System (NHS) to include principal arterial roadways.
- Consolidates existing federal transportation programs into a smaller number of core programs.
- Incorporates changes to assist in the reduction of delivery times for transportation improvement projects.

As part of MAP-21 the RTP must address the following new requirements:

- The RTP must include a description of the performance measures and performance targets used in assessing the performance of the transportation system.
- The RTP must include a system performance report to evaluate the existing condition and performance of the transportation system.
- Examine how transportation connectivity gaps may affect access to essential services such as housing, employment, health care, schools/education, and recreation.

- Include coordination across regional boundaries and collaboration with MassDOT and transit operators to ensure a regional approach to transportation planning.
- Consider using scenario planning to develop potential regional investment strategies, population and employment growth, and the impact of regional performance measures.
- Conduct a benefits and burdens analysis based on the projects approved in the RTP.
- Include a section on livability and climate change.
- Continue to address the eight planning factors from the SAFETEA-LU legislation.

2. Clean Air Act Amendments of 1990

As a result of federal Clean Air legislation, the Regional Transportation Plan must include a complete analysis of air quality issues in the region, along with demonstrations of how this plan will work to achieve National Ambient Air Quality standards. Further, it must include regional short and long range transportation plans and projects indicating the future direction of the transportation system. The degree to which the short and long range plans are discussed is essentially the option of the organization(s) preparing the plan. It is important to note, however, that it is necessary for transportation projects/plans to be included in a Regional Transportation Plan if they are to receive federal funding for implementation.

3. Title VI / Environmental Justice

Title VI states that "No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." Title VI bars intentional discrimination as well as disparate impact discrimination (i.e., a neutral policy or practice that has a disparate impact on protected groups).

The Environmental Justice (EJ) Orders further amplify Title VI by providing that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

In response to Environmental Justice Executive Order 12898, and at the request of the Massachusetts Department of Transportation and the Federal Highway Administration, PVPC has been incorporating environmental justice into the transportation planning process. Environmental Justice seeks to ensure equity in the distribution of benefits and burdens of transportation resources. As the Metropolitan Planning Organization (MPO), PVPC is

responsible for identifying minority and low-income populations within the region and ensuring that transportation programs, policies, and activities do not have a disproportionately high and adverse human health or environmental effects on these populations. In addition, PVPC is responsible for providing opportunities for participation in the decision making process for all socio-economic groups.

Goals of Title VI and Environmental Justice include:

- Identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of the transportation programs, policies, and activities on minority populations and low-income populations.
- Assess the distribution of impacts on different socio-economic groups for the investments identified in the transportation plan and TIP.
- Make a special effort to engage and involve representatives of minority and low-income groups to hear their views regarding changes to and performance of the planning process.
- Enhance analytical capabilities to ensure that the long-range transportation plan and the transportation improvement program (TIP) comply with Title VI. Integrate this analysis into transportation programs, policies, plans and activities.
- Identify strategies and efforts in the planning process for ensuring, demonstrating, and substantiating compliance with Title VI.
- Develop a demographic profile of the metropolitan planning area or State that includes identification of the locations of socio-economic groups, including low-income and minority populations as covered by the Executive Order on Environmental Justice and Title VI provisions.
- Identify the needs of low-income and minority populations. Use demographic information to examine the distributions across these groups of the benefits and burdens of the transportation investments included in the plan and TIP.
- Create an analytical process for assessing the regional benefits and burdens of transportation system investments for different socio-economic groups.
- Create a public involvement process that identifies a strategy for engaging minority and low-income populations in transportation decision making.
- Demonstrate efforts to engage low-income and minority populations as part of the certification review and public outreach effort.
- Identify mechanisms to ensure that issues and concerns raised by low-income and minority populations are appropriately considered in the decision making process.

B. PARTICIPANTS IN THE TRANSPORTATION PLANNING PROCESS

A variety of public and private entities are involved in the Transportation Planning Process. A summary of these organizations and their responsibilities follows.

1. Member Communities

The Pioneer Valley Region consists of 43 incorporated cities and towns. Each has a large responsibility to provide local transportation facilities and services. As a result, a significant portion of each local budget is expended for transportation purposes. Communities also receive state funds, called Chapter 90, for transportation purposes. Some of these local responsibilities and/or expenditures include:

- Initiation of federally assisted projects for roadways not under state jurisdiction;
- Support for public transit by more than half of the region's 43 municipalities that are members of the Pioneer Valley Transit Authority (PVTA);
- Contribution by some rural municipalities to special, local paratransit services in their towns;
- Provision of school transportation, public service vehicles (such as police, fire and, in some areas, trash removal), local traffic regulation, and road and sidewalk maintenance by all municipalities in the Pioneer Valley Region; and,
- Seasonal maintenance of local roadways (snow, etc.).

To provide a well-maintained and efficient transportation network for the Pioneer Valley region, it is important that the municipalities adopt suitable plans, policies, and programs for guiding future transportation and land use improvements in their areas, and that these municipal plans and programs be coordinated with regional planning efforts.

2. The Pioneer Valley Metropolitan Planning Organization (MPO)

The Pioneer Valley Metropolitan Planning Organization (MPO) implements and oversees the 3C transportation planning process in the Pioneer Valley region. The objective of the 3C transportation planning process is to assist, support, and provide the capability to maintain an open comprehensive, cooperative, and continuing transportation planning and programming process at all levels of government in conformance with applicable federal and state requirements and guidelines. The Pioneer Valley MPO was restructured in August of 2006 to enhance the role of the local communities in

the transportation planning process and allow local MPO members to represent subregional districts respective to community size and geographic location. The number of voting members was also increased from eight to ten. A more recent update in 2011 recognized changes to the MPO membership as a result of the creation of the Massachusetts Department of Transportation. The Pioneer Valley MPO consists of the following officials, their designee (as allowed under the current Memorandum of Understanding), or alternate.

- The Secretary of the Massachusetts Department of Transportation
- The Administrator of the Massachusetts Department of Transportation – Highways Division
- The Chairman of the Pioneer Valley Planning Commission
- The Chairman of the Pioneer Valley Transit Authority
- The Mayors of two of the following three (3) urban core cities:

  Chicopee Holyoke Springfield
- The Mayor or a Selectman of one of the following four (4) cities and towns:

  Agawam Southwick Westfield
  West
- The Mayor or a Selectman of one of the following five (5) cities and towns:

  Amherst Easthampton Hadley
  Northampton South Hadley
- A Selectman of one of the following fourteen (14) suburban and rural towns:

  Belchertown Brimfield East Longmeadow
  Granby Hampden Holland
  Longmeado Ludlow Monson
  Palmer Pelham Wales
  Ware Wilbraham

- A Selectman of one of the following seventeen (17) suburban and rural towns:

  Blandford Chester Chesterfield
  Cummington Goshen Granville
  Hatfield Huntington Middlefield
  Montgomery Plainfield Russell
  Southampton Tolland Westhampton
  Williamsburg Worthington

In addition, the Joint Transportation Committee (JTC) Chairman, and one representative each from the Federal Highway Administration (FHWA), the

Federal Transit Administration (FTA), the Chair of the Infrastructure Committee of the Western Massachusetts Economic Development Council (EDC), the five (5) alternate community MPO representatives, and one representative each from both the Massachusetts Department of Transportation Highways Division District One and District Two Offices shall be considered ex-officio, non-voting members of the Pioneer Valley MPO. Alternate members shall be additional chief elected officials from each of the above-cited categories of communities and he/she shall be eligible to attend, participate and vote at MPO meetings in the event that the primary member cannot attend.

The MPO jointly develops, reviews, and endorses annually a Planning Work Program which includes a Unified Planning Work Program; a Transportation Plan; a Transportation Improvement Program' as well as transportation plans and programs as may from time to time be required by federal and state laws and regulations. Each of the MPO members reviews regional transportation documents/plans and, if acceptable, indicates its acceptance by endorsing the document. Endorsement is made by a simple majority of those members present and voting, provided that one of the state agencies is included in the majority vote. The MPO is the forum for cooperative transportation decision-making in the Pioneer Valley region.

a) Pioneer Valley Planning Commission (PVPC)

The Pioneer Valley Planning Commission serves as the comprehensive regional planning agency for the 43 cities and towns of Hampshire and Hampden Counties in Western Massachusetts. It is one of the eight signatory bodies to the region's MPO and is responsible for guiding growth and development (both physical and economic) in the Pioneer Valley. In its role as the lead planning agency for the MPO, PVPC provides the staff to conduct MPO and other transportation planning activities for the Pioneer Valley. Transportation planning funds come from many sources including its member communities, the Federal Highway Administration, the Federal Transit Administration, the Massachusetts Department of Transportation, and the Pioneer Valley Transit Authority, among others.

b) Pioneer Valley Transit Authority (PVTA)

The PVTA is the regional transit authority in the Pioneer Valley. Like PVPC, it is also a signatory agency to the region's MPO. The Pioneer Valley Transit Authority provides fixed route bus services and paratransit van services to 24 cities and towns in the region.

The PVPC provides a significant planning support to the PVTA. Further, PVPC includes transit improvement projects in the Transportation Improvement Program (TIP) and in the Regional Transportation Plan (RTP),

both of which serve as guides for determining future facilities and service improvements of the PVTA. PVTA receives funds from the Federal Transit Administration, the Massachusetts Department of Transportation, member communities, passenger fares, and advertising.

c) Massachusetts Department of Transportation

The Massachusetts Department of Transportation is a merger of the former Executive Office of Transportation and Public Works and its divisions with the Massachusetts Turnpike Authority, the Massachusetts Highway Department, the Registry of Motor Vehicles, and the Massachusetts Aeronautics Commission. Developed under Chapter 25 of the Acts of 2009, this transportation reform legislation was signed into law in June 2009 and became effective in November 2009.

MassDOT oversees four divisions: Highway, Mass Transit, Aeronautics, and the Registry of Motor Vehicles (RMV) in addition to an Office of Planning and Programming, the Massachusetts Bay Transportation Authority (MBTA), and all Regional Transit Authorities (RTA).

The Mission of the MassDOT is to deliver excellent customer service to people who travel in the Commonwealth, and to provide our nation's safest and most reliable transportation system in a way that strengthens our economy and quality of life.

i) Massachusetts Department of Transportation – Highways Division

The Highway Division includes the roadways, bridges, and tunnels of the former Massachusetts Highway Department and Massachusetts Turnpike Authority. It also includes many bridges and parkways previously under the authority of the Department of Conservation and Recreation. They are responsible for the design, construction and maintenance of the Commonwealth's state highways and bridges. The Division is responsible for overseeing traffic safety and engineering activities including the Highway Operations Control Center to ensure safe road and travel conditions.

There are a total of five Highway Division offices representing distinct areas of the state. The majority of the Pioneer Valley region is located in District Two, with the westernmost portion of the region falling in District One.

From time to time, MassDOT issues formal engineering and policy directives to introduce new design standards or to supplement, clarify or amend existing design standards. The most recent list of MassDOT Engineering Directives to be used during project design is available at: http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/DesignEngineering/EngineeringDirectives/ListofEngineeringDirectives.aspx

d) Joint Transportation Committee (JTC)

The JTC is a committee comprised of representatives of local, regional and state governments, as well as private groups and individuals involved in providing transportation facilities, services, and/or planning, including Peter Pan Bus Lines, Inc., the Pioneer Valley Railroad, and the Westfield Airport. The JTC was established by the 3C Memorandum of Understanding for the purpose of incorporating citizen participation in the transportation planning process. It is intended that the JTC be representative of both public and private interests in the region and provide a forum for reviewing transportation plans and projects, offering comments and recommendations to guide transportation planning and transportation improvements in the region. The JTC also serves in an advisory capacity to the MPO as they decide on whether accepting and endorsing a plan or project is appropriate. The JTC plays a key role in reviewing documents such as the Regional Transportation Plan, the annual Transportation Improvement Program and the Unified Transportation Work Program.

i) Bicycle and Pedestrian Subcommittee

The Pioneer Valley Joint Transportation's Bicycle and Pedestrian Subcommittee was established by the JTC in 2000. The subcommittee is responsible for oversight and coordination of activities related to the implementation of the Bicycle and Pedestrian Plan. The subcommittee establishes priorities for implementation of action items defined in the Bike and Ped Plan and provides recommendations to the JTC on work tasks included in the Unified Planning Work Program. Members on the subcommittee are appointed by the JTC and include representatives from the Pioneer Valley Chapter of MassBike, the West Springfield Community Police Department, Northeast Sport Cyclists, the Westfield Open Space Committee, the City of Northampton, MassDOT Highways Division District 2, and JTC representatives from Westfield, Springfield, East Longmeadow, South Hadley and Northampton.

ii) TIP Subcommittee

The Pioneer Valley Transportation Improvement Program (TIP) Subcommittee was established by the JTC in 2003. The subcommittee was formed to provide local input on the establishment of project milestones to track the status of current and future TIP projects. The goal of the subcommittee is to develop recommendations for the entire JTC on candidate projects to be included as part of the current TIP. Factors such as the projects score from the Pioneer Valley Transportation Evaluation Criteria (TEC), current design status, environmental permitting status, and status of any needed right of way acquisition are all used to develop the

listing of projects recommended for inclusion in the TIP. The subcommittee also assists the PVPC as community liaisons to increase public participation in TIP related tasks such as the update of the PVPC TIP database of projects.

3. Other State Agencies

In addition to federal transportation funding, the Commonwealth spends a large portion of its own available funds on transportation improvement projects. All federal funds received by the Commonwealth for transportation projects must be supplemented with a state match (usually 80% federal/ 20% state ratio). Assistance is also provided for some local street improvements, mass transit, school transportation, and special paratransit services. In order to provide these funds, the Commonwealth's Legislature periodically enacts a transportation bond bill. In each Transportation Bond, funds are appropriated to communities based on a formula under the provisions of MGL Chapter 90, section 34. These funds are commonly known as Chapter 90 funds. The Chapter 90 highway formula is comprised of three variables: local road mileage (58.33 %), employment figures (20.83 %) and population estimates (20.83 %). Under this formula, those communities with a larger number of road miles receive proportionately more aid than those with fewer road miles. Transportation Bonds have also earmarked funds for the design and/or construction of specific projects. Funding for these projects has occurred at the discretion of the legislature.

a) Department of Environmental Protection (DEP)

The Clean Air Act Amendments of 1990 require all states that do not meet federal air quality standards to prepare a State Implementation Plan (SIP) identifying specific strategies for achieving National Ambient Air Quality standards. The Commonwealth of Massachusetts is considered a non-attainment area, meaning that it does not meet the established air quality standards. The lead organization in preparing the required SIP is the Department of Environmental Protection. DEP monitors the air quality status and recommended improvement strategies (by region) from the Commonwealth's thirteen (13) Regional Planning Agencies. This information is then used to prepare a statewide strategy for meeting federal air quality standards.

4. Federal Agencies

The federal government and its various agencies develop national transportation policies and are the principal funding source for many transportation improvements. Most federal activity is exercised through

agencies of the US Department of Transportation (DOT), but the US Department of Health and Human Services (HHS) also provides some transportation assistance, predominantly paratransit funding.

a) Department of Transportation (DOT)

The US Department of Transportation administers and coordinates highway, transit, air, and rail planning at the federal level in addition to a substantial number of assistance programs to state and local governments. Specific activities (typically broken down by mode) are handled by individual federal agencies housed within the Department of Transportation. These agencies include the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), the Federal Aviation Administration (FAA), the United States Coast Guard (USCG), the Surface Transportation Board (STB) and the Federal Railroad Administration (FRA).

i) Federal Highway Administration (FHWA)

The FHWA performs its mission through three main programs:

The Federal-Aid Highway Program provides federal financial assistance to the States to construct and improve the National Highway System, urban and rural roads, and bridges. The program provides funds for general improvements and development of safe highways and roads.

The Motor Carrier Safety Program develops regulations and enforces federal requirements for the safety of trucks and buses to reduce commercial vehicle crashes. It also governs hazardous cargoes as they move over the nation's highways.

The Federal Lands Highway Program provides access to and within national forests, national parks, Indian reservations and other public lands by preparing plans, letting contracts, supervising construction facilities, and conducting bridge inspections and surveys.

ii) Federal Transit Administration (FTA)

FTA is the primary federal funding source for planning and implementing mass transportation improvements. FTA provides financial assistance for both urban and rural mass transportation, and subsidizes some paratransit services for non-profit organizations. Both capital and operating funds are made available.

iii) Federal Aviation Administration (FAA)

FAA provides funding assistance for airport planning and construction, as well as for air traffic control, establishment of safety standards and inspection of accidents.

iv) Federal Railroad Administration (FRA)

FRA is a regulatory body concerned with safety issues related to rail traffic. The FRA is responsible for investigating rail accidents, but also works to develop and implement programs to promote safe rail operation.

b) Department of Health and Human Services

The Department of Health and Human Services assists service agencies in their effort to provide transportation for the elderly, medical services, and community service operations. Most of these are paratransit services.

c) Department of Homeland Security

The Department of Homeland Security was created on January 23, 2002. It is responsible for securing our nation's borders and transportation systems while working to prevent the entry of terrorists and instruments of terror. The Department of Homeland Security is comprised of four divisions:

- Border and Transportation Security
- Emergency Preparedness and Response
- Chemical, Biological, Radiological and Nuclear Countermeasures
- Information Analysis and Infrastructure Protection

A key mission of the Department is to increase measures to ensure the security of the nation's transportation system while continuing to efficiently serve the needs of legitimate travelers and industry.

5. Other Transportation Planning and Service Organizations

In addition to the many local, state, and federal government agencies involved in transportation planning and improvements, other public and private organizations are also important to the operation and improvement of transportation facilities and services in the Pioneer Valley region.

- A number of social and human service agencies in the Pioneer Valley region operate paratransit service. Although some of these operators receive federal assistance, many are privately operated and funded.
- Amtrak is the primary provider of intercity passenger rail service. No commuter rail is currently offered for inter-regional commuters to areas like Hartford and Boston.
- CSX Transportation took over Conrail's operations in the Pioneer Valley region in June of 1999. They are the largest rail freight operator in the region with providing services to the eastern half of the US. Several short lines and one regional railroad also operate freight service within the region.
- Many associations of transportation service providers, such as the American Trucking Association (ATA), are working within federal and state legislation to enact changes that have the potential to impact transportation planning and the focus of transportation improvements.

- The Pioneer Valley has been very successful in involving business leaders, environmentalists and developers in the transportation planning process. Efforts like the Plan for Progress and Valley Vision 4 - the Regional Land Use Plan bring these new partners to the transportation planning table.

C. KEY PRODUCTS

1. Transportation Improvement Program

The Transportation Improvement Program (TIP) is the central program management tool for structuring transportation programs. The TIP is to be fully consistent with the RTP and the planning process. In doing this, the projects identified in the TIP will concur with the goals, policies and objectives of the RTP.

The TIP is scheduled for update every year. Additional changes may be made to the TIP after the required public participation and an MPO meeting. The current TIP identifies a four year listing of projects for implementation. The TIP must be fiscally constrained and programmed according to a regional target (estimate of federal funds) which is provided by MassDOT. All projects, regardless of funding source, are to be identified in the TIP.

Projects identified in the TIP are to be prioritized. Conformity to environmental regulations is key in determining the feasibility and priority of projects. Environmental analysis will also assist in identifying the funding source of projects based on federal restrictions.

The TIP shall also be available for public official review and comment. Included in this public participation is the update on the amendment process associated with the TIP.

2. Unified Planning Work Program

The Unified Planning Work Program (UPWP) is a narrative description of the annual technical work program for a continuing, cooperative, and comprehensive (3C) transportation planning process in the Pioneer Valley Region. The UPWP provides an indication of regional long and short-range transportation planning objectives, the manner in which these objectives will be achieved, the budget necessary to sustain the overall planning effort, and the sources of funding for each specific program element.

Work tasks within the UPWP are reflective of issues and concerns originating from transportation agencies at the federal, state, and local levels. Many tasks are specifically targeted to implement provisions of federal legislation such as MAP-21, the CAAA, and the Americans with Disabilities Act (ADA).

3. Certification with Title VI

The State and the Metropolitan Planning Organization must annually certify to the Federal Highway Administration and the Federal Transit Administration that their planning process is addressing the major issues facing the region and is being conducted in accordance with all applicable requirements. FHWA and FTA jointly review and evaluate the transportation planning process of each Transportation Management Area (an urbanized area of greater than 200,000) to determine if the process meets the requirements. The review must take place at least once every four years. FHWA and FTA certify the transportation planning process and/or specify corrective actions. Highway and transit funds may be withheld from the region if it is determined that the planning process does not meet the requirements.

The certification process must identify which mechanisms are in place to ensure that issues and concerns raised by low-income and minority populations are appropriately considered in the decision making process. Appropriate evidence must be presented to demonstrate that these concerns have been appropriately considered and that the MPO has made funds available to local organizations that represent low-income and minority populations to enable their participation in the planning processes.

D. MAP-21 SEVEN NATIONAL GOAL AREAS

As part of the transition to a performance-based transportation program, the Pioneer Valley region has placed an emphasis on transportation improvements that demonstrate progress towards the following seven national goal areas of MAP-21:

- **Safety**—To achieve a significant reduction in traffic fatalities and serious injuries on all public roads.
- **Infrastructure condition**—To maintain the highway infrastructure asset system in a state of good repair.
- **Congestion reduction**—To achieve a significant reduction in congestion o n the NHS.
- **System reliability**—To improve the efficiency of the surface transportation system.
- **Freight movement and economic vitality**—To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development.
- **Environmental sustainability**—To enhance the performance of the transportation system while protecting and enhancing the natural environment.

- **Reduced project delivery delays**—To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices.

The Pioneer Valley MPO has developed an annual Regional Performance Measures task as part of the UPWP to assist in the development of measures that advance the seven national goals and are consistent with Massachusetts GreenDOT policy. In addition, a number of tasks included as part of the UPWP serve to advance a number of planning efforts that support the seven national goals.

Table 2-1 – Pioneer Valley UPWP Support of National Goals Areas

UPWP Task Description	National Goals
Regional Transportation Plan Update consists of the update of the RTP as required every four years. The RTP focuses on incorporating new planning requirements from the MAP-21 legislation and advancing transportation improvements to address regional needs, strategies, and performance measures.	All
Transit System Surveys and Route Implementation collects existing route data and ridership surveys to assist in improving the reliability and performance of the PVTA fixed route system.	Safety, Congestion Reduction, System Reliability
Regional Freight Planning focuses on identifying opportunities to enhance the movement of freight in the region.	Freight Movement and Economic Vitality
Regional Congestion Management Process (CMP) uses a variety of data sources to measure congestion along regional corridors and identify congestion bottlenecks. Planning studies are developed for congested areas to assist in developing projects to reduce congestion.	Congestion Reduction, System Reliability
Regional Pavement Management System collects pavement condition data for all federal aid eligible roadways on a four year cycle. The impact of planned roadway improvement projects can be analyzed under a variety of funding levels to identify the level of investment required to keep pavement in a good state of repair.	Infrastructure Condition, Reduce Project Delivery Delays
Regional Safety and Planning Studies develops a list of the Top 100 High Crash Intersections to monitor the effectiveness of regional safety improvements and to advance planning studies to identify potential safety improvements.	Safety, Reduce Project Delivery Delays
Intelligent Transportation System (ITS) and Regional Evacuation Planning assists in ongoing regional ITS and evacuation planning efforts to increase the deployment of ITS technology, provide real time information to the public, and enhance regional transportation security.	Safety, Congestion Reduction, System Reliability
Climate Change Implementation assists Pioneer Valley communities to plan for the impacts of climate change on the regional transportation system. It also serves to develop strategies and projects that can have a positive impact on greenhouse gas emissions from transportation sources in compliance with the Massachusetts GreenDOT policy.	Infrastructure Condition, Environmental Sustainability
Green Street and Infrastructure encourages the use of green streets and infrastructure where practical to reduce stormwater and other environmental impacts by the regional transportation system.	Infrastructure Condition, Environmental Sustainability

1. The Eight Factors of SAFETEA-LU

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) required all metropolitan planning organizations to incorporate eight factors into their planning process. While this legislation has been replaced by MAP-21, MPOs are encouraged to continue to address the eight planning factors are part of their RTP. The Pioneer Valley MPO has taken great strides to incorporate these eight factors into the Regional Transportation Plan and the regional planning process. This section addresses each factor separately and shows how the Pioneer Valley has incorporated the factor into our regional planning process.

a) Support the economic vitality of the metropolitan areas, especially by enabling global competitiveness, productivity, and efficiency.

In 1994, the Pioneer Valley Planning Commission completed the "Pioneer Valley Plan for Progress: A Regional Economic Strategy for the Pioneer Valley." The Regional Plan for Progress brings together the vital economic interests of the Pioneer Valley to build a competitive regional community with a world class environment which stimulates development and growth. The Plan for Progress was updated in 2004 and reflects a broader concept of regional development that capitalizes on the dynamic interaction of people, place and work. In 2009, a new strategy was added – Develop a Green Regional Economy. The heart of the plan is seven cross-cutting themes that strategy teams must consider in their action plans in order to meet the region's goals: cross-border collaboration (with the greater Hartford region), diversity, education, industry clusters, sustainability, technology, and urban investment.

The Pioneer Valley Region was designated as an official Economic Development District (EDD) by the Economic Development Administration (EDA) in the Fall of 1999. The PVPC annually prepares a Comprehensive Economic Development Strategy (CEDS) report to update the current economic conditions of the Pioneer Valley region, summarize the current status of action strategies, and prioritize a listing of potential projects from our region that are likely to seek EDA financial assistance.

In September of 2000, the Hartford-Springfield Economic Partnership (HSEP) was formed. This partnership helps market the region north and south of the Connecticut-Massachusetts border along the I-91/Connecticut River Valley corridor. HSEP has advanced projects with regional implications and furthered the economic progress of the interstate region by capitalizing on historic, economic, natural, and cultural ties. The region was branded "New England's Knowledge Corridor: Gateway to Innovation" for marketing purposes.

The Pioneer Valley RTP promotes many strategies to enhance the economic vitality of the region. These include recommendations to revitalize the urban core, redevelop Brownfield sites, and improve congested locations. By promoting projects to maintain a safe and efficient multi-modal regional transportation system, local businesses are assured of quick, reliable access to the Interstate Highway System. This facilitates easy access by employees and the efficient movement of products to and from the region.

The PVPC has produced an annual State of the Region Report since February of 2000. This report identifies trends that are either improving or degrading the livability of the Pioneer Valley Region. Information on trends in community vitality, the regional economy, regional commuting trends, and environmental quality was compiled to assist our region in making wise choices to promote responsible growth in the future. The PVPC has created a dedicated website for the State of the Region Report (http://www.stateofthepioneervalley.org/). This web site is a source for evaluating the current state of the Pioneer Valley in western Massachusetts and to view trends of selected economic indicators for the region.

b) Increase the safety of the transportation system for motorized and non-motorized users.

The Pioneer Valley Planning Commission consciously addresses the area of safety in all aspects of our transportation planning process. All transportation studies conducted by the PVPC include a safety component. Historical crash data is utilized to identify past trends and existing pedestrian and vehicular safety issues. Short and long term recommendations are identified as part of these studies to both reduce congestion and improve safety.

The PVPC participated in the development of the Massachusetts Strategic Highway Safety plan to establish the context for how safety will be incorporated into all aspects of transportation planning and project implementation. The mission of this plan is to develop, promote, implement and evaluate data-driven, multi-disciplinary strategies to maximize safety for users of the roadway system.

In May 2013, PVPC updated its the Top 100 High Crash Intersections in the Pioneer Valley Region report. A defined strategy of the 2007 RTP to improve safety, this document ranks intersections based on the number and severity of crashes. It identifies the location of each intersection, current improvement projects that could improve safety, and locations with no currently planned improvements that could benefit from further study. The current version of the report also developed a process to rank the top 25 high crash roadway segments in the region.

Safety of pedestrians, bicyclists and motorists are analyzed and integrated into all transportation projects that PVPC conducts. PVPC is a Highway Safety Improvement Program (HSIP) partner with MassDOT. Road safety audits have become an integral part of the HSIP. A list of roadway safety audits that have completed in the Pioneer Valley region is included as part of Chapter 6.

Finally, the safety of pedestrians, bicyclists and transit riders are also addressed as part of ongoing transportation planning activities and in all transportation surveys produced by PVPC. A survey completed by the PVPC along the State Street corridor in the City of Springfield will assist in the identification of areas that required improved lighting and transit waiting areas. PVPC surveys users of regional off road bicycle facilities to specifically inquire about the safety of users. Concerns regarding pedestrian and bicycle safety expressed by the public during outreach efforts related to the Knowledge Corridor Rail Project were driving influences in securing funds for a grade separated railroad crossing in Northampton. Similar public hearings, studies and outreach efforts identified pedestrians and bicyclists concerns that resulted in safer crosswalks, intersection design, and improved traffic control devices. PVPC participates as part of the LiveWell Springfield coalition to improve access to active living opportunities such as walking and biking in the City of Springfield.

c) Increase the security of the transportation system for motorized and non-motorized users.

The security of the transportation system has quickly become a major priority in the transportation planning process. PVPC staff has worked closely with federal, state and local officials to improve existing databases and maps on critical areas of the transportation infrastructure. Correspondence with local emergency personnel has also been critical to develop plans to implement in the event of natural disasters and acts of terrorism.

Transit facilities in the Pioneer Valley are improving security capabilities and measures. PVTA has implemented an automated vehicle location system that will track the entire service fleet in real time. Security cameras and audio with alert equipment have been installed in passenger terminals, vehicle storage, and maintenance facilities.

The Merrick-Memorial Redevelopment Plan identified a number of issues surrounding the existing security of the CSX rail yard in West Springfield. This led to the development of a number of recommendations for this area and spurred numerous discussions with CSX to advance improvements in this area.

PVPC has conducted evacuation planning studies using the regional transportation model and dynamic traffic assignment. The TransCAD modeling software was used to analyze pre-determined evacuation scenarios at the macro level. Dynamic Traffic assignment was utilized because it is more responsive to operational factors, route changes, and produces more realistic results for modeling unexpected results than traditional travel demand models.

The Western Massachusetts Evacuation Plan was completed in 2013 to provide emergency responders on the local, state, and federal levels with the resources necessary for conducting a regional evacuation in as efficient and effective a manner as possible. The plan provides maps and lists of evacuation routes, population centers, infrastructure, and other critical assets. Contact information for municipal and state officials, as well as major employers, schools, and hospitals is also provided. The plan was completed in conjunction with other emergency plans that have been developed or are currently being developed for western Massachusetts, including a regional sheltering plan and regional communications plan.

d) Increase the accessibility and mobility of people and for freight.

Accessibility to the regional transportation system is a high priority in the Pioneer Valley. The Pioneer Valley Regional Congestion Management Process (CMP) proposes improvement alternatives to maintain convenient access to the regional highway system, and maintain the efficient mobility of vehicles in the region. Performance measures have been implemented into the CMP process for the movement of people and for the movements of goods. These performance measures are utilized to promote consistency with the RTP.

The Pioneer Valley Transit Authority (PVTA) provides wheelchair lifts on all of their fixed route transit vehicles and provides bicycle racks on all buses. Strategies to promote and enhance pedestrian and bicycle travel throughout the region are included as part of the Pioneer Valley Regional Bicycle and Pedestrian Transportation Plan.

The Holyoke Transportation Center was a joint development project between public and private partners that opened on September 27, 2010. This transportation center provides vastly improved transportation access, facilities and amenities for persons traveling to, from and through downtown Holyoke. The transportation center will facilitate intra- and intercity bus service. PVTA operates 7 bus routes to this transportation center; furthermore the center provides connection between bus routes that serve the northern and southern parts of the region. Union Station in Springfield is also under construction to create a state of the art regional intermodal center. The plan features an

expanded and enhanced passenger-rail and bus service. The station could potentially be served by Amtrak, Peter Pan Bus Lines and PVTA.

PVPC has been working with Connecticut DOT to establish commuter rail service between New Haven and Springfield. The corridor was identified as a key component in meeting the goals of improving and sustaining the regional economic viability and improving regional livability in the Pioneer Valley as well as in Connecticut's Capitol region. In addition to serving commuters traveling between the towns and cities along the corridor, the service could provide a connection to Bradley International Airport and multiple links to Amtrak Intercity service.

The efficient movement of freight is a high priority in the Pioneer Valley Region. Representatives from local freight carriers are included as part of the Pioneer Valley Joint Transportation Committee and their needs are addressed as part of the RTP. The movement of freight is also considered in the planning and design of local transportation improvement projects.

PVPC was directed by the FHWA district office in 2009 to update the inventory of freight connectors to the National Highway System (NHS) in the Pioneer Valley Region. This task included an inventory and evaluation of the condition of NHS connector highway infrastructure, a review of improvements and investments made or programmed for each connector; and the identification of impediments and options to making improvements to the intermodal freight connector.

In 2014, construction was completed to realign Amtrak service along 63 miles of the Knowledge Corridor between Springfield and the Vermont state line. This results in significant time savings for the movement of people and goods through the Pioneer Valley. The train now serves the City of Northampton and will serve the City of Holyoke via a new rail station in the near future.

The Merrick-Memorial Neighborhood Redevelopment Plan identifies ways to enhance the longstanding relationship between the CSX rail yard in West Springfield and the neighborhood's various constituencies including residents, industrial users and commercial businesses. A project, currently in the design stage, is being advanced to improve the vertical clearance of the existing Union Street overpass. When completed, this improvement will facilitate access to the CSX rail yard while reducing the impact on heavy vehicles on a residential area.

e) 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.

Travel demand management initiatives, land use strategies, and non-motorized transportation programs are all included in the RTP and will play a vital role in promoting energy conservation efforts in the region. The RTP focuses on both supply-side strategies such as travel demand management, traffic control measures and use of alternate modes of transportation and demand-side strategies such as stronger land use regulations to comply with the Clean Air Act Amendments in the Pioneer Valley.

The Pioneer Valley Planning Commission incorporates the strategies and recommendations of the Regional Transportation Plan into future versions of the Regional Transportation Improvement Program and the Unified Planning Work Program. Through the advancement of projects and studies of regional importance in combination with a strong public participation process it is hoped that an improvement in the quality of life in the Pioneer Valley can be realized.

In 1997, the Pioneer Valley Planning Commission unveiled their regional land use plan - Valley Vision. This plan developed a set of regional goals and objectives and specific action strategies that could be used for implementing our goals to preserve land use at the local level. The first update to the regional land use plan - Valley Vision 2 - expanded on the first plan to incorporate the latest data on population and the results of recent efforts by the Commonwealth to promote Smart Growth and Sustainable Development. Valley Vision 2 is a Smart Growth plan, in that it is designed to promote compact, mixed use development in and around existing urban and town centers, while promoting protection of open space and natural resources outside developed centers. In 2010, PVPC received a grant from the Massachusetts Executive Office of Housing and Economic Development. As part of the grant requirement PVPC has updated Valley Vision to reflect the Commonwealth's Sustainable Development Principals. Creating the new Valley Vision 3 included reviewing changes to regional growth and preservation trends, ensuring regional goals, strategies and tools are consistent with the Commonwealth's, identifying priority areas for protection and priority areas for future growth, and ensuring that our 43 communities are consistent with proposed legislation.

The Pioneer Valley Clean Energy plan focuses on actions that promote and develop clean energy generation in the region that increases the local circulation of profits generated from proposed developments to support a

regional clean energy economy—creating many new local businesses and employment opportunities. The goals of the Pioneer Valley Clean Energy Plan are:

- Reduce our region's energy consumption to 2000 levels by the end of 2009 and reduce that by 15 percent between 2010-2020.
- Site sufficient new capacity to generate 214 million kilowatt hours of clean energy annually in the Pioneer Valley by the end of 2009 and another 440 million kilowatt hours per year by 2020.
- Reduce our region's greenhouse gas emissions by 80 percent below year 2000 levels by 2050.
- Create local jobs in the clean energy sector.

GreenDOT was launched by the Massachusetts Department of Transportation's as a comprehensive initiative to encourage environmental responsibility and sustainability. Through the GreenDOT policy, 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 our activities, from strategic planning to construction and system operations. More information on GreenDOT is provided in the next section of the RTP.

The RTP for the Pioneer Valley Metropolitan Planning Organization adheres to GreenDOT's policies. All proposed transportation planning tasks for the MPO have been modified to incorporate these policies to the extent possible.

f) Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.

The Pioneer Valley transportation planning process focuses on new and innovative ways to enhance the integration and connectivity of the regional transportation system. The revitalization of Union Station in Springfield is an example of a regional project to improve the connectivity between transportation modes. Currently under construction, Union Station will be the new regional intermodal transportation center providing access to public transit, private bus companies, and passenger rail. The downtown Springfield location has convenient access to the Interstate Highway System, ample parking at local garages, as well as convenient pedestrian access.

The Holyoke Transportation Center at Veteran's Park serves downtown Holyoke and provides access to public transit, private bus companies, day-care, and adult education classes. The center is also within walking distance of a new passenger rail station. A Transit Center on a smaller scale is also proposed for the City of Westfield.

The Pioneer Valley RTP in combination with the Pioneer Valley Bicycle and Pedestrian Plan promotes strategies to encourage people to bicycle or walk

as an alternative to making a trip by car. Recommendations include providing bicycle racks at retail centers and places of employment as well as making neighborhoods more walkable, through the installation of sidewalks, bike paths and lanes, and traffic calming measures. The plan supports “complete streets” initiatives that reduce greenhouse gas emissions and promote the healthy transportation options of walking, bicycling, and public transit in balance with automobile use.

The New Haven-Hartford-Springfield Rail project represents a broad partnership between the State of Connecticut, Amtrak and the Federal Railroad Administration (FRA), as well as the states of Massachusetts and Vermont. The goal is ambitious – to provide those living, working or traveling between New Haven, CT, Hartford, CT and Springfield, MA with high speed rail service equal to the nation’s best rail passenger service. Since 1999, the Pioneer Valley Region and Connecticut have been working toward the implementation of passenger rail service between the three cities. The return of passenger rail service to the Connecticut River line in 2014 has improve service time and expanded service to the communities of Greenfield and Northampton. Rail service to the City of Holyoke will also be provided upon completion of their rail station project.

In its 2005 Transportation Appropriations Bill, Congress designated the Boston, MA – Springfield, MA to New Haven, CT as well as the Springfield, MA to Albany, NY corridors as part of the Northern New England High Speed Rail Corridor. Congress further provided funds to study the feasibility of High Speed Rail Service in the Boston – Springfield - New Haven Corridor. MassDOT is advancing a study of the corridor to explore opportunities for passenger rail service and provide a scalable, incremental plan for the implementation of new or expanded services.

g) Promote efficient system management and operation.

The Pioneer Valley Planning Commission utilizes the 3C (Comprehensive, Continuing, Cooperative) Transportation Planning Process for all transportation planning in this region. Public participation is included at all stages of the transportation planning process so that recommendations can be reflective of local needs.

All projects eligible for funding through the Transportation Improvement Program (TIP) are evaluated using the Transportation Evaluation Criteria (TEC) developed for the Pioneer Valley. This new set of criteria was endorsed by the MPO in February of 2015 and incorporates a wide range of criteria to assist in the advancement of MAP-21, GreenDOT, and regional performance measures. Each project is ranked numerically using the TEC in consultation with representatives from the PVPC, the state and local

government. The results of this procedure are used to develop a priority listing of projects for the TIP to be considered by the MPO.

Previously programmed transportation facilities and construction improvements are re-evaluated to determine changing regional transportation needs, priorities and long range considerations before including such projects in the RTP. The Pioneer Valley regional transportation model is utilized to evaluate long-range projects to determine their impact on congestion and air quality in the region.

The planning and development of transportation facilities and services in the Pioneer Valley is coordinated with adjoining Regional Planning Agencies such as the Berkshire Regional Planning Commission (BRPC), Franklin Regional Council of Governments (FRCOG), Central Massachusetts Regional Planning Commission (CMRPC), and the Capitol Region Council of Governments (CRCOG) in Hartford, Connecticut. Traffic counts performed along the regional borders are shared with the neighboring region. In addition, neighboring regions are invited to participate in transportation planning activities of interest.

PVTA has successfully integrated Intelligent Transportation System (ITS) technology on all transit vehicles. This ITS system enhances information and communications technology to increase the security of the transit system for operators and passengers while providing real-time transportation data to increase operational efficiency. Similarly, Interstate Route I-91 now has a fiber-optic communications and ITS surveillance system for the entire corridor from the Connecticut border to the Vermont border. The fiber-optic communications is central to the installation of ITS on this corridor and as a means of serving the local communities and businesses with broadband access to the Internet.

h) Emphasize the preservation of the existing transportation system.

Preserving and maximizing the efficiency of the transportation infrastructure has been identified as a high priority in the Pioneer Valley Planning process. A regional pavement management system has been in place in the Pioneer Valley since 1993 to ensure that federal-aid eligible roadways are maintained in the most cost effective and efficient manner. In addition, many communities in the region have enlisted planning commission assistance to establish a local pavement management system in order to efficiently maintain all community roadways.

The historic $3 billion Accelerated Bridge Program (ABP) represents a monumental investment in Massachusetts infrastructure. This program will greatly reduce the number of structurally deficient bridges in the state system,

while creating thousands of construction jobs. Since 2008, the number of former MassHighway and DCR structurally deficient bridges has dropped from 543 to 416, a decline of 23%. As of October 1, 2014, the ABP has completed 160 bridge projects, with another 29 bridge projects in construction, and an additional 5 bridge projects scheduled to start construction within the next calendar year. Over the course of the eight year program, well over 250 bridges are planned to be repaired or replaced.

Another form of infrastructure preservation consists of the efforts within the region to preserve abandoned rail corridors and toe path canal beds. These right of ways are maintained for future non-motorized transportation uses. The Norwottuck Rail Trail, Connecticut Riverwalk and the Manhan Rail Trail are all examples of projects that reuse existing transportation rights of way in the region.

2. GreenDOT

MassDOT launched its GreenDOT initiative on June 2, 2010. GreenDOT was developed to assure a coordinated approach to sustainability and to integrate sustainability into the responsibilities and decision-making of all MassDOT employees. The following three mutually-reinforcing goals form the foundation of GreenDOT:

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

The initiative is a comprehensive response to a range of state and MassDOT laws, policies and initiatives including: the Global Warming Solutions Act, the Green Communities Act, the Healthy Transportation Compact, Leading by Example, YouMoveMassachusetts, and Complete Streets. The Global Warming Solutions Act requires Massachusetts to reduce economy wide GHG emissions: 10% -25% below 1990 levels by 2020 and an 80% reduction below 1990 levels by 2050. The transportation sector is the largest GHG emitter, producing 31% of 1990 emissions and projected to produce 38% of 2020 emissions. GreenDOT also incorporates a statewide mode shift goal to triple the percentage of trips made by bicycling, transit and walking.

GreenDOT is also comprised on an additional by seven goals that can be tied to regional planning efforts. In the Pioneer Valley region, these goals and their recommended strategies have been incorporated into the new Transportation Evaluation Criteria (TEC) used to prioritize transportation improvement projects included as part of the TIP. The TEC is described in greater detail in Chapter 12 of the RTP. Table 2-2 summarizes the seven

GreenDOT goals, their associated strategies and how they are addressed in the TEC for the Pioneer Valley.

Table 2-2 – Integration of GreenDOT Goals into the RTP

Policy/Planning - Design a Multi-Modal Transportation System, Triple Mode Share of Bicycling, Transit, and Walking, & Promote Healthy Transportation and Livable Communities	
Associated Strategy	**RTP/TEC Integration**
Providing secure and/or covered bicycle parking and shared used paths	Projects are eligible to receive up to 12 points for bicycle and pedestrian improvements in the "Livability" category. Projects receive 1 point for providing bicycle amenities such as bicycle parking.
Improving access to transit and other vital community services	Projects are eligible to receive up to 4 points by improving access to transit.
Designing complete street projects with municipalities	Complete Streets consistency is worth up to 3 points.
Encouraging Safe Routes to Schools projects	Projects that provide safe and reliable access to education receive 0.5 point.
Incorporating public health impacts in the transportation planning process	Projects that complete a Health Impact Assessment will receive 1 point.
Coordinating on regional and statewide bicycle and pedestrian planning efforts.	Many "Livability" subcategories in the TEC support regional and statewide bicycle and pedestrian planning efforts.
Supporting Bike Share programs locally and regionally.	Projects can receive 2 points for being part of a locally adopted Bike Share Program.
Prioritizing critical pedestrian and bicycle network gaps, i.e. Bay State Greenway	Critical Gaps are identified as part of PVPC's Regional Bicycle Linkages Map. Projects that provide connections to regional bikeways/walkways receive 1 point.
Improving bicycle and pedestrian counts	PVPC collects bicycle and pedestrian movements as part of all intersection turning movement counts.
Air - Reduce Greenhouse Gas Emissions & Improve Air Quality	
Associated Strategy	**RTP/TEC Integration**
Developing projects to improve air quality	Projects that demonstrate improvements to air quality can receive up to 1 point.
Analyzing GHG reduction strategies in transportation improvement projects and tracking progress	PVPC performs GHG analysis for all proposed RTP and TIP projects.
Setting regional goals for reducing VMT (travel demand)	Projects that demonstrate a significant reduction in single occupant vehicle use will receive 1 point.
Analyzing fleet fuel usage and supporting retrofits and procurement of alternative fuel vehicles	The RTP supports the use of alternatively fueled vehicles. PVTA has hybrid transit vehicles and is in the process of purchasing electric buses.
Supporting alternative fuels vehicle infrastructure	PVTA is in the process of purchasing an electric vehicle charging station.
Increasing bus and transit route efficiency	The PVPC has an ongoing task in its UPWP to study transit route efficiency.
Promoting anti-idling policies and educational outreach	Not specifically addressed in the TEC but included as a Need in the RTP

Table 2-2 – Integration of GreenDOT Goals into the RTP (cont.)

Energy - Consume Less Energy & Increase Reliance on Renewable Energy		
	Associated Strategy	**RTP/TEC Integration**
	Evaluating outdoor lighting and traffic signal systems, and retrofitting where feasible	Upgrades to traffic signal equipment can be worth up to 6 points.
	Planning for the implementation of energy efficient measures and renewable energy projects	The RTP incorporates strategies from the Pioneer Valley Clean Energy Plan.
Land - Minimize Energy and Chemicals Used in Maintenance & Enhance Ecological Performance		
	Associated Strategy	**RTP/TEC Integration**
	Implementing sustainable stormwater management	Up to 2.5 points can be received through the use of green infrastructure and the reduction of impervious surfaces to manage stormwater.
	Protecting and restoring native landscaping, woodland, and urban tree coverage	Projects that protect or enhance environmental assets receive 0.5 point.
	Implementing sustainable road salt and sanding practices	Included as a strategy in the RTP.
	Designing landscapes for wildlife habitat restoration, safe migration, and accommodation	Improvements to stream crossings and culverts that improve fish and wildlife passage receive 1 point.
	Reducing outdoor light pollution	Not specifically addressed.
	Advocating for urban trees into Complete Streets designs/studies	Complete Streets consistency is worth up to 3 points.
Materials - Improve Lifecycle Impacts of Investments & Purchase Environmentally Preferred Products		
	Associated Strategy	**RTP/TEC Integration**
	Planning for climate resiliency in the development of projects	Projects that preserve floodplains receive 0.5 point. Projects that improve storm resilience in areas prone to flooding receive up to 3 points.
	Supporting the use and identify appropriate applications for warm mix and recycled content paving materials	Not specifically addressed.
Waste - Achieve Zero Solid Waste Disposal		
	Associated Strategy	**RTP/TEC Integration**
	Identifying projects with zero construction waste diversion goals	Not specifically addressed.
	Implementing regional litter prevention programs with their respective municipalities	Not specifically addressed.
Water - Use Less Water & Improve Ecological Function of Water Systems		
	Associated Strategy	**RTP/TEC Integration**
	Planning projects that minimize impacts on surface water and enhance wetlands flood storage capacity	Projects that preserve wetlands receive 0.5 point.
	Considering sea level rise and storm surge projections in project planning	Projects that improve storm resilience in areas prone to flooding receive up to 3 points.

CHAPTER 3

PUBLIC PARTICIPATION

The Draft Regional Transportation Plan for the Pioneer Valley (RTP) underwent a public review and comment period consistent with the Pioneer Valley Region Public Participation Process. Early on in the development of the RTP a series of focus groups were convened to assist in the development of the draft document. Focus groups consisted of a core group of representatives that were invited to participate in a 2 hour discussion on the development of the vision statement, goals, needs, and strategies included in the RTP. Comments received as part of the focus groups were used to assist in the development of the problem statements included as part of the Chapter 1 of the RTP. There were a total of five focus groups on the RTP.

- October 8, 2014 – Bicycle and Pedestrian Focus Group
- November 6, 2014 – Transit Focus Group
- November 6, 2014 – Environment, Sustainability and Climate Change Focus Group
- November 12, 2014 – Infrastructure Focus Group
- November 20, 2014 – Freight Focus Group

In the past PVPC staff also presented elements of the draft RTP at six public meetings geographically spread across the region (Amherst, Chesterfield, Northampton, Springfield, Ware, and Westfield). Attendance at these public meetings was historically very low so an on-line video was developed in consultation with the JTC and MPO to provide a brief overview of the RTP in a format that was more accessible to residents of the Pioneer Valley.

Videos were made available through the PVPC website in December 2014. The video is approximately 15 minutes long and was recorded in both English and Spanish. Complete transcripts of the video narration are also available on the PVPC website. The link to the RTP video is:
http://www.pvpc.org/sites/default/files/RTP%20movie%20Medium%20Quality.mp4

A. DRAFT RTP

The PVPC utilized existing committees such as the Joint Transportation Committee, Pioneer Valley Executive Committee, and Pioneer Valley Metropolitan Planning Organization to provide routine status updates in the development of the Draft RTP. A brief presentation on the RTP was given, and comments received as part of the meeting were incorporated into the Draft RTP. The monthly JTC meetings were

particularly useful to receive feedback from local communities on the content of the RTP.

An environmental consultation day was scheduled to allow the opportunity for discussion and comment on the potential environmental impacts of transportation projects included in the regional transportation plan. PVPC created larger scale maps of many of the figures presented in the RTP and invited a number of special interest groups to comment on the Draft RTP.

- Wednesday, May 13, 2015 – Environmental Consultation Day, 12:00 PM – 4:00 PM, PVPC Office

Two public meetings to solicit public comments on the Draft Regional Transportation Plan were scheduled for 7:00 PM at the following locations:

- July 14, 2015 - Northampton City Hall City Council Chambers, 210 Main Street
- July 16, 2015 - Pioneer Valley Planning Commission, Springfield, 60 Congress Street

Copies of the Draft RTP were made available for public review at: the Agawam, Amherst, Blandford, Chicopee, Easthampton, Holyoke, Ludlow, Monson, Northampton, Plainfield, South Hadley, Springfield, Ware, West Springfield and Westfield libraries; the Springfield office of PVPC; and, on-line from PVPC's web page at www.pvpc.org.

Table 3-1 – Comments Received on the Draft RTP during Environmental Consultation

Comment	From	MPO Response
List TEC Score Subtotals so that people can see how projects performed in each subcategory	Lynn Benander, Co-op Power	This change has been made for TEC scoring summaries.
Expand the type of projects on the list to find more creative ways to achieve TEC goals in new ways. Consider allocating a larger share of the budget to projects that are unrelated to personal vehicle transportation.	Lynn Benander, Co-op Power	The MPO will continue to work to develop an equitable mix of regional transportation projects.
Please add the new and proposed bikeway projects that the City has been working on. These projects include projects in design and proposed projects.	Wayne Feiden, City of Northampton	These changes will be incorporated into the Final RTP.
Please include the new bike lane on 75. Also, the Town is interested in expanding bike lanes on several roads in town. Please refer to mark-ups on the map.	Michelle Chase, Town of Agawam	These changes will be incorporated into the Final RTP.
The town is interested in bicycling and walking connections to surrounding communities including access to Forest Park. Converse Street is being reconstructed. The Town is interested in a Complete Streets Policy.	Marie Angelides, Town of Longmeadow	The MPO will continue to work with the Town of Longmeadow to advance opportunities to enhance bicycle and pedestrian connections.
Please add the new bikeway projects that the town is developing (see map mark-ups).	Dick Grannels, Town of Southwick	These changes will be incorporated into the Final RTP.
EJ Minority area seems inaccurate (West Springfield)	Anonymous	The Minority areas meet the regional definition as defined by the MPO based on 2010 Census data.
Roundabouts – particularly the forthcoming project for Damon Road should make use of the center island for stormwater management.	Anonymous	Comment Noted
To promote best practices/sustainability, there should be dollars specifically devoted to best example projects in the region, perhaps meeting criteria of "Living Community Challenge." This dedicated funding could be similar to allocations currently devoted to safety/high crash intersections.	Anonymous	Comment Noted
There should be funds dedicated to projects with high sustainability scoring, similar to how there is safety money available only for high crash locations.	Anonymous	Comment Noted
Damon Road is now a joke! I have stopped using it because of the stupid new traffic light for the train. Any energy savings gained from new people taking the train are far outweighed by wasted fuel and time in the new Damon Road back-ups.	Anonymous	Comment Noted
The projects are all about motor vehicle capacity accommodation and enhancement. Exit 19 project is an example. But putting this money into auto trip demand reduction measures (bikes, transit, ped) is a far more viable, long term approach. Please show us an alternative TIP with 90% of funds dedicated to auto trip reductions.	Anonymous	Comment Noted

Table 3-2 – Comments Received on the Draft RTP as Part of the 30 Day Public Participation Process

#	Comment	From	MPO Response
1	The MPO should clearly distinguish between the Operations & Maintenance as defined in Title 23 and that of the PVPC Financial Plan. The Financial Plan labels Operations and Maintenance as expenditures which include reconstruction, transportation studies, bridge replacement and other various transportation improvements. These activities are different from maintenance that upkeep and preserve the existing system (i.e sweeping, mowing, crack sealing, bridge washing, signals, rolling stock maintenance). For the purposes of operations and maintenance the financial plan shall contact system level estimates of cost and revenue sources that are reasonably expected to main the federal aid highways and public transportation system (23 CFR 450.324(7)(h)). This demonstration should occur prior to project development to ensure there are adequate resources to maintain the system while implementing improvements.	Brandon Wilcox, FHWA	The Financial Plan has been updated to address these comments and demonstrate sufficient resources are available to maintain the existing transportation system. This information is presented in Tables 13-4 and 13-5.
2	The Financial Constraint summary should separate highway from transit revenue. It addition it is unclear whether Rail commitments are programmed into these categories.	Brandon Wilcox, FHWA	This change has been made as requested.
3	The Financial Plan should identity all necessary sources of funding or strategies to fund transportation projects and needs. The chapter includes several Rail improvements and operational needs. The RTP should identify funding or otherwise specify them as unfunded or illustrative needs.	Brandon Wilcox, FHWA	This change has been made as requested.
4	The MPO should verify that the total programmed commitments on Table 13-13 matches total programmed commitments on Table 13-18 and so forth.	Brandon Wilcox, FHWA	This change has been made as requested.
5	Verify that the transit capital improvement commitments meet financial constraint of available revenue in table 13-5	Brandon Wilcox, FHWA	This change has been made as requested.
6	The MPO should consider describing strategies how “Additional Projects” will be identified in each program category from FY 2016-2040.	Brandon Wilcox, FHWA	Additional information has been added to the Financial Chapter to explain how additional projects will be identified.
7	Table 13-8 is missing the Total Estimated Highway Revenue	Brandon Wilcox, FHWA	This table has been corrected.
8	Instances of 2012 RTP should be corrected to 2016 RTP where appropriate (Pg. 413, 417, 437)	Brandon Wilcox, FHWA	These corrections have been made.
9	The MPO has made significant efforts to incorporate performance measures into its planning and programming documents. The MPO should continue to demonstrate the consistency between the RTP and TIP implementation in regards to performance. The system performance report card will provide a good benchmark for your next RTP update.	Brandon Wilcox, FHWA	Comment noted.
10	Good comprehensive prioritized project lists, including transit.	Nicolas Garcia, FTA	Comment noted.

Table 3-2 – Comments Received on the Draft RTP as Part of the 30 Day Public Participation Process (cont.)

#	Comment	From	MPO Response
11	Financial section appears to contain all the required information.	Nicolas Garcia, FTA	Comment noted.
12	Please combine the revenue and needs tables so that it's easier to compare costs and revenues (or instead of fully combining them, you could also just carry forward the total revenue figure into the needs table).	Nicolas Garcia, FTA	This change has been made as requested.
13	Please include a grand total column in the needs tables.	Nicolas Garcia, FTA	This change has been made as requested.
14	It looks like Transit Capital needs outweigh projected revenues by a wide margin--this is fine but you need to identify a fiscally constrained subset of projects which will be funded if no additional revenue becomes available.	Nicolas Garcia, FTA	The Financial Plan has been updated to address these comments and demonstrate sufficient resources are available
15	There seem to be some issues with the total capital needs calculations: In the Needs Table (13-4) the grand total comes to $784M. However, in the discussion on p. 425, it states that the total need is $660M, a lower figure. And then it goes on to say that the needs are double the available funds ($518M) which isn't true for either of the above figures. Please clarify what precisely the total needs and revenues are, and fix any discrepancies.	Nicolas Garcia, FTA	Additional information has been added to the Financial Chapter to clarify the transit component.
16	The draft RTP is very long at 519 pages. MassDOT suggests that in 2020 when the next RTP is drafted, that the region take a more contemporary approach to a planning document: short concise narrative, reliant on graphics, maps and figures to communicate complex ideas, under 100 pages for principle content and appendices for technical information understood mostly by transportation professionals.	David Mohler, MassDOT Office of Transportation Planning	Comment noted.
17	MPO staff is commended for identifying discrete problems through public outreach processes, transportation needs categorized by priority and strategy based solutions.	David Mohler, MassDOT Office of Transportation Planning	Comment noted.
18	Please replace the term "alternative modes" throughout the document with "healthy transportation" or "bicycling, transit and walking."	David Mohler, MassDOT Office of Transportation Planning	This change has been made as requested.
19	Chapter 1 -This chapter seems redundant to the Executive Summary and in some instances seems to contain verbatim text. This chapter could be shortened and be more truly introductory in nature.	David Mohler, MassDOT Office of Transportation Planning	Chapter 1 will be modified as part of future updates to the RTP.
20	Chapter 2 -This chapter should be briefer while more descriptive of the . transportation planning process. The chapter currently reads as a series of descriptions of agencies, programs and initiatives without sufficient linkages. between each for the reader to understand how transportation planning is conducted. Use of graphics to illustrate processes and decision making is recommended.	David Mohler, MassDOT Office of Transportation Planning	Chapter 2 will be modified as part of future updates to the RTP.

Table 3-2 – Comments Received on the Draft RTP as Part of the 30 Day Public Participation Process (cont.)

#	Comment	From	MPO Response
21	Chapter 3 - Page 62 -The last paragraph should be checked for writing and grammatical errors.	David Mohler, MassDOT Office of Transportation Planning	This change has been made as requested.
22	Chapter 10 - Page 287 -The system performance report is a very clear way to communicate the needs of the region. This information may be useful in the Executive Summary to differentiate it from Chapter 1.	David Mohler, MassDOT Office of Transportation Planning	Comment noted.
23	Chapter 12 - This is a very robust discussion on needs and strategies. The projects that are listed should be more clearly shown to be priorities to be considered for regional target funding or recommendations to MassDOT for funding by statewide sources.	David Mohler, MassDOT Office of Transportation Planning	Projects included as part of Chapter 12 have been ranked as "High, Medium, and Low" priorities based on input received from monthly Joint Transportation Committee meetings, focus group discussions, and the public participation process. In addition all projects have been mapped by this prioritization scheme to clearly indicate the regional prioritization.
24	Chapter 13 - This chapter presents the project funding in a somewhat confusing manner. The tables in the chapter could be revised to be clearer, especially in regards to what the MPO will be programming through their target funding sources, and what is being recommended to MassDOT for funding by statewide sources.	David Mohler, MassDOT Office of Transportation Planning	The Financial Chapter has been reorganized and clarified to clearly present all information based on comments received from FHWA, FTA, and MassDOT.
25	Chapter 15 and 16 -These chapters should be presented earlier in the document as to inform the reader of how Title VI, Environmental Justice and public participation in general influenced the vision, goal setting, metrics, needs, strategies and priority recommendations of the RTP. Chapter 16 could be more robust in its discussion of how the public was engaged, and how that feedback was incorporated into the plan.	David Mohler, MassDOT Office of Transportation Planning	These chapters will be relocated to appear after Chapter 2 in the final version of the document

Table 3-2 – Comments Received on the Draft RTP as Part of the 30 Day Public Participation Process (cont.)

#	Comment	From	MPO Response
26	Please find the attached response to CLF for inclusion in either 1) your responses to RTP comments documentation, and/or 2) in you actual RTP documents if not yet finalized. This is in response to the comment letters from the Conservation Law Foundation, contending that air quality conformity determinations for ozone precursors should continue to be conducted in Massachusetts. The last paragraph in particular is essentially the action that we are taking to address the issues raised.	Trey Wadsworth, MassDOT Office of Transportation Planning	The CLF response will be included as part of the Conformity Chapter of the Final RTP.
27	You likely already have something very similar to the text below for your CO area, but if you have the opportunity to bolster your RTP text for more explanation, you should do so) - The Lowell, Waltham, Worcester and Springfield Areas are classified attainment for carbon monoxide with a limited maintenance plan in place. No regional air quality analysis is required in limited maintenance plan areas as emissions may be treated as essentially not constraining for the length of the maintenance period because it is unreasonable to expect that such areas will experience so much growth in that period that a violation of the carbon monoxide NAAQS would result. Therefore, in areas with approved limited maintenance plans, Federal actions requiring conformity determinations under the transportation conformity rule are considered to satisfy the "budget test." All other transportation conformity requirements under 40 CFR 93.109(b) continue to apply in limited maintenance areas, including project level conformity determinations based on carbon monoxide hot spot analyses under 40 CFR 93.116.	Bob Frey, MassDOT Office of Transportation Planning	The section on "Carbon Monoxide Limited Maintenance Plan" of the Conformity Chapter has been updated to include this more concise text regarding CO maintenance areas.
28	Please find attached the final MassDOT RTP forecasts out to 2040 for population, households, and employment by municipality for Massachusetts. These totals reflect numerous comments and discussions I have had with many of you since April, and while they continue to be based largely on the forecast work of the UMass Donahue Institute and MAPC, they do reflect input received from all RPA staff for areas outside of the MAPC region.	Bob Frey, MassDOT Office of Transportation Planning	The updated socio-economic forecasts have been included as part of the Final RTP.
29	This 522 page RTP is very robust, and a bit overwhelming. For the 2020 RTP, planning efforts should include the creation of a more concise document to encourage community involvement.	Laura Hanson, MassDOT – Projects, Highway Division District 2	Comment noted.
30	From time to time, MassDOT issues formal engineering and policy directives to introduce new design standards or to supplement, clarify or amend existing design standards. This should be referenced in the RTP with the following link since it provides the most recent list of MassDOT Engineering Directives to be used during project design: http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/DesignEngineering/EngineeringDirectives/ListofEngineeringDirectives.aspx	Laura Hanson, MassDOT – Projects, Highway Division District 2	This change has been made as requested.

Table 3-2 – Comments Received on the Draft RTP as Part of the 30 Day Public Participation Process (cont.)

#	Comment	From	MPO Response
31	Page 493 Item B 1.a should mention or discuss Estimated Habitat, as a GIS sub set of Priority Habitat, or in general. Priority should be capitalized. http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/regulatory-maps-priority-and-estimated-habitats/	Robert Natario, MassDOT – Environmental, Highway Division District 2	This change has been made as requested.
32	Page 493 Item B 1. b Mass Stream Crossing Standards were developed by the Dept of Fish and Game, Division of Ecological Restoration, and UMass is normally given credit for developing the original Standards in 2004.	Robert Natario, MassDOT – Environmental, Highway Division District 2	This change has been made as requested.
33	Page 494 Item B 1. c It is suggested to include or mention The Design Guide, Chapter 14, Wildlife Accommodation. Chapter 14 - http://www.massdot.state.ma.us/Portals/8/docs/designGuide/CH_14.pdf Design Guide - http://www.massdot.state.ma.us/highway/DoingBusinessWithUs/ManualsPublicationsForms/ProjectDevelopmentDesignGuide.aspx. It is also suggested to change the Link provided to the Link below: http://www.massdot.state.ma.us/highway/Departments/EnvironmentalServices/FormsPublicationsDocuments/StormwaterManagement.aspx	Robert Natario, MassDOT – Environmental, Highway Division District 2	This change has been made as requested.
34	Suggest changing the existing language on Page 494 regarding the Wetlands Protection Act to: The Massachusetts Wetlands Protection Act provides definitions of wetland resource areas and their 100 foot Buffer Zones, and gives jurisdiction to the Conservation Commission of each City or Town. If a project is located within a 100 foot Buffer Zone, or proposes work within a wetland, stream or intermittent stream, a proponent must go before the appropriate local Con Com. Depending on the impacts of the project the proponent may need to file either a Request for Determination of Applicability or a Notice of Intent. In turn the Con Com, and DEP would review the project and issue a Determination or an Order of Conditions. If the project requires a NOI and is also within NHESP Habitat, the NOI must be sent to NHESP for their review and comment. There are Buffer Zone and other limited exemptions within the WPA, and as listed above there are exemptions to work within NHESP Habitat. http://www.mass.gov/eea/agencies/massdep/water/regulations/310-cmr-10-00-wetlands-protection-act-regulations.html	Robert Natario, MassDOT – Environmental, Highway Division District 2	This change has been made as requested.

Table 3-2 – Comments Received on the Draft RTP as Part of the 30 Day Public Participation Process (cont.)

#	Comment	From	MPO Response
35	It is suggested to revise the section on the River Protection Act from Pages 494 & 495 to: Chapter 258 of the Acts of 1996 protects areas within 200 feet of rivers and perennial streams, beginning at the mean annual high water line on both sides of the river or stream. This 200 foot resource area known as Riverfront Area is a consideration the Wetlands Protection Act and is under jurisdiction of the Local Conservation Commissions and DEP. http://www.mass.gov/eea/agencies/massdep/water/regulations/massachusetts-rivers-protection-act.html	Jennifer Richard, MassDOT Highway Division District 2	This change has been made as requested.
36	In looking over the map and text in chapters 8 (page 253) and 9 (page 266-7) that refer to Critical Linkages data on culverts, I had a question (not a formal comment, just asking for clarification). I am wondering if there might have been a slight misinterpretation of these data. The plan refers to these as showing the top 5% of culverts and stream crossings for ecological and hydrological connectivity. If you are using the data TNC sent, or you are using the raw Critical Linkages data but using the delta IEI or impact score, then this interpretation is not entirely matched up to the data. What we sent (which uses the impact score), measures the potential increase in habitat connectivity that results from improving a road-stream crossing. In other words, these would be the top 5% of culverts and stream crossings with the greatest potential to increase the connectivity of surrounding habitat if they were improved. Critical Linkages is very powerful and is being used by MassDOT and EEA and many others, so I think it's a great update to the RTP, but its weakness is that it can be very difficult to explain when you are trying to work it into a document like this. If you have questions about any of the above, or if it would be easier for you to direct the author of this section to take a look and connect with us with questions, feel free to contact Jessica Dyson at jdyson@tnc.org or 617-532-8349. As she helped develop these data, she's probably the best person to answer questions about their interpretation and how to accurately explain them.	Laura Marx, The Nature Conservancy Massachusetts Chapter	This section will be rewritten to clarify the representation of Critical Linkages data as it appears in the RTP.
37	We are still working on getting the NECR 286K upgrade rail project off the ground. We have met with the new MASSDOT secretary and her rail manager. The new DRAFT MASSDOT one year plan notes: "The next five-year capital plan will have the opportunity to reflect the priorities of our communities through their respective Regional Transportation Plans that will be endorsed by MPOs this summer." I would like to talk about how the NECR 286K project fits into this plan. As you remember, the project was in the bond bill last year and it is highly ranked in the MA State Rail Plan.	Charles Hunter, Genesee & Wyoming Railroad Services, Inc.	Additional information has been added to the RTP on the NECR 286k rail project. The project has also been added as a Visionary project in Chapter 14.

Table 3-2 – Comments Received on the Draft RTP as Part of the 30 Day Public Participation Process (cont.)

#	Comment	From	MPO Response
38	I am requesting that a new project the Town has recently started designing be included as a High Priority project in the plan. The project I am referring to is the Memorial Avenue Complete Streets project. The project entails the rehabilitation of the Memorial Avenue (Route 147) corridor from the Route 5/Memorial Avenue Rotary to the Route 147 Bridge over the Westfield River connecting the Town with Agawam.	Edward C. Sullivan, Mayor of West Springfield	This project has been added to the financially constrained section of the RTP as requested.
39	Agawam believes that the Feeding Hills Intersection reconstruction project should be changed from a medium to a high priority. When comparing the TEC score for this project with the other projects that are ranked as a high priority, it seems like this project should fit in that same category. Also, this project is in a critical area that experiences significant congestion. The project also has a great deal of both public and political support.	Michelle C. Chase, Agawam Town Engineer	This change has been made as requested.
40	I wish to express my interest in improvement of Brimfield Road, Holland, MA.	Elaine Lengowski	Comment noted. This project is included as part of the financially constrained section of the RTP.
41	I am writing in support of the Brimfield Road repaving project in Holland. This is one of the main roads leading into Holland and the connector road to Interstate 84 in Union, CT. the road gets a lot of traffic and is in poor condition. I hope this project will be funded soon.	JoAnn Higgins	Comment noted. This project is included as part of the financially constrained section of the RTP.
42	This email is to provide support for the Town of Holland's attempt qualify for a TIP Grant for use in repaving Brimfield Road. • As you probably know, major sections of Brimfield Road in Holland are badly in need of resurfacing, with the cost of repair increasing each year as the roadway surface and support deteriorates. • The Town struggled to come up with the funds to proceed with the preliminary engineering work, hoping that having the project 'shovel ready' would improve our chance of receiving the grant when funds became available. Appropriating dollars for the engineering work was no small task, as our small town's funds are limited and spending these dollars came with significant risk that a grant for the project would not become available. • Brimfield Road is the major connector between Holland and Brimfield, and the most direct route taken by the Brimfield Ambulance Services in serving medical emergency needs in our town. • Although the dollars needed for the Brimfield Road repaving are small in comparison to most 'big city' projects, these dollars are of MAJOR support in maintaining roadway infrastructure in smaller towns such as Holland.	Andrew and Lynn Harhay	Comment noted. This project is included as part of the financially constrained section of the RTP.

CHAPTER 4

ENVIRONMENTAL JUSTICE AND TITLE VI CERTIFICATION

A. BACKGROUND

The Pioneer Valley Planning Commission (MPO) is required to certify to the Federal Highway Administration and the Federal Transit Administration that their planning process addresses the major transportation issues facing region. This certification assures that planning is conducted in accordance with Title VI of the Civil Rights Act of 1964, and requirements of Executive Order 12898 (Environmental Justice). Under the provisions of Title VI and Environmental Justice PVPC works to assess and address the following:

Civil Rights Act of 1964, Title VI " No person in the United States shall, on the grounds of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."

Executive Order 12898, Environmental Justice "Each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing as appropriate disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.

The U.S. Department of Transportation (USDOT) issued a DOT Order to Address Environmental Justice in Minority Populations and Low-Income Populations in 1997. It identifies environmental justice as an "undeniable mission of the agency" along with safety and mobility. USDOT stresses three principles of environmental justice:

- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
- To prevent the denial of reduction in or significant delay in the receipt of benefits by minority and low-income populations.

B. GOALS OF THE PIONEER VALLEY ENVIRONMENTAL JUSTICE PLAN

The Pioneer Valley Planning Commission has been working together with Pioneer Valley Transit Authority (PVTA), MassDOT, Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) on addressing the principles of Title VI and Environmental Justice in the

transportation planning process for the Region. The primary goals of the plan include:

1. Goals Related to Identifying the Region's Minority and Low-Income Populations

- Develop a demographic profile of the Pioneer Valley Region that includes identification of the locations of socio-economic groups, including low-income and minority populations as covered by the Executive Order on Environmental Justice and Title VI provisions.

2. Goals Related to Public Involvement:

- Create a public involvement process that identifies a strategy for engaging minority and low-income populations in transportation decision making, and routinely evaluate this strategy for its effectiveness at reducing barriers for these populations.

3. Goals Related to Service Equity:

- Institutionalize a planning process for assessing the regional benefits and burdens of transportation system investments for different socio-economic groups. Develop an on-going data collection process to support the effort and identify specific actions to correct imbalances in the RTP, TIP and Transit funding.

C. IDENTIFICATION OF MINORITY AND LOW INCOME POPULATIONS AND TARGET POPULATIONS

Strategy - *Identifying minority and low-income populations using 2010 Census data. Review EJ population thresholds and assessment methods from other regions and select a definition that provides the best representation for minority and low-income populations in the Pioneer Valley.*

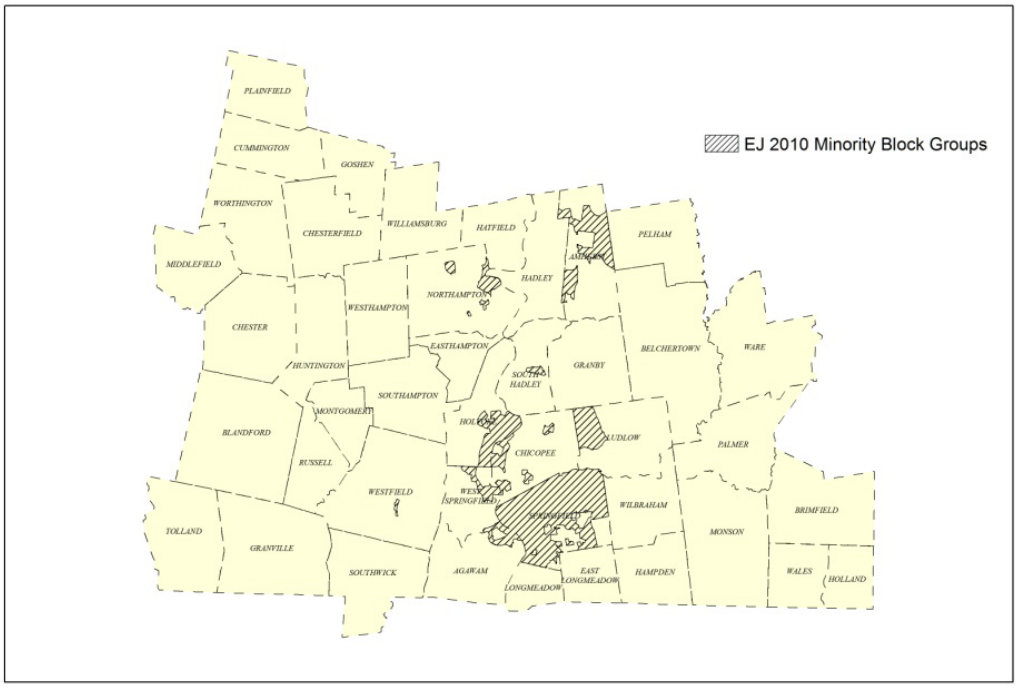
The equity performance measures developed in subsequent sections of the plan are dependent on an accurate definition of the "target population." The 43 communities of the Pioneer Valley Region are diverse in incomes and ethnicity. The region's urban cores of 14 communities comprise the majority of the population and nearly 90 percent of the jobs. To establish the most effective measure of equity, PVPC staff reviewed EJ plans from similar Metropolitan Planning Organizations in other parts of the country. The definition used to define "target populations" in each of these plans was scrutinized and evaluated based on its applicability to our region. From these plans, 8 different population definitions for low income and minority populations were singled out for review in Pioneer Valley. PVPC actively solicited additional feedback and input from stakeholders in the region.

1. Minority Populations

The PVMPO defines “minority” as “the population that is not identified by the census as White-Non-Hispanic” in the ACS (2010 based Census). Under this definition, minority persons constitute 23.48% of the region’s population. The racial or ethnic groups included are:

- White Non-Hispanic
- African-American or Black
- Hispanic or Latino (of any race)
- Asian (including Native Hawaiian, & other)
- American Indian (& Alaska Native)
- Some other race
- Two or More Races

Figure 4-1 – Census Block Groups with Minority Populations Exceeding Regional Average



Source: ACS 2006-10 (2010 based Census)

Minority persons comprise 23.48 percent of the region's population as a whole. The racial or ethnic groups used in the 2010 census include; White Non-Hispanic, African-American or Black, Hispanic or Latino (of any race), Asian (including Native Hawaiian, & other) American Indian (& Alaska Native), Some other race, and Two or More Races. For the EJ tasks minority was defined as **“the population that is not identified by the census as "White-Non-Hispanic."** (A breakdown of these populations is included in Tables 4 -1 – 3.)

Table 4-1 – Pioneer Valley Population by Race

Race	Population	Percent
White alone	499,593	82.11%
Black or African American alone	39,915	6.56%
American Indian and Alaska Native alone	1,493	0.25%
Asian alone	11,095	1.82%
Native Hawaiian and Other Pacific Islander	390	0.06%
Some other race alone	42,650	7.01%
Two or more races	13,343	2.19%
Total:	608,479	100.00%

Table 4-2 – Pioneer Valley Non-Hispanic or Latino Population Breakdown

	Population	Percent
Not Hispanic or Latino:	534,070	87.77%
White alone	475,944	78.22%
Black or African American alone	36,774	6.04%
American Indian and Alaska Native alone	1009	0.17%
Asian alone	10,993	1.81%
Native Hawaiian and Other Pacific Islander alone	210	0.03%
Some other race alone	797	0.13%
Two or more races	8,343	1.37%

Table 4-3 – Pioneer Valley Hispanic or Latino Population Breakdown

	Population	Percent
Hispanic or Latino:	74,409	12.23%
White alone	23,649	3.89%
Black or African American alone	3,141	0.52%
American Indian and Alaska Native alone	484	0.08%
Asian alone	102	0.02%
Native Hawaiian and Other Pacific Islander alone	180	0.03%
Some other race alone	41,853	6.88%
Two or more races	5,000	0.82%

2. Identification of Low Income Populations

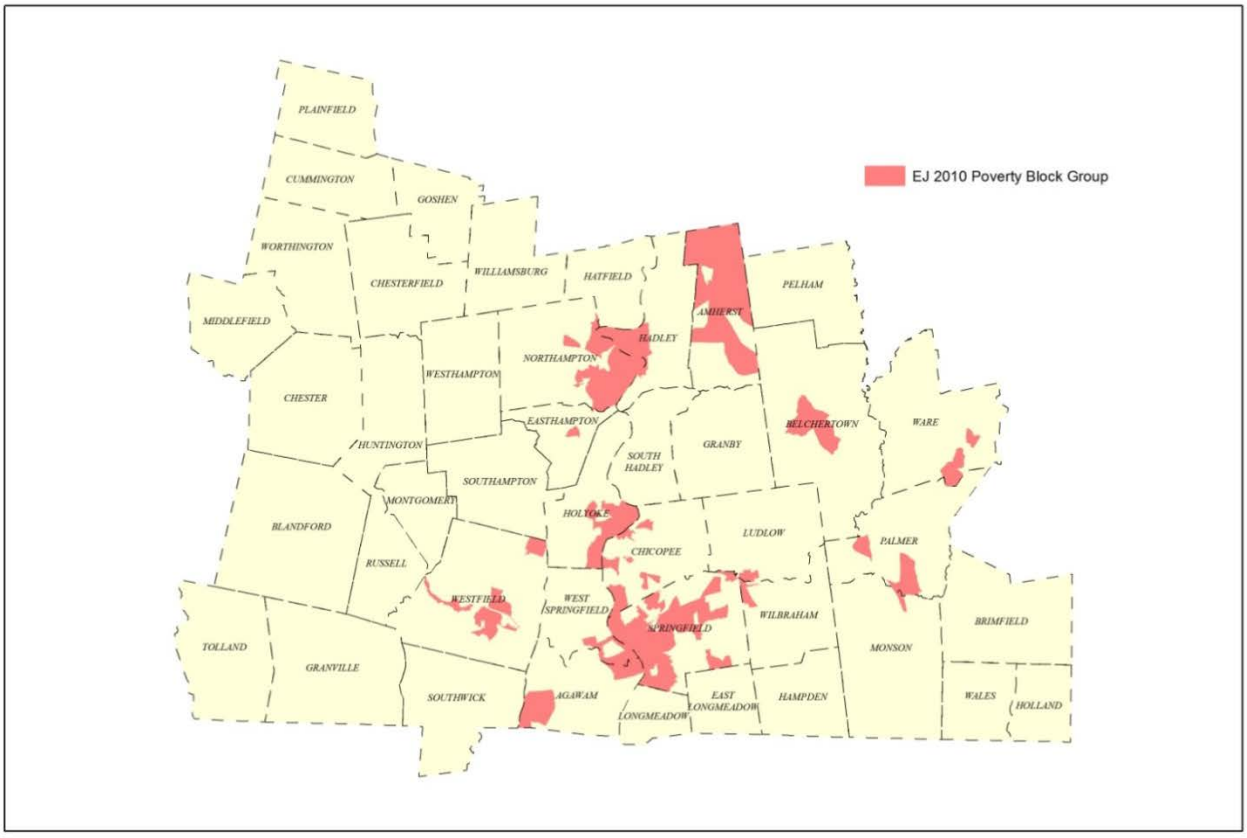
The PVMPO defines a “low income” areas using census block group data. Any block group with a proportion of people in that block group living at or below the federally defined poverty level that exceeds the proportion of people in poverty in the region as a whole, which is 15.47% is defined as “low income.”

3. Region Trends in Low Income Trends in Populations

In the Pioneer Valley region, poverty rates of the general population have climbed from a low of 12.6% in 2002 to 16.7% in 2012. Between 2005 and 2010, poverty rates hovered consistently around 15 percent, dropping slightly in 2008 but then increasing in 2009 to 15.8 and again in 2012 to 16.7 percent,

a rate higher than has existed for over a decade. This rate continues to follow a decade-long pattern of exceeding Massachusetts' overall rate by several percentage points. In 2012, this difference was 5.9 percent. The poverty rate trends, and the per capita income growth patterns suggest that the region did not share equally in the state's economic growth at the end of the 1990s, nor in the middle portion of the 2000s. While in 2010, for the first time in over a decade, the total poverty rate in the Pioneer Valley region was lower than that of the nation as a whole; the current 2012 rate is 1.9% above the national rate.

Figure 4-2 – 2010 Census Block Groups with a Poverty Rate above that of the Region



Source: ACS (2010 based Census)

4. Region Trends in Minority Populations

Continuing an established trend, the region's Hispanic and Latino population grew by 48.2% between 2000 and 2012, a rate of growth that was significant, though slightly lower than that of both the state and nation (see Table 2). While the rate of growth in the Hispanic and Latino population has been slightly slower than that of the state, at approximately 17% of the total population, the Hispanic and Latino population is actually slightly higher than

that of the nation. In this sense, the Pioneer Valley region looks less like the rest of the state as a whole and more like nation-wide demographics. Conversely, the proportion of the Pioneer Valley region population identifying exclusively as White (81.3%) is closer to that of the state (80.1%) than to the nation (73.9 percent).

Table 4-4 – Hispanic or Latino Population in the Pioneer Valley Region 2000-2012

	Hispanic or Latino Persons			% of Total Population		
	2000	2012	% Change	2000	2012	% Change
Pioneer Valley Region	74,409	110,301	48.2%	12.2%	17.6%	5.4%
Hampden County	69,197	102,369	47.9%	15.2%	22.0%	6.8%
Hampshire County	5,212	7,932	52.2%	3.4%	5.0%	1.6%
Massachusetts	428729	673,885	57.2%	6.8%	10.1%	3.3%
United States	35,305,818	52,961,017	50.0%	12.5%	16.9%	4.4%

Sources: U. S. Census Bureau, 2010 Decennial Census and 2012 ACS 1-Year estimates

Table 4-5 – Population by Race 2012

	White	African American	Native American	Asian	Pacific Islander	Other Races
Pioneer Valley Region	81.3%	7.0%	0.3%	2.8%	0.0%	8.6%
Hampden County	78.4%	8.6%	0.3%	2.2%	0.0%	10.5%
Hampshire County	89.8%	2.6%	0.1%	4.4%	0.2%	2.9%
Massachusetts	80.1%	7.1%	0.2%	5.7%	0.0%	6.8%
United States	73.9%	12.6%	0.8%	5.0%	0.2%	7.5%

Source: U.S. Census Bureau, 2012 1-Year County Population Estimates.

Percentages add up to more than 100% because of ability to report more than one racial category. Because the U.S. Census Bureau considers Hispanic/Latino an ethnic category rather than a race category, all race categories include some people who are Hispanic or Latino and some who are not.

D. IDENTIFICATION OF PERSONS WITH DISABILITIES POPULATIONS

In identifying “Persons with Disabilities” PVPC used the Census definition of employed persons with a disability between ages 21-64. A more inclusive definition of people needing transportation services would also include age groups 5 and younger, and children age 5-17. However, because these age groups are not considered part of the workforce that typically needs daily transportation; they are not included in this analysis. The 2015 update of this report used the American Community Survey block level estimates for this data.

Figure 4-3 – Census Block Groups- Individuals in the Pioneer Valley Age 21-64 with Disabilities

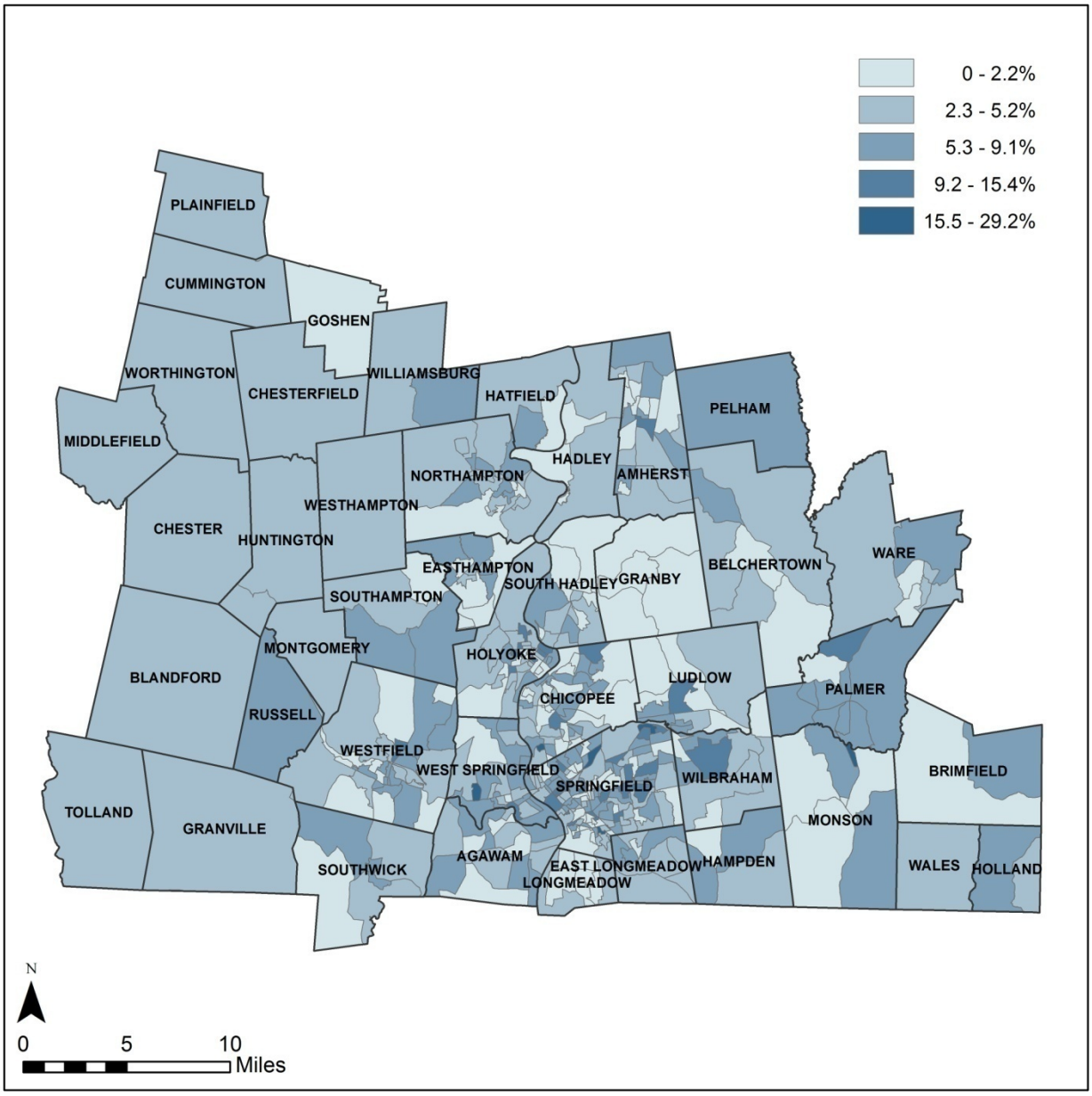
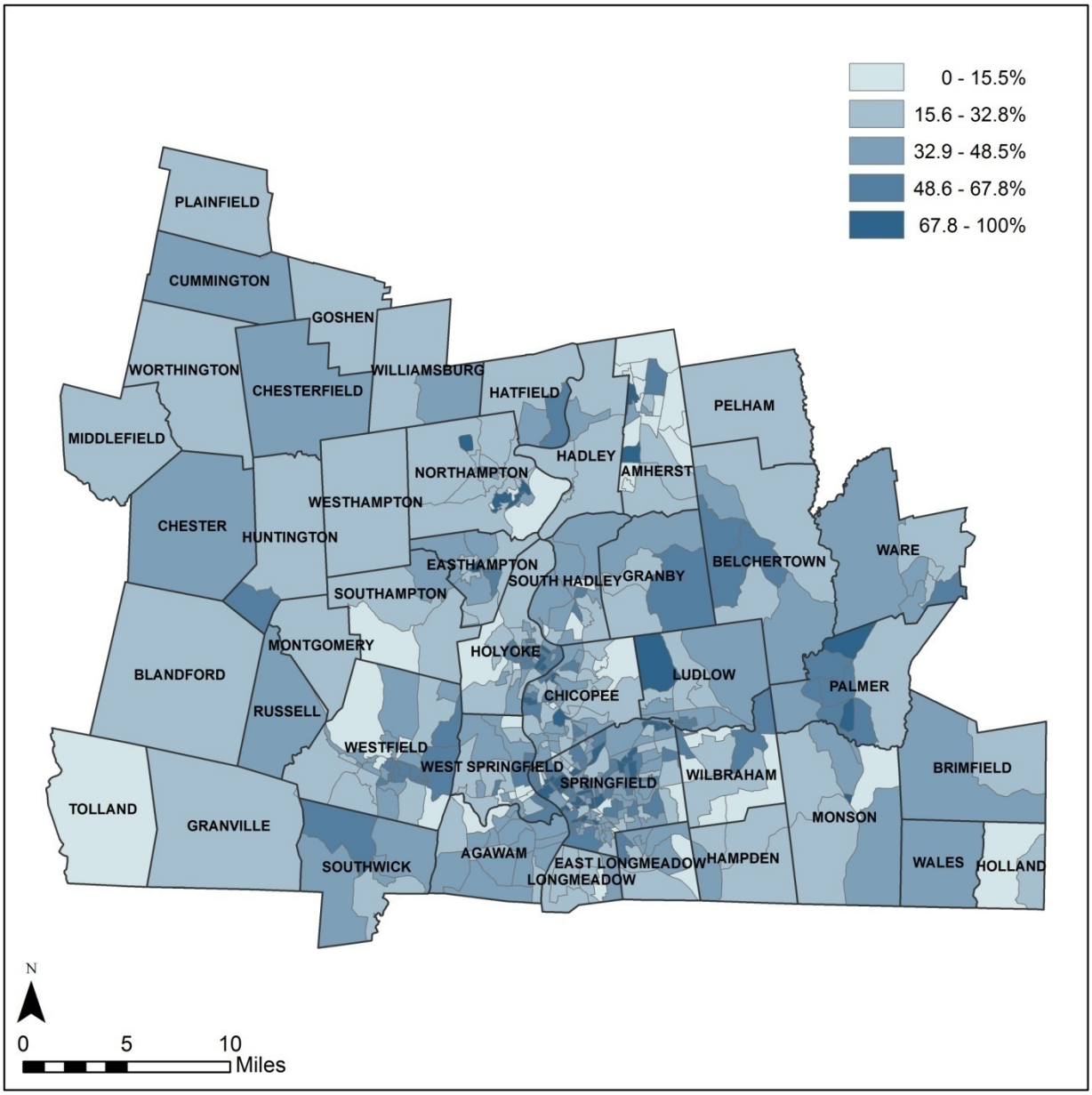


Figure 4-4 – Census Block Groups Individuals in the Pioneer Valley Age 65+ with Disabilities

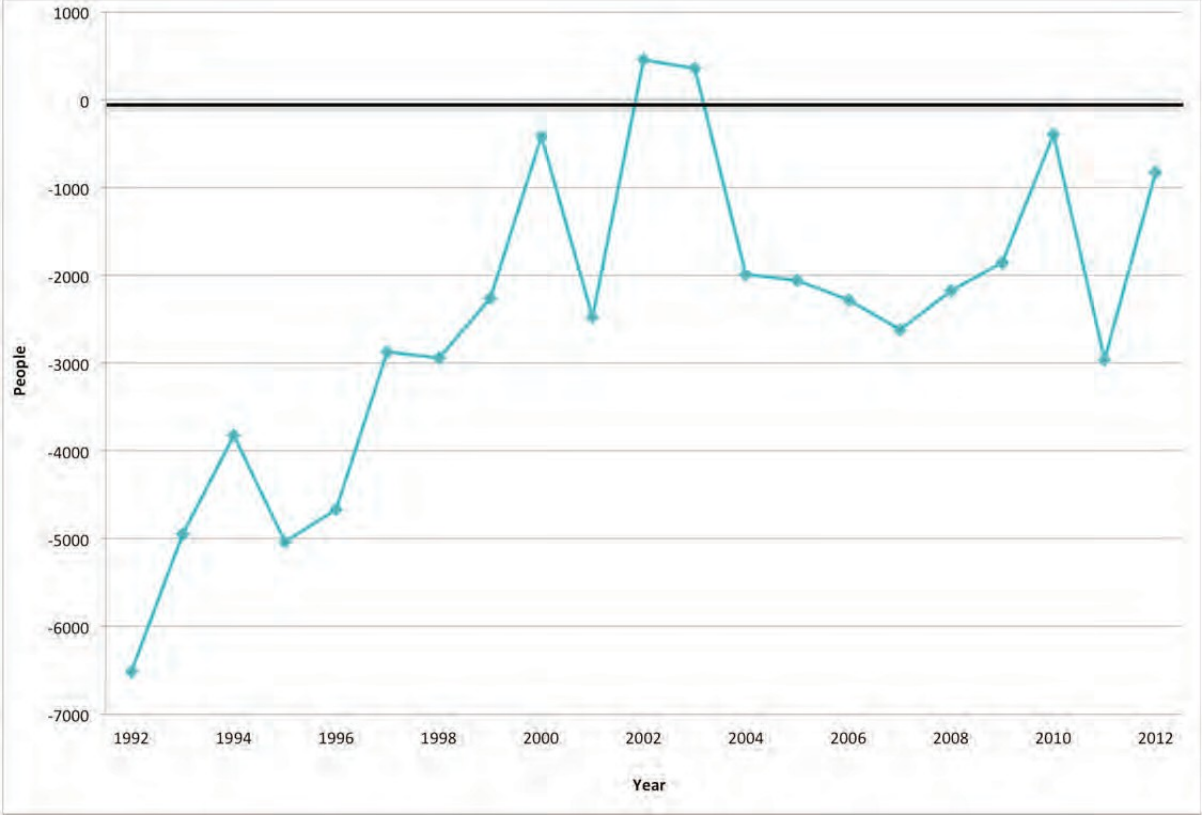


1. Foreign Born Demographics and Migration

Retaining the population base has been a challenge in the Pioneer Valley region, although trends of out-migration have decreased to half of what they formerly were. In the 1990s, there was a net domestic out-migration of nearly 40,000 people. While the first decade of the 21st century has still seen net domestic out-migration, the loss between 2000-2010 was less than half of the previous decade with net out-migration of about 15,500 people and just under 4,000 additional people lost by 2012. . Migration out of the Valley peaked in

2007 at 2,621 and decreased significantly in the years following. This was also the period during the recession of the 2000s when the housing market crashed and reflected similar trends to those in previous economic downturns. Of concern, 2011 saw another spike in outmigration to 2,963; however, 2012 saw that trend slow again to 831. Although 2012 was hopeful, this trend will need to be watched closely to determine if recent improvements will be negated over the coming years.

Figure 4-5 – Net Domestic Migration in the Pioneer Valley Region



Source: U. S. Census Bureau Population Division, 2012

The Pioneer Valley has always been a destination for foreign immigrants and this continues to be the case. From 1990 to 1999 inclusive, a total of 12,703 new immigrants settled in the Pioneer Valley region. In fact, if not for foreign born immigration, the Pioneer Valley region would have experienced a net loss of population between 1990 and 2000. This trend of foreign immigration has continued and the first decade of the 2000s saw an even larger influx. During the period 2000-2012 inclusive, an additional 23,283people immigrated to the region from another country representing 3.7% of the 2012 population.

E. CONSULTATION AND ACTIVE SOLICITATION OF PUBLIC PARTICIPATION

The Public Participation program was developed around a process that includes outreach to representatives of the target populations. The Pioneer Valley Planning Commission has an ongoing working relationship with representatives of minority and low-income populations. The Plan for Progress, the Urban Investment Strategy Team, and the Welfare to Work Program and Regional Comprehensive Land Use Plan have created relationships with opened lines of communication into the needs and issues of minority and low-income populations.

In developing the EJ program PVPC started with a review of the existing public participation program. With this document serving as a foundation, staff began actively soliciting participation from representatives of minority and low-income population that had previously not participated in the planning process. PVPC reorganized the public participation process to focus more staff resources towards consultation with organizations representing low income and minority populations and coordinated the transportation outreach into the meetings and schedules of these stakeholders. The goal was to examine all aspects of the transportation planning process and allow PVPC to be actively involved in creating programs and projects that directly addressed the need of these groups that actively serve the populations. The issues and needs identified in this ongoing process are incorporated into projects, programs, and specific tasks through the Unified Planning Work Program, Transportation Improvement Program, and the Regional Transportation Plan.

1. Methods to Engage Populations in the Planning Process

Many neighborhoods in Pioneer Valley Region receive a high influx of immigrant populations from a wide range of nationalities. PVPC staff develop and employ a strategic public engagement process with an open approach to engage, inform and involve ethnically diverse neighborhoods in the decision making process.

PVPC's guiding principles in this process include:

- Effective public participation is about relationship and trust building. Engaging people is challenging work and engaging people in transportation issues is especially challenging.
- As outsiders (PVPC is viewed as an outsider) we approach the low-income, minority, LEP populations where they live and where they gather and through established community-based organizations that interact with them. This is how to connect.

- Finally, think of outreach as an "ongoing process" that we are constantly working to improved and refine as our needs change and our communities change.

2. Previous Work

PVPC has continued to solicit input from minority and low income stakeholder groups and organizations regarding transportation planning efforts, including the Regional Transportation Plan and Transportation Improvement Plan and the Unified Planning Work Program. Public participation efforts related to the RTP and TIP have been expanded to include Spanish language notices in local media, interpretive serviced and translation services upon request. PVPC has conducted presentations at neighborhood council meetings, and attended community activities. A new complaint procedure was developed in 2014 for responding to issues and concerns regarding Title VI. PVPC gave a presentation to MPO members regarding Title VI and Environmental Justice and continues to improve on coordination of efforts on Title VI and Environmental Justice between PVPC, FRCOG, and CRCOG. PVPC revised the Public Participation Plan to include bilingual outreach for all public participation efforts that impact target populations. This effort includes public notices for major planning documents (RTP, TIP, and UPWP) and transit surveys. In 2015 staff attended training workshops sponsored by FHWA on improving public outreach. MassDOT's Office of Diversity and Civil Rights staff has presented and met with staff regarding Title VI and opportunities to expand outreach. Title VI program updates and revisions have been presented to the Joint Transportation Committee and the MPO. The Joint Transportation Committee and the MPO review and approve the scope of work for Title VI tasks in the UPWP and reviewed many of the planning products. Demographic data on target populations was used to schedule the location of public outreach efforts to assure that public hearings for the Regional Transportation Plan were held in communities with significant Title VI and EJ populations.

Examples of Title VI and EJ related outreach are described in the following:

a) Merrick Memorial Project

In the Merrick Memorial Project PVPC staff met with local officials and interviewed the Memorial Elementary school principal with regard to the language groups and minority groups frequently encountered, when working in the neighborhood. PVPC asked specifically what type translation services are frequently needed or requested and how these needs are typically met. During and after meetings, community groups and neighborhood contacts were asked about the best way to notify residents of future meetings or project development. This notification included:

- Email notice
- Ads in the newspaper with translations
- PVPC website
- Announcement from community group (religious, political, etc.)
- Telephone calls to key elected officials and city staff.
- To facilitate involvement PVPC placed an emphasis on low tech visual aids with less text and more interaction and discussion. Handouts, maps, charts effectively engaged residents and contributed to overcoming language and cultural barriers. Healthy food and beverages were provided and Interpreters were on-site and available when needed. Staff encouraged responses and feedback; "we would like to know if our assumption are correct from your perspective." Oral comments and a scribe was assigned to take notes or record comments.

b) Springfield Complete Streets Bicycle and Pedestrian Plan

In developing the Springfield Bicycle and Pedestrian Plan, PVPC staff engaged a broad group of neighborhood community organizations to assist in public outreach and coordination. This coalition included:

- Baystate Health Brightwood Health Center
- Caring Health Center
- City of Springfield Office of Elder Affairs
- City of Springfield Office of Planning and Economic Development
- City of Springfield Parks Department
- Concerned Citizens of Mason Square
- Develop Springfield Corporation
- Enterprise Farm
- Gardening the Community
- HAP Housing
- Health New England
- Mason Square Health Task Force
- Mass in Motion
- Mass Mutual
- Massachusetts Department of Public Health Western Region
- MassBike
- New North Citizens Council
- Partners for a Healthier Community
- Pioneer Valley Asthma Coalition
- Pioneer Valley Riverfront Club
- Springfield Housing Authority
- Springfield Partners for Community Action
- Springfield Vietnamese American Civic Association
- University of Massachusetts Amherst

- Vietnamese Health Project/ Mercy Medical Center

c) Equity Caucus Agenda 2015

The Pioneer Valley Planning Commission is one of just six organizations across the country to receive an award from the Leadership Conference Education Fund and PolicyLink to advance affordable, accessible transportation policy. PVPC will use funds to embed transit equity principles into LiveWell Springfield and will host local activities to engage, educate, and empower local leaders within communities of color to lift up the Equity Caucus Agenda locally and federally. Specifically, PVPC is collaborating with Joseph Krupczynski and the Center for Design Engagement, Natalia Muñoz of Verdant Multicultural Media, and Evelín Aquino to expand the successful Capacity Building sessions implemented in 2014 for emerging leaders in Springfield. (For a summary of this work, go to: http://www.pvpc.org/content/new-video-building-skills-equity-and-engagement-planning).

When PVPCP completed a three-and-a-half-year HUD-funded equity and engagement project in 2014, a need was identified to expand capacity building. With this effort PVPC's civic engagement goal is not just to engage individuals from under-represented groups, but also to create pathways for them into positions of power. Participation from communities that are often left out brings important voices to the table.

The five other grant recipients are Metropolitan Organization for Racial and Economic Equality (Kansas City, MO), Puget Sound Sage/Tacoma-Pierce County Equity Network (Seattle, Washington), Services for Independent Living (Euclid, Ohio), Urban Habitat (Oakland, California), and WISDOM (Milwaukee, Wisconsin). Emerging leaders from Springfield will meet with representatives from these communities in Washington, D.C. this June to share information about the work.

Equitable transportation investments are crucial to connecting people to jobs, educational opportunities, affordable housing, health care, and other basic needs. Through a coalition of over 100 organizations, the Transportation Equity Caucus is charting a new course for transportation investments, one that is focused on policies that advance economic and social equity in America.

d) PVTA Service Change Meetings and Public Outreach

In December 2013, four public information meetings were held to share ideas for improving PVTA service and to gain input from riders and the general public. These meetings included a formal presentation of potential service improvement options being considered by the PVTA study team, and the

opportunity for attendees to discuss their ideas and concerns about particular routes. Meetings were held in Springfield, Holyoke, Northampton and Amherst; more than 75 individuals attended. These meetings were supplemented with rider drop-in sessions at the Springfield Bus Terminal and the Holyoke Transportation Center.

In March and April of 2014, fourteen formal public meetings were held around the service area to get final public input on specific route changes. A third party hearings officer presided over the meetings. The hearings officer was responsible for allocating time to individuals for public testimony; all meetings were recorded and transcribed for the PVTA Advisory Board. PVTA provided a Spanish translator at all of the meetings and all meeting locations were ADA accessible. Individuals who attended the meeting were provided an informational sheet with the recommended service change and a map of the particular route(s) they were interested in commenting on. These informational sheets were provided in English and Spanish. If the individual had further questions, the PVTA provided staff that could provide details as needed.

e) Executive Order 530 and Regional Coordinating Councils Outreach

In 2011 Gov. Patrick signed Executive Order 530 to examine and offer suggestions to improve/reform Community, Social Service and Paratransit transportation . The Order established a Commission of 16 members charged with making recommendations to improve transportation services used by persons with disabilities, low incomes, limited English proficiency, and seniors and visitors to the Commonwealth. . The Commission held public listening sessions across the state and based on the findings, developed over 60 recommendations ranging from making more wheelchair-accessible taxis available to facilitating paratransit transfers between transit regions. One recommendation of the report (Executive Order 530 Final Report July 2012) was to establish Coordinating Councils (RCCs) as part of a statewide initiative to improve service quality and increase efficiency. PVPC has been engaged with coordinating regular meetings of the Pioneer Valley RCC.

f) Identification of Unmet Needs for Human Mobility Services and Stakeholder Outreach

PVPC updated the Pioneer Valley Coordinated Human Services Plan (in 2014) with a range of transportation stakeholders in the region that included representatives of public, private, and nonprofit transportation and human-services providers, as well as members of the public. Public input for the CHST was incorporated from the PTVA 2014 Comprehensive Service Analysis, the 2014 PVTA Paratranist Service Analysis, the 2014 Pioneer Valley Regional Coordinating Council Survey, and the 2014 Getting to

Healthy: Improving Access to Care study for Cooley Dickinson Health Care. Additional opportunities for public comment were scheduled after the release of the draft document and at the scheduled MPO public meeting.

g) GovDelivery topic and contacts distribution list

PVPC worked with the Massachusetts Office of Diversity and Civil Rights to create a comprehensive database of contacts. MassDOT maintains a Civil Rights related GovDelivery topic and contacts list, which is a compilation of individuals and entities identified by MassDOT as well as those on the contact lists maintained by each of the thirteen (13) MPOs/RPAs across the Commonwealth. MassDOT's Office of Diversity and Civil Rights recently coordinated an effort in each MPO/RPA to expand their outreach lists with Title VI- and ADA-related stakeholders and organizations that had not yet been incorporated into MPO/RPA outreach. This effort saw the statewide list of contacts swell from 3,000 to 5,000.

h) Outreach Consultation and Coordination with PVTA

As a member of the PVMPO, the PVTA is an active participant in the metropolitan planning process. The PVTA Advisory Board Chair (or, in his or her absence, the PVTA Administrator) is a permanent PVMPO board member; PVTA participates in the activities of the Joint Transportation Committee (JTC), the principal advisory body to the PVMPO, as an ex-officio member; PVTA submits specific comments on projects in the Transportation Improvement Program (TIP) as they are brought forward; and PVTA coordinates planning activities and services through direct and frequent meetings with PVMPO staff. PVTA, in coordination with PVMPO, places transit projects on the TIP and Regional Transportation Plan (RTP).

PVTA's principal goals for the PIP are to seek out and integrate the needs and views of all transit customers, especially those of minority, low income, and Limited English Proficiency (LEP) populations—people who may have comparatively fewer resources to present their concerns about transit. PVTA's PIP is structured to offer regular and continuous opportunities for the public to be involved in the agency's planning and operational decisions. Multiple channels of communication are available to PVTA customers, businesses served by PVTA, and non-riders of the region. PVTA staff is accessible by telephone, e-mail, and in person. Agency contact information is posted on the website (www.pvta.com), on transit vehicles, on route schedules, and in all publications. Public meetings are held in transit accessible locations, with notices posted on vehicles and the agency's website. PVTA also utilizes local media (i.e., newspapers, television stations, websites) to publicize public meetings and events.

The activities outlined in the PIP are geared to provide meaningful opportunities for the residents of PVTA's service region to participate in aspects of transit planning and service for which the authority is responsible. These activities include:

- Facilitation of the monthly PVTA Advisory Board.
- Operation of the PVTA Information Center.
- Providing service information and reports.
- Responding to media inquiries.
- Fostering community participation in bus rider forums and paratransit rider committees.
- Conducting outreach to transit stakeholders, including employers, businesses and community based organizations.
- Conducting regular surveys of transit customers and potential transit markets.
- Facilitating the participation of municipal governments and state and local agencies in PVTA planning activities.
- Meetings with the Directors of municipal councils on aging.
- Outreach workshops or tabling events about PVTA services at social service and elder care agencies (approximately 8 per year).
- Monthly meetings with City of Northampton Public Transportation Committee.
- System wide bus rider forums (May 13 and 20, 2009).
- Public hearings for the Comprehensive Service Analysis and proposed modification.
- Public hearing for Paratransit Service Analysis.
- Media releases.
- Meetings with stakeholders.
- Public events to publicize PVTA service improvements and capital projects.

The specific actions that PVTA has taken during the last three years to ensure that minority and low-income people of the service region had meaningful access to transit services include:

- Development and implementation of the PVTA Limited English Proficiency (LEP) Plan.
- Recruiting and hiring of bilingual call center staff (English and Spanish).
- Production in 2015 of a new system wide route maps in Spanish and English.
- Spanish radio and print advertisements for Sumner Express and All-day pass services.
- Web site multi-language translation feature added.

- Biannual bus rider forums with bilingual staff and translators available.
- Quarterly paratransit rider meetings.
- Spanish versions of paratransit services guide and manual.
- Spanish and sign language interpreters at public meetings upon request.
- Onboard rider surveys available in Spanish from bilingual surveyors.

F. EQUITY ASSESSMENT MEASURES

1. Equity Assessment Strategies

Title VI and the executive orders of Environmental Justice call for programs that quantify the benefits and burdens of the transportation investments and evaluate the impacts for different socio-economic groups. To accomplish this task PVPC worked with the JTC to establish measures of effectiveness that would reflect quantifiable transportation expenditures in the Region. These measures were used to evaluate capital expenditures in the Regional Transportation Plan and Transportation Improvement Program and to evaluate transit service. The evaluations provide a barometer of the distribution of resources and also assist decision-makers in achieving an equitable balance of in future years.

2. Equity Distribution Analysis

Information collected from census data, GIS, transit route inventory, and regional models was used to identify and assess transportation deficiencies, benefits, and burdens. The evaluation of each measure of effectiveness included the following:

a) Distribution of Transportation Investments in the Region

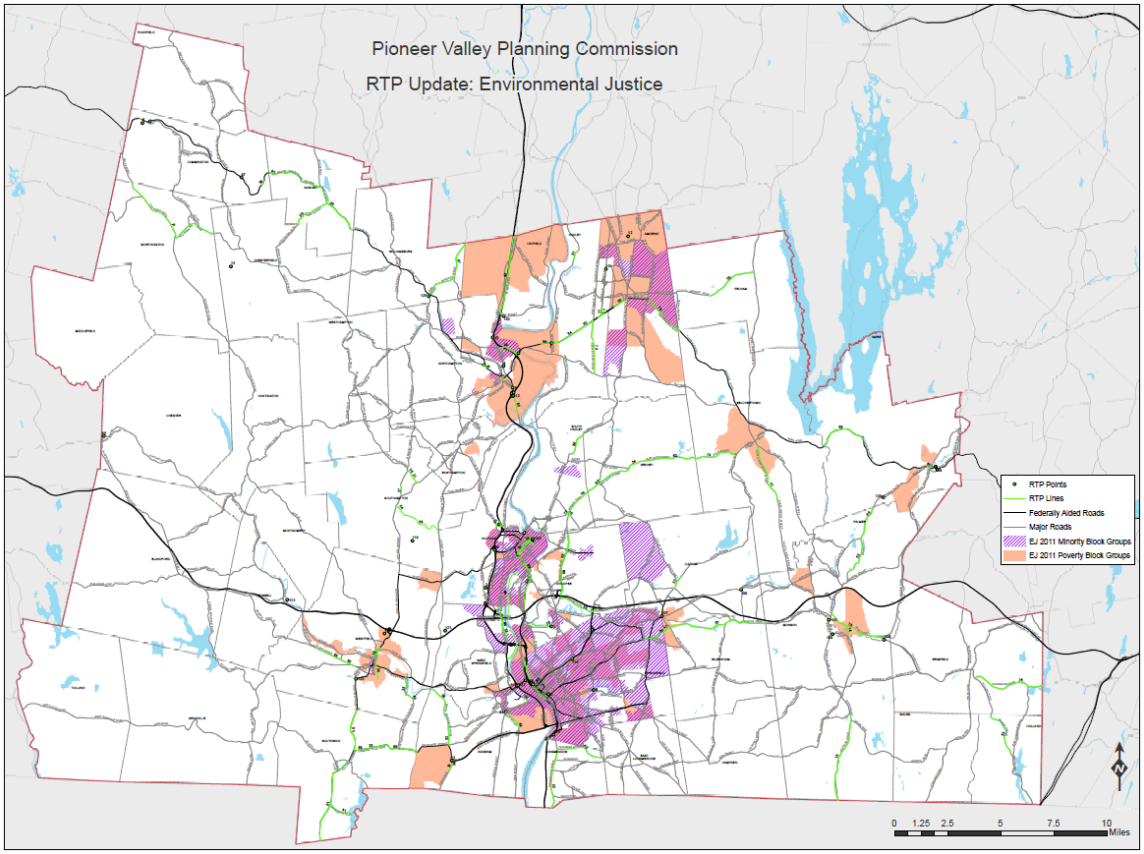
Past and proposed funding allocations for TIP projects were calculated for defined low income and minority populations. PVPC completed an inventory of projects included on the RTP and mapped these projects. GIS tools were used to determine the amount of transportation funds (including bridge projects) allocated to each population group and also compared these values to regional average allocations using census block group data. This analysis is also conducted annually for the Transportation Improvement Program. PVPC is also working to conduct analysis on other Title VI protected classes. The RTP analysis is presented in the Table 4-6.

The analysis shows that 49.14 percent of projects on the RTP are located in low block groups and that 27.59 percent of projects are located in minority block groups. The table also shows that 70.89 percent of funding was distributed to defined low income block groups compared to 26.82 percent to other block groups in the region.

Table 4-6 – Distribution of Projects in the RTP to Low Income and Minority Populations

	PVPC Total	Low Income Block Groups	Minority Block Groups	% PVPC Total in Low Income Block Groups	% PVPC Total in Minority Block Groups	Other Block Groups	% PVPC Total in Other Block Groups
Transportation Analysis Zones (Block Groups)	442	158	163	35.74%	36.87%	233	52.71%
Population	621570	207727	212230	33.41%	34.14%	346117	55.68%
Minority Population	171475	110607	130808	64.50%	76.28%	30535	17.80%
Number of Projects	116	57	32	49.14%	27.59%	56	48.28%
Number of Funded Projects	116	57	32	49.14%	27.59%	56	48.28%
Projects not Funded	0	0	0	0.00%	0.00%	0	0.00%
Projects	$753,320,372	$534,037,612	$392,707,857	70.89%	52.13%	$202,049,770	26.82%
Funded Projects	$753,320,372	$534,037,612	$392,707,857	70.89%	52.13%	$202,049,770	26.82%
Projects Not Funded	0	0	0	0.00%	0.00%	0	0.00%
Total Project Dollars per Capita	1,211.96	2,570.86	1,850.39	2.12	1.53	583.76	0.48
Funded Project Dollars per Capita	$1,211.96	$2,570.86	$1,850.39	212.12%	152.68%	$583.76	48.17%
Not Funded Project Dollars per Capita	0	0	0	0.00%	0.00%	0	0.00%

Figure 4-6 – Distribution of Projects in the RTP to Low Income and Minority Populations

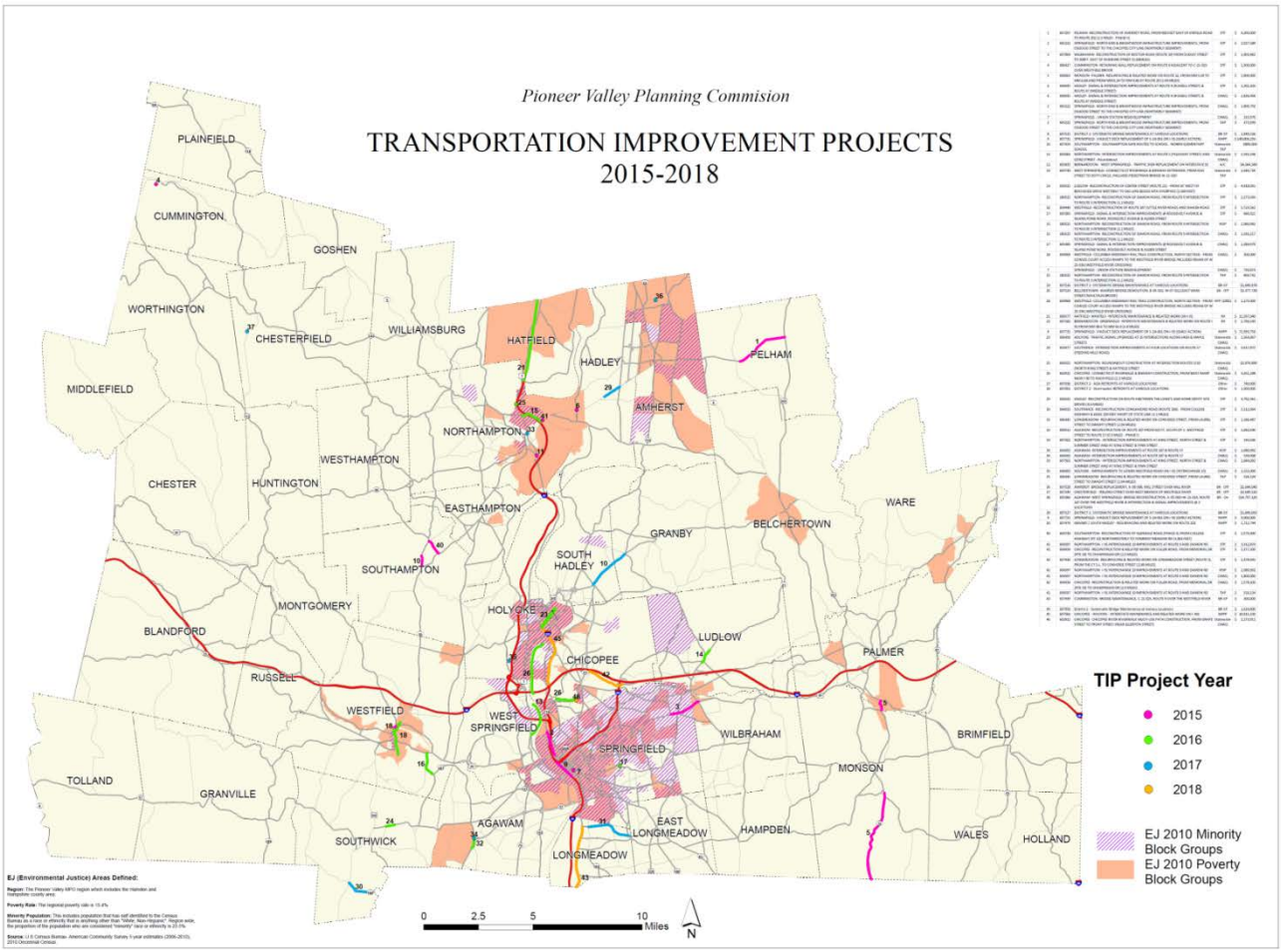


b) Annual Equity Assessment of Distribution of TIP Funding

PVPC conducted an equity assessment on the transportation planning tasks completed as part of previous UPWP's this assessment process has previously been used on the Regional TIP and identifies how regional transportation improvement projects have potential impacted defined minority and low-income block groups in the region. The following demographic map displays an overlay of federally funded projects from the Transportation Improvement Program (TIP) to minority and low income census block groups.

http://pvpc.maps.arcgis.com/apps/StorytellingTextLegend/index.html?appid=f54bf3b6dfd04033980dcd9a898b85a3

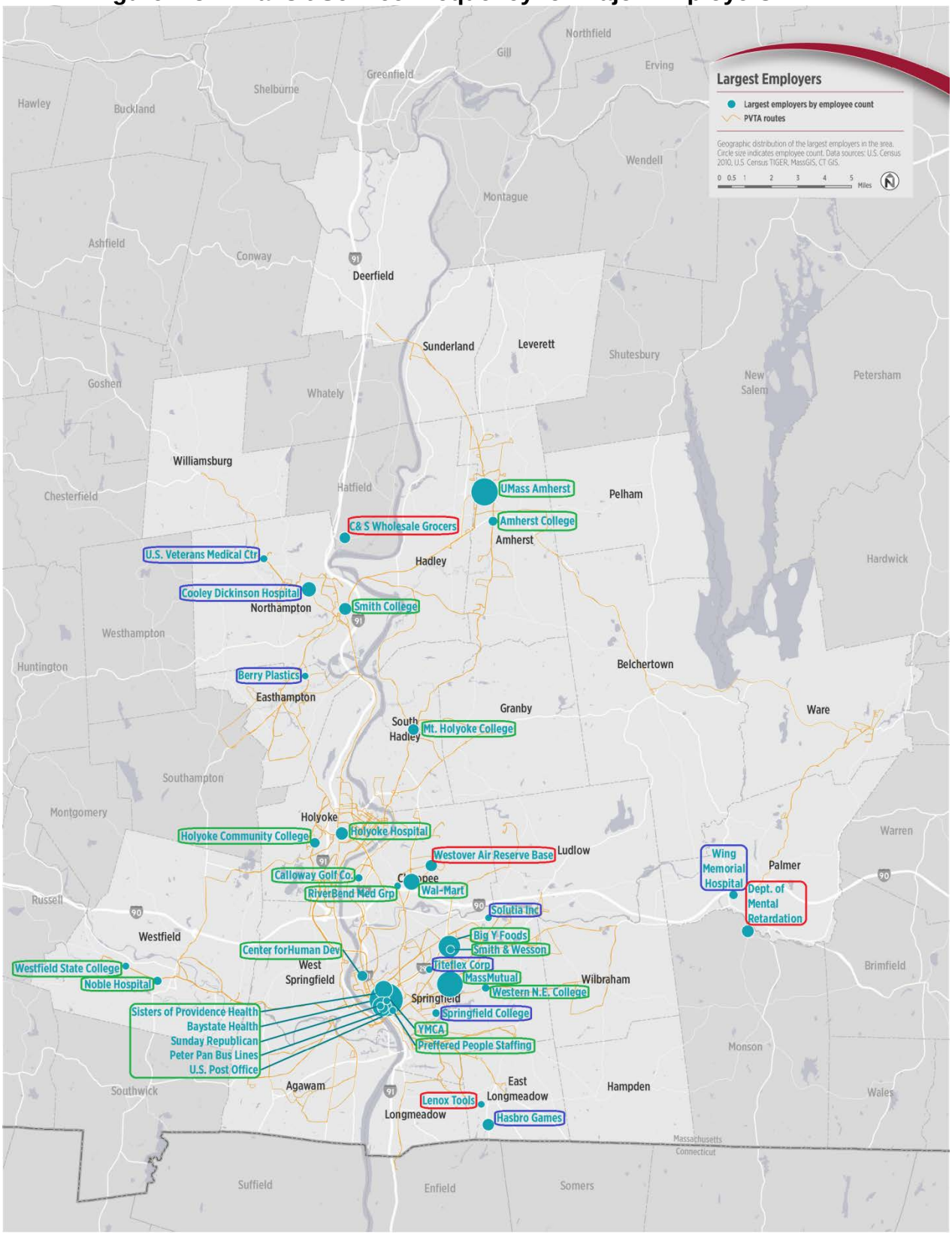
Figure 4-7 – Distribution of Transportation Projects



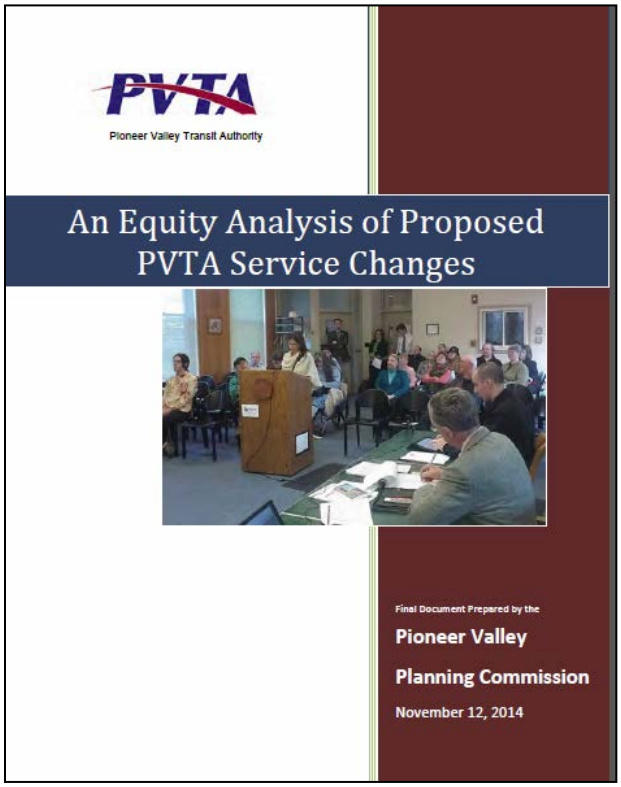
c) Transit Access to Major Employers

PVPC staff reviewed transit service access to major employers in the region as part of the Coordinated Human Services Plan. The results of this analysis are shown in Figure 4-8. Major Employers with frequent service are circled in green, employers with less frequent service are circled in blue, and those employers with no PVTA service are circled in red.

Figure 4-8 – Transit Service Frequency for Major Employers



d) Equity Analysis of PVTA Comprehensive Service Changes



In 2014 PVPC conducted a equity analysis of proposed changes to the PVTA transit service in the region. A crucial objective of the Comprehensive Service Analysis and the fall service changes informed by it is the streamlining of PVTA's route network. This improves the system's efficiency, resulting in expanded service hours, increased service frequencies, new bus routes, added travel options, and new destinations to the network. This is accomplished by the elimination of duplicative service and minor route deviations that increase travel time without significantly improving access. Overall a total of 48.7 route miles will be discontinued in the fall service changes; a 7.5% reduction. Of the route miles scheduled to be discontinued, 21.5 are in Environmental Justice areas (44% of total), while the other 27.2 miles are outside Environmental Justice areas (56% of total). The burden of total mile reduction is mostly borne outside of Environmental Justice areas.

e) Distribution of UPWP Tasks

PVPC conducted an equity assessment on the transportation planning tasks completed as part of previous UPWP efforts. UPWP tasks are an important barometer as they provide assistance to Towns that might not have the resources to complete the task and also because the planning studies and reports generated through UPWP task can result in recommendations that prepare a project for future development. For this assessment process work plans from the previous five years were reviewed to identify the transportation planning tasks that were completed for each of the 43 communities in the PVPC region. Tasks included data collection, planning studies, local technical assistance requests, and regional activities such as the update to the TIP or CMP. All total, nearly 499 tasks were identified over the five year period. While the total number of projects for each community is often a function of the size of the community, at least on task was completed for each community over the five year period. This information is summarized in the Table 4-7.

Table 4-7 – Transportation Tasks by Community and Year

Community	2010	2011	2012	2013	2014	Total
Agawam	2	2	2	1	3	10
Amherst	4	2	4	4	1	15
Belchertown	1	3	1		1	6
Blandford	1	1		1		3
Brimfield		2	3	2	1	8
Chester	1	2	1	1	1	6
Chesterfield	1					1
Chicopee	4	1	3	3	3	14
Cummington	1		1		1	3
East Longmeadow	2	2		1	1	6
Easthampton	3	3	2	1	3	12
Goshen	1	1	1		1	4
Grandby		2		3		5
Granville		1	1	1	1	4
Hadley	1	3	4	2	1	11
Hampden	1		2		1	4
Hatfield				1		1
Holland	1	1				2
Holyoke	3	5	6	3	3	20
Huntington	1	1	1	2	1	6
Longmeadow	3		1	4	2	10
Ludlow	7	1			2	10
Middlefield		1				1
Monson	1	1		1		3
Montgomery			1	2	1	4
Northampton	7	6	5	7	3	28
Palmer	1					1
Pelham	1	1		1		3
Plainfield	1	1	1	1	1	5
Region Wide	38	29	33	34	28	162
Russell	1	1	1	1		4
South Hadley	3	1	2	4	3	13
Southampton	1	1	2	1		5
Southwick	6	2	1	2	3	14
Springfield	8	12	10	6	6	42
Tolland			1	1	1	3
Wales			1	1		2
Ware	5	2	1	2	2	12
West Springfield	4	3	2	2	1	12
Westfield	1	1	3	3	1	9
Westhampton	2			1	1	4
Wilbraham	1		1	1	1	4
Williamsburg	1		3	1	1	6
Worthington	1					1
Grand Total	**121**	**95**	**101**	**102**	**80**	**499**

In addition to counts completed for MassDOT and as part of ongoing planning studies, PVPC offer two free traffic counts for each member community per calendar year. Traffic counts over the last five years were reviewed for each community to determine how much data has been collected across the region and as a way to identify how many communities may not be aware of the traffic counting services we offer. This information is summarized Table 4-8. Traffic counts include both automatic traffic counts and manual turning movement counts.

There is a wide range of traffic count data that has been collected across each of the 43 communities. In general, a higher number of completed traffic counts is an indication that a transportation safety or congestion study was conducted in that community during the calendar year. No traffic counts were performed for the Town of Middlefield and less than five traffic counts were performed in the communities of Blandford, Chesterfield, Hatfield, Holland, Huntington, Montgomery, Palmer, and Worthington. This could be an indication of the need for the transportation section to alert each of these communities of the availability of our regional traffic counting program.

PVPC also collects pavement distress data for all federal aid eligible roadways in the region. This data is collected on a five year rotation and is summarized in Table 4-9. No pavement distress data is currently collected for the Town of Middlefield as there are no federal aid eligible roadways. Pavement distress data was collected and distributed to each of the remaining 42 communities over this five year period. New pavement data is not collected under this program until pavement data has been collected for the entire region.

Travel time data is collected for select communities and corridor as part of the regional congestion management process (CMP). CMP corridors are identified based on input from communities and the JTC. Data collection occurs on a four year cycle but is also constrained by ongoing construction or other activities that could skew travel time data. There are currently CMP corridors or a portion of a CMP corridor in 20 of our 43 communities. The three largest cities of Springfield, Chicopee, and Holyoke have the most corridors as they typically have the most congestion. This information is summarized on in Table 4-10.

Table 4-8 – Traffic Counts by Community and Year

Community	2010	2011	2012	2013	2014
Agawam	5		1		1
Amherst	5	7	5	8	4
Belchertown	5	7			
Blandford	1	2		1	
Brimfield			17		
Chester	1	1	1	2	2
Chesterfield	4				
Chicopee	10	1	1	1	16
Cummington	2		2		2
East Longmeadow	8	4		1	
Easthampton	10	4	3		3
Goshen	3	1	1		2
Granby		1		6	
Granville		3	2	1	1
Hadley	1	1	3	8	1
Hampden	6		2		2
Hatfield				1	
Holland		1			
Holyoke	11	29	13	2	10
Huntington	3			1	
Longmeadow	4		1	3	1
Ludlow	9	1			1
Middlefield					
Monson	2	7		2	
Montgomery			2		
Northampton	18	8	16	34	8
Palmer	3				
Pelham	3	7		1	
Plainfield	1	2	6		2
Russell	4	4	1	1	
South Hadley	6	12	1	4	3
Southampton	4	14			
Southwick	21	2	1	2	28
Springfield	10	15	35	31	24
Tolland			2	1	2
Wales			2	4	
Ware	9	1			15
West Springfield	10	1	36	1	8
Westfield	1	4	5	20	2
Westhampton	1			1	3
Wilbraham	6		3	2	7
Williamsburg	1		13		3
Worthington	1				

Table 4-9 – Pavement Data Collection by Community and Year

Community	2010	2011	2012	2013	2014
Agawam					X
Amherst					X
Belchertown					X
Blandford		X			
Brimfield	X				
Chester	X				
Chesterfield	X				
Chicopee			X		
Cummington		X			
East Longmeadow		X			
Easthampton		X			
Goshen		X			
Granby	X				
Granville		X			
Hadley	X				
Hampden		X			
Hatfield	X				
Holland	X				
Holyoke			X		
Huntington		X			
Longmeadow					X
Ludlow					X
Middlefield	No Federal Aid Eligible Roadways				
Monson	X				
Montgomery	X				
Northampton				X	
Palmer	X				
Pelham	X				
Plainfield				X	
Russell	X				
South Hadley	X				
Southampton	X				
Southwick		X			
Springfield			X		
Tolland		X			
Wales	X				
Ware	X				
West Springfield					X
Westfield				X	
Westhampton		X			
Wilbraham	X				
Williamsburg		X			
Worthington	X				

Table 4-10 – CMP Data Collection by Community and Year

Community	Total Corridors	2010 - 2011	2011 - 2012	2012 - 2013	2013 - 2014
Agawam	5	X	X	X	
Amherst	4				
Belchertown	2		X		X
Chicopee	12	X	X		X
East Longmeadow	3		X	X	
Easthampton	3		X	X	X
Granby	1		X		
Hadley	3			X	X
Holyoke	10	X	X	X	X
Longmeadow	4		X	X	
Ludlow	3		X		X
Northampton	5			X	X
Palmer	1			X	
South Hadley	2		X		
Southwick	1			X	
Springfield	23	X	X	X	X
Ware	1		X		
West Springfield	4		X		X
Westfield	3		X	X	
Wilbraham	3			X	X

3. Pioneer Valley Limited English Proficiency Plan and Analysis of Language-related U.S. Census Data

The Pioneer Limited English Proficient (LEP) Plan was been developed by the Pioneer Valley Planning Commission (PVPC) in consultation with the FTA and MassDOT. This plan describes the strategic approach that PVPC is pursuing to achieve its program to better engage people who are Limited English Proficient (LEP) in metropolitan transportation planning activities. PVPC's goal is to ensure that LEP persons have meaningful access to the public involvement process for PVMPO activities. This LEP Plan clarifies PVMPO's responsibilities with respect to LEP requirements as a recipient of federal financial assistance from the U.S. Department of Transportation to people who are Limited English Proficient in accordance with:

PVMPO identifies LEP persons who need language assistance through the following activities and services:

- Coordination with municipal, regional and state agencies engaged in transportation planning processes.
- Outreach to community based organizations and municipal agencies to ask their assistance in identifying LEP persons who may need language assistance.
- Outreach to social service agencies in the region.
- Planning coordination and public involvement services and activities with the Pioneer Valley Transit Authority.
- Inclusion of instructions on how to request language translation of key written documents on public meeting notices.
- Asking persons attending public hearings if Spanish language translation and/or signing interpreter services are desired or needed (services are always available).
- Demographic assessment of census data to ascertain likely geographic location of potential LEP customers.

Information regarding PVMPO transportation planning processes is made available through multiple means, including translated public meeting notices and providing a bilingual staff whenever possible. PVMPO's future programs and services to enhance accessibility of transit services to LEP persons include:

- Maintenance of a written translation and oral interpreter service provider's database. This effort improves the speed and convenience with which written documents can be translated for the public, and reduces the need to have public requests for them.
- Ensuring that PVMPO members are aware of the USDOT LEP guidance and support their LEP planning activities, as appropriate.
- Regular updates to this LEP Plan, as needed by new events, such as the release of language-related demographic data from the decennial census and/or indications of increases in LEP population.
- Identification of community based organizations that are not being contacted through existing outreach.

This section presents analysis of demographic data related to the ability to speak English from the 2010 U.S. Census and the American Community Survey (ACS). Table 4-11 shows the wide range of languages other than English spoken at home in the Pioneer Valley and speaks to the cultural diversity of the region.

Table 4-11 – Languages other than English Spoken at Home in the PVPC Region

Languages	Total	Percent	Cumulative
Spanish or Spanish Creole	67,249	57.2%	57.2%
Polish	6,990	5.9%	63.1%
French (incl. Patois, Cajun)	6,388	5.4%	68.6%
Russian	5,646	4.8%	73.4%
Portuguese or Portuguese Creole	5,014	4.3%	77.6%
Chinese	2,810	2.4%	80.0%
Vietnamese	2,653	2.3%	82.3%
African languages	2,342	2.0%	84.3%
Italian	2,122	1.8%	86.1%
Other Slavic languages	1,720	1.5%	87.5%
Other Asian languages	1,441	1.2%	88.8%
German	1,421	1.2%	90.0%
Mon-Khmer, Cambodian	1,267	1.1%	91.1%
Arabic	1,122	1.0%	92.0%
Other Indo-European	967	0.8%	92.8%
Korean	952	0.8%	93.6%
Other Indic	736	0.6%	94.3%
Greek	728	0.6%	94.9%
Japanese	682	0.6%	95.5%
Hindi	677	0.6%	96.0%
Thai	665	0.6%	96.6%
French Creole	608	0.5%	97.1%
Urdu	579	0.5%	97.6%
Serbo-Croatian	536	0.5%	98.1%
Tagalog	484	0.4%	98.5%
Other West Germanic	348	0.3%	98.8%
Persian	308	0.3%	99.0%
Hebrew	219	0.2%	99.2%
Other Pacific Island	167	0.1%	99.4%
Scandinavian	153	0.1%	99.5%
Gujarati	146	0.1%	99.6%
Laotian	99	0.1%	99.7%
Hungarian	96	0.1%	99.8%
Armenian	93	0.1%	99.9%
Other and unspecified	65	0.1%	99.9%
Yiddish	52	0.0%	100.0%
Other Native North American	23	0.0%	100.0%
Hmong	17	0.0%	100.0%
Navajo	0	0.0%	100.0%
Total other than English at Home	**117,585**	100%	100.0%

4. Recommendations from the Limited English Proficient (LEP) Plan

The PVPC staff will continue to implement recommendations identified through analysis and the public participation process with the assistance of the Joint Transportation Committee, the MPO and the Pioneer Valley Transit Administration. PVPC intends to take actions necessary to assure that the all

affected communities are included in the decision making process and that the information needed to make decisions is available. As the process develops, practices being tested today may be institutionalized as policy depending on their success.

Examples include:

- Review and update the measures of effectiveness on a regular basis, incorporating new spending on projects listed in the TIP.
- Expand public participation efforts related to the RTP and TIP to include local presentations at special group meetings, neighborhood council meetings, and community activities.
- Adopt MassDOT recommendations related to the PVMPO Public Participation Plan.

5. Ongoing Evaluation of Title VI and EJ Planning Efforts

To assess success in achieving the goals an action item evaluation was developed. This list will be used as an ongoing review of the effectiveness of policies and practices related to EJ and Title VI.

- Has a demographic profile of the metropolitan planning area been developed that identifies low-income and minority populations? Has this data been updated to reflect revised census data?
- Have PVTA and PVPC responded to requests for new and expanded transit service when requested? Has the region sought funds to offer these services?
- Have Title VI reporting requirements been supplemented with a report to the MPO?
- Does the planning process use demographic information to examine the benefits and burdens of the transportation investments included in the plan and TIP?
- Does the planning process have an analytical process in place for assessing the regional benefits and burdens of transportation system investments for different socio-economic groups?
- To what extent has PVPC made proactive efforts to engage and involve representatives of minority and low-income groups through public involvement programs? Does the public involvement process have a strategy for engaging minority and low-income populations in transportation decision making?
- What issues were raised, how are their concerns documented, and how do they reflect on the performance of the planning process?
- What mechanisms are in place to ensure that issues and concerns raised by low-income and minority populations are appropriately considered in the decision making process?

- What corrective action should be put into the process regarding existing requirements and prepare it for future regulatory requirements?

G. TITLE VI AND EJ SELF CERTIFICATION

The Pioneer Valley MPO has conducted an analysis of the Pioneer Valley Regional Transportation Plan with regard to Title VI and EJ conformity. The purpose of the analysis is to evaluate the impacts of the transportation planning process on minority and low-income populations. The analysis evaluates efforts to identify minority and low-income populations, develop public participation inclusive of these populations, and to identify imbalances that impact these populations. The procedures and assumptions used in this analysis follow FHWA guidance, are consistent with the procedures used by MPOs in Massachusetts, and are consistent with Title VI of the 1964 Civil Rights Act, National Environmental Policy Act, Section 109(h) of Title 23, Dot Title VI Regulations, DOT and CEQ NEPA Regulations, Section 1202 of TEA-21, DOT and CEQ NEPA Regulations, Section 1203 of TEA-21, DOT Planning Regulations, Executive Order 12898, USDOT Order 5610.2, and FHWA Order 6640.23.

Accordingly, PVPC has found the Pioneer Valley Regional Transportation Plan to be in conformance with Title VI of the Civil Rights Act of 1964, and requirements of Executive Order 12898 (Environmental Justice). Specifically, the following conditions are met:

1. Conditions Related to Public Involvement

PVPC has identified a strategy for engaging minority and low-income populations in transportation decision making and to reduce participation barriers for these populations. Efforts have been undertaken to improve performance, especially with regard to low-income and minority populations and organizations representing low-income and minority populations. (In 2015 the PVPC will be modifying the Public Participation Process to further incorporate Title VI guidance from the Massachusetts Office of Diversity and Civil Rights.)

2. Conditions Related to Equity Assessment

The Pioneer Valley planning process has an analytical process in place for assessing the regional benefits and burdens of transportation system investments for different socio-economic groups. A data collection process is used to assess the benefit and impact distributions of the investments and specific strategies are identified for responding to imbalances.

3. Title VI and EJ Conclusions

PVPC addresses environmental justice and social equity issues as part of its transportation planning process. PVPC indentifies goals to enhance the existing public participation process, methodology to identify low income and minority populations, and provides measures of effectiveness to evaluate transportation deficiencies, benefits, and burdens. The PVPC will continue to improve its public participation and planning process to ensure that it is conducted in accordance with Title VI of the Civil Right Act of 1964, FHWA/FTA guidance on LEP and requirements of Executive order 12898 (Environmental Justice) to give full and fair consideration to minority and low income residents in the region. The region's outreach and efforts to engage the public in meaningful discussion around transportation issues has made great strides and will continue to be a priority of the MPO.

CHAPTER 5

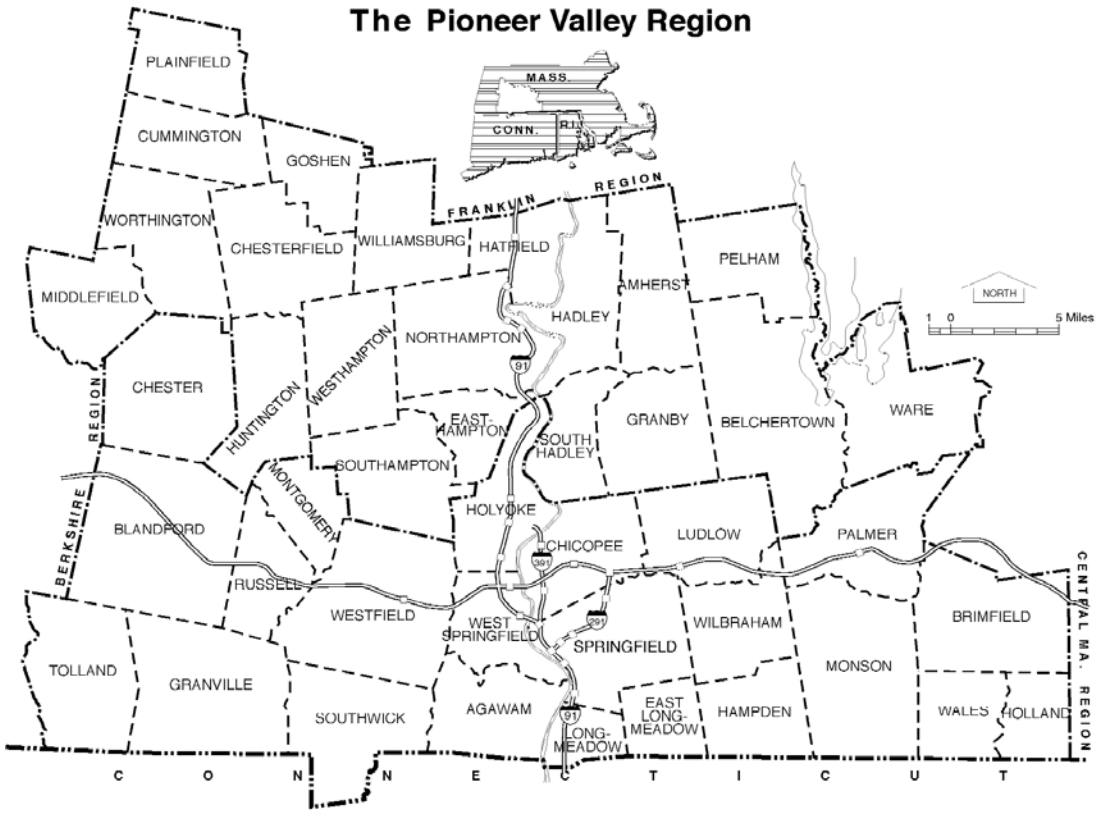
REGIONAL PROFILE

Social and economic trends can have significant implications on transportation planning. This chapter presents a profile of the region's physical, socioeconomic, demographic and environmental characteristics as they relate to transportation planning and construction.

A. PHYSICAL CHARACTERISTICS

The Pioneer Valley Region is located in the Midwestern section of Massachusetts. Encompassing the fourth largest metropolitan area in New England, the region covers 1,179 square miles. The Pioneer Valley is bisected by the Connecticut River and is bounded on the north by Franklin County, on the south by the State of Connecticut, on the east by Quabbin Reservoir and Worcester County and on the west by Berkshire County.

Figure 5-1 – Pioneer Valley Region Map



The Pioneer Valley Region, which is comprised of the 43 cities and towns within the Hampden and Hampshire county areas, is home to more than 608,000 people. Hampden County, the most populous of the four western counties of Massachusetts, is approximately 635 square miles. Hampden County is made up of 23 communities including the Springfield-Chicopee-Holyoke urbanized area. Hampshire County is situated in the middle of Western Massachusetts and includes an area of 544 square miles.

The third largest city in Massachusetts, Springfield is the region's cultural and economic center. Springfield is home to several of the region's largest employers, including Massachusetts Mutual Life Insurance Company, Baystate Medical Center, Mercy Hospital Incorporated, Solutia, Smith & Wesson Company, and Verizon. Major cultural institutions include the Springfield Symphony, City Stage, Springfield Civic Center, Quadrangle Museums, the Basketball Hall of Fame, and the new Dr. Seuss National Memorial Sculpture Garden.

The cities of Chicopee and Holyoke were the first planned industrial communities in the nation. Merchants built an elaborate complex of mills, workers' housing, dams, and canal systems that evolved into cities. While many historic mills and industries are now gone, a number of 19th and 20th century structures are maintained and improved through municipal preservation and revitalization initiatives.

Unique within the Commonwealth of Massachusetts, the Pioneer Valley region contains a diverse economic base, internationally known educational institutions, and limitless scenic beauty. Dominant physical characteristics include the broad fertile agricultural valley formed by the Connecticut River, the Holyoke Mountain range that traverses the region from Southwick to Pelham, and the foothills of the Berkshire Mountains. Prime agricultural land, significant wetlands, and scenic rivers are some of the region's premier natural resources. Choices in lifestyle range from contemporary downtown living to stately historic homes, characteristic suburban neighborhoods, and rural living in very small communities—a variety that contributes to the diversity and appeal of the region. Its unique combination of natural beauty, cultural amenities, and historical character make the Pioneer Valley region an exceptional environment in which to live and work.

B. HIGHWAY

1. Access

The Pioneer Valley area is considered the crossroads of transportation in Western Massachusetts. Situated at the intersection of the area's major highways, Interstate 90 (Massachusetts Turnpike) traveling east-west and

Interstate 91 traveling north-south, the region offers easy access to all markets in the Eastern United States and Canada. Major southern New England population centers are accessible within hours.

Table 5-1 – Driving Distance and Time from Springfield

Destination	Distance	Time
Albany, NY	85 miles	1.5 hours
Boston, MA	91 miles	1.5 hours
New York City, NY	140 miles	3.0 hours
Philadelphia, PA	260 miles	5.0 hours
Montreal, Quebec	301 miles	5.5 hours
Washington DC	400 miles	8.0 hours

The interstate expressways (I-90/I-91) link most of the major urban centers in the region. The basic highway network including interstate highways, U.S. numbered routes and state routes, along with other traffic arteries, provides access to all municipalities in the region, both urban and rural. The pattern of principal arterial highways in the region is radial, extending outwards from each of the region's major centers, a consequence of development and topographic influences.

Table 5-2 – Regional Interstate Highways

Interstate Highways	Principal Orientation	# of In- Region Interchanges	In-Region Mileage	Toll Road?
I-90	East/West (Mass. Turnpike)	6	46.08	Yes
I-91	North/South	22	31.17	No
I-291	Connector (Springfield to I-90)	6	5.44	No
I-391	Connector (I-91 to	6	3.82	No

The highway network is composed of various facilities that are separated into systems within the federal-aid highway program by the Massachusetts Highway Department on the basis of their functional classification which takes into account the various functions and uses of the roads. The federal-aid highway program in Massachusetts is a state administered program. The program consists of three separate federal aid systems, the National Highway System (NHS), the Interstate System and the Surface Transportation Program.

The Federal-Aid highway system in the Pioneer Valley region consists of approximately 1,364 miles, of which approximately 346 miles are on the National Highway System (NHS), and approximately 1,000 miles belong to the Surface Transportation Program (STP). The STP is a block grant type

program that includes NHS roadways which primarily consist of Interstate routes and a large percentage of urban and rural principal arterials. The Federal-Aid highway system consists of any roadway that is not functionally classified as a rural minor collector or local roadway. Local roads constitute approximately 66% of the total roadway system.

The roadway mileage in the Pioneer Valley has remained fairly consistent over the last several years, since the construction of Interstate 391. New roadway construction has become more difficult in recent years as a result of rising construction costs and the requirements of the Clean Air Act Amendments of 1990. The last major new roadway to be constructed in the region occurred in 1996 when a portion of Route 57 was relocated in Agawam. This project extended the existing limited access portion of Route 57 out to Route 187.

2. Functional Classification

The Federal-Aid Highway Act of 1973 required the use of functional highway classification to update the Federal-Aid Highway system and identify the National Highway System. Both of these highway systems are used as inventory mechanisms and funding eligibility criteria for our nation's roadway network.

In 1992, the PVPC, under the direction of the Massachusetts Department of Transportation (MassDOT), began the reclassification process to update the federal-aid network in the Pioneer Valley Region. The region's roadways were grouped into classes according to the service they are intended to provide. The region's urbanized area is updated as a result of the 2010 census. In 2005, the PVPC solicited information on roadway classification changes from local officials in order to identify existing roadways that have been permanently closed to through traffic in response to enhanced regional security or changes in local traffic flow and develop a proposed new functional classification scheme to maintain a comprehensive and continuous network of functionally classified roadways in the region.

The seven functional classifications adopted by Massachusetts are summarized below:

Interstate - Freeways service as principal arterials providing service to substantial statewide and interstate travel.

Rural Principal Arterials - Major highways that serve corridor movements having trip length and travel density characteristics that indicate substantial statewide or interstate travel. Principal Arterials include the Interstate system.

Rural Minor Arterial - Roadways with statewide significance that link cities and large towns forming an integrated network of intracounty importance.

Rural Major Collectors and Urban Minor Arterials - Those roads that provide service to cities, towns and other traffic generators not served by the arterial system; roads that link these places with the arterial system; and roads that serve the more important intracounty travel corridors.

Rural Minor Collectors and Urban Collectors - Roads that bring traffic from local roads to collector roads; roads that provide service to small communities and link local traffic generators to the rural areas.

Local Roads - Roads that provide access to adjacent land; roads that provide service to relatively short distances. Local roads include all roads not classified as part of the principal arterial, minor arterial, or collector system.

Other Urban Principle Arterials - Roadways with significance that service access to and within the urbanized area. Connections to interstate and rural principle arterials are typical.

After local and state reviews, a final federal-aid network was completed for the Pioneer Valley Region. Table 5-3 summarizes the roadway mile by functional classification for each community. The functional classification of a roadway may be upgraded or downgraded based on changes in land use, population, and vehicular volume. Communities can request a change in the functional classification through a written request to the PVPC. If PVPC concurs, that a change is warranted, the request is submitted to MassDOT Planning for their approval. Once approved by MassDOT, the change requires endorsement by both the MPO and the FHWA before the functional classification can be officially changed.

Table 5-3 – Miles of Roadway by Community and Functional Classification

		Functional Classification					
Community	**Total**	**Interstates**	**Urban Arterials**	**Rural Arterials**	**Urban Collectors**	**Rural Collectors**	**Local Roads**
Agawam	152.0	0.0	29.1	0.0	27.8	0.0	95.1
Amherst	136.4	0.0	42.1	0.0	5.2	1.4	87.7
Belchertown	163.1	0.0	25.9	7.5	9.5	8.7	111.5
Blandford	87.8	8.5	0.0	0.0	0.0	33.5	45.8
Brimfield	79.5	2.9	0.0	8.8	0.0	17.1	50.7
Chester	66.1	0.0	0.0	6.5	0.0	22.3	37.3
Chesterfield	58.2	0.0	0.0	7.6	0.0	15.6	35.0
Chicopee	258.9	11.2	39.8	0.0	15.6	0.0	192.3
Cummington	61.2	0.0	0.0	12.9	0.0	9.4	38.9
East Longmeadow	100.3	0.0	21.4	0.0	9.4	0.0	69.5
Easthampton	92.1	0.5	25.1	0.0	5.0	0.0	61.5
Goshen	42.6	0.0	0.0	5.4	0.0	8.3	28.9
Granby	68.9	0.0	16.8	1.0	12.3	6.0	32.8
Granville	73.9	0.0	0.0	9.0	0.0	17.6	47.3
Hadley	81.5	0.0	18.5	4.1	4.3	10.9	43.7
Hampden	54.7	0.0	5.8	0.0	2.5	7.2	39.2
Hatfield	59.0	3.7	4.4	0.0	0.0	10.2	40.7
Holland	37.5	0.1	0.0	0.0	0.0	11.6	25.8
Holyoke	174.3	9.9	37.5	0.0	20.9	0.0	106.0
Huntington	54.3	0.0	0.0	11.2	0.0	11.7	31.4
Longmeadow	99.2	3.3	14.2	0.0	5.0	0.0	76.7
Ludlow	136.6	5.9	25.1	0.0	10.0	1.6	94.0
Middlefield	38.4	0.0	0.0	0.0	0.0	7.5	30.9
Monson	110.3	0.0	13.2	3.3	0.9	16.9	76.0
Montgomery	30.7	0.1	0.0	0.0	0.0	8.3	22.3
Northampton	178.9	6.1	48.3	0.0	16.1	0.0	108.4
Palmer	114.8	7.6	30.7	1.6	7.1	9.4	58.4
Pelham	46.0	0.0	2.7	5.7	0.0	8.4	29.2
Plainfield	48.8	0.0	0.0	0.0	0.0	17.7	31.1
Russell	36.3	4.0	7.8	0.0	1.3	6.8	16.4
South Hadley	104.7	0.0	17.9	0.0	10.2	0.0	76.6
Southampton	78.5	0.0	10.8	0.0	7.9	1.4	58.4
Southwick	85.1	0.0	16.3	2.9	10.8	7.7	47.4
Springfield	496.8	11.2	99.6	0.0	46.6	0.0	339.4
Tolland	41.9	0.0	0.0	5.7	0.0	5.4	30.8
Wales	28.8	0.0	0.3	0.0	0.0	13.1	15.4
Ware	117.5	0.0	13.9	4.8	9.0	5.5	84.3
West Springfield	143.7	6.3	31.0	0.0	8.9	0.0	97.5
Westfield	248.0	6.7	47.0	0.0	20.1	0.0	174.2
Westhampton	47.6	0.0	0.0	0.0	0.0	22.4	25.2
Wilbraham	114.7	1.1	20.2	0.0	12.4	4.6	76.4
Williamsburg	51.1	0.0	2.7	7.0	0.0	12.9	28.5
Worthington	64.4	0.0	0.0	10.3	0.0	10.6	43.5
Pioneer Valley Region	**4,365.1**	**89.1**	**668.2**	**115.3**	**278.8**	**351.7**	**2,862.1**

Source: MassDOT

3. Jurisdiction

There are over 4,365 miles of road in the region. As of 2013, city and town governments administered 81 percent of the road miles and the MassDOT was responsible for approximately eight percent. The Massachusetts Turnpike Authority, the Department of Conservation and Recreation, the Federal Government, various park systems and the state colleges and universities administered a small number of roadway miles. Table 5-4 gives an inventory of the region's roadway miles according to the governmental unit responsible for maintaining them.

Table 5-4 – Miles of Roadway by Community and Administrative Unit

Community	Total	Mass DOT	City/ Town Accepted	DCR	State Park	State Institutional	County Institutional	Unaccepted	Combined Federal
Agawam	151.9	14.2	121.7	0.0	3.9	0.0	0.0	12.1	0.0
Amherst	136.4	5.3	100.4	0.0	0.0	8.2	0.0	22.5	0.0
Belchertown	163.0	15.3	127.1	7.9	0.0	2.0	0.0	10.7	0.0
Blandford	87.9	18.2	62.5	0.0	3.6	0.0	0.0	3.6	0.0
Brimfield	79.5	15.1	64.3	0.0	0.0	0.0	0.0	0.1	0.0
Chester	66.1	6.5	57.1	0.0	1.1	0.0	0.0	1.4	0.0
Chesterfield	58.2	0.1	53.3	0.0	0.2	0.0	0.0	4.7	0.0
Chicopee	258.7	17.1	153.4	0.0	1.2	0.0	0.0	71.4	15.6
Cummington	61.3	9.6	48.7	0.0	0.0	0.0	0.0	2.2	0.8
East Longmeadow	100.4	0.0	96.7	0.0	0.0	0.0	0.0	3.7	0.0
Easthampton	92.3	3.0	83.0	0.0	2.6	0.0	0.0	3.7	0.0
Goshen	42.7	7.2	25.6	0.0	5.0	0.0	0.0	4.9	0.0
Granby	68.9	7.7	58.1	0.2	0.0	0.0	0.0	2.9	0.0
Granville	73.9	0.1	64.7	0.0	1.2	0.0	0.0	7.9	0.0
Hadley	81.4	8.1	64.6	0.0	1.2	3.8	0.0	3.7	0.0
Hampden	54.7	0.0	53.7	0.0	0.0	0.0	0.0	1.0	0.0
Hatfield	59.1	7.6	50.5	0.0	0.0	0.0	0.0	1.0	0.0
Holland	37.4	0.1	35.4	0.0	0.0	0.0	0.0	1.9	0.0
Holyoke	174.4	16.9	132.6	0.0	5.1	1.8	0.0	18.0	0.0
Huntington	54.4	11.8	37.1	0.0	0.0	0.0	0.0	1.8	3.7
Longmeadow	99.0	3.3	84.9	0.0	0.0	0.0	0.0	10.8	0.0
Ludlow	135.7	6.1	122.6	0.1	0.3	0.0	0.0	6.6	0.0
Middlefield	38.4	0.0	38.4	0.0	0.0	0.0	0.0	0.0	0.0
Monson	110.3	7.1	100.4	0.02	0.0	0.6	0.0	2.1	0.0
Montgomery	30.7	0.1	30.6	0.0	0.0	0.0	0.0	0.0	0.0
Northampton	179.0	13.9	148.9	0.0	0.0	2.7	0.0	11.2	2.3
Palmer	114.8	23.3	87.9	0.0	0.0	0.0	0.0	3.6	0.0
Pelham	46.0	5.7	22.8	14.7	0.8	0.0	0.0	2.0	0.0
Plainfield	48.7	0.0	47.9	0.0	0.0	0.0	0.0	0.8	0.0
Russell	36.2	13.5	22.6	0.0	0.0	0.0	0.0	0.1	0.0
South Hadley	104.7	8.4	85.6	0.0	0.6	0.0	0.0	10.1	0.0
Southampton	78.4	5.4	69.1	0.0	0.0	0.0	0.0	3.9	0.0
Southwick	85.0	7.2	67.9	0.0	0.0	0.0	0.0	9.9	0.0
Springfield	496.7	13.0	424.6	0.0	6.7	1.4	0.0	51.0	0.0
Tolland	42.0	0.2	40.2	0.0	1.6	0.0	0.0	0.0	0.0
Wales	28.8	5.1	23.7	0.0	0.0	0.0	0.0	0.0	0.0
Ware	117.3	11.3	86.0	17.0	0.0	0.0	0.0	3.1	0.0
West Springfield	143.7	15.2	117.3	0.0	0.0	0.0	0.0	11.2	0.0
Westfield	247.9	16.3	185.5	0.0	0.0	0.4	0.0	45.7	0.0
Westhampton	47.6	0.01	44.1	0.0	0.0	0.0	0.0	3.5	0.0
Wilbraham	114.7	6.1	100.3	0.0	0.0	0.0	0.0	8.3	0.0
Williamsburg	51.1	5.7	42.1	0.0	0.0	0.0	0.0	3.3	0.0
Worthington	64.4	6.0	58.1	0.0	0.2	0.0	0.0	0.1	0.0
Pioneer Valley Region	**4363.5**	**336.5**	**3,541.9**	**39.9**	**35.5**	**21.0**	**0.0**	**366.4**	**22.5**

Source: MassDOT

4. Bridges

Among the existing transportation facilities in the Pioneer Valley Region major bridge crossings remain a focal point for regional transportation concerns, as many streets and highways converge into a limited number of crossings over the Connecticut, Westfield and Chicopee Rivers. Table 5-5 lists the bridges by community according to the governmental unit responsible for maintaining them.

5. Vehicle Miles Traveled

In general, traffic on the region's roadways has been increasing. The estimated number of daily vehicle miles traveled (DVMT) in the Pioneer Valley Region experienced periods of fluctuation between increase and decline in the period between 2003 and 2015. There was an overall increase of 128,000 miles per average weekday between 2003 and 2015. A short lived decrease in DVMT is expected thereafter followed by a steady increase over the next decade and half before starting to decrease again. The magnitude of increase is shared in the region's rural areas as well. Table 3-6 presents the Pioneer Valley's estimated urban DVMT by functional class for the years 2003 through 2040. Changes in total DVMT from 2003 – 2040 is displayed in Figure 5-2.

Figure 5-2 – Estimated Daily Vehicle Miles Traveled

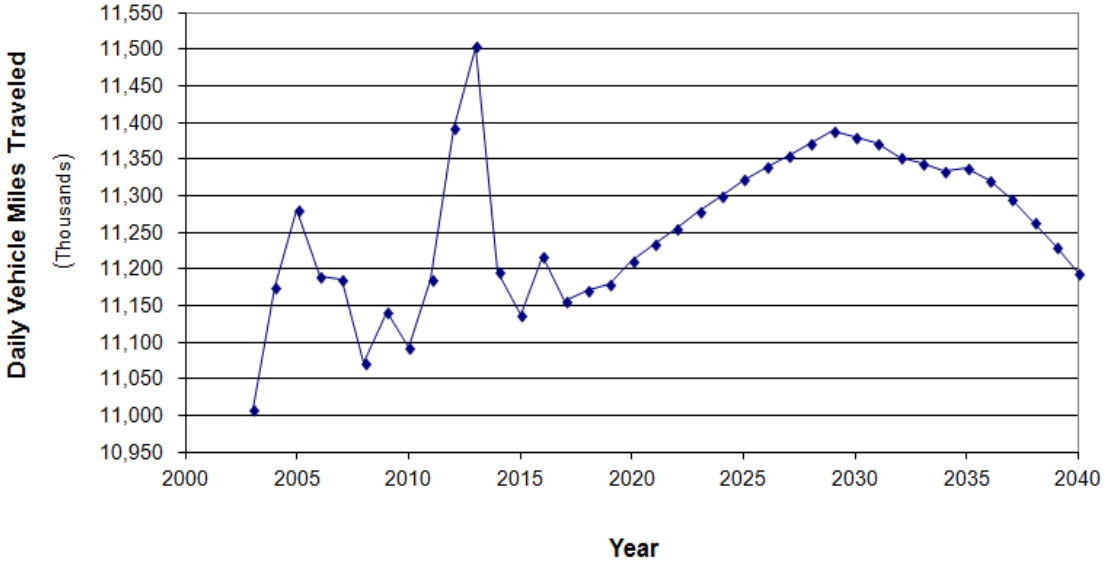


Table 5-5 – Number of Bridges by Community and by Administrative Unit

Community	Total Bridges	MassDOT	Municipal	Other State Agencies
Agawam	18	17	1	
Amherst	15	5	10	
Belchertown	12	4	8	
Blandford	12	6	6	
Brimfield	26	10	16	
Chester	25	9	16	
Chesterfield	9	3	6	
Chicopee	50	45	5	
Cummington	13	7	6	
Easthampton	19	9	10	
East Longmeadow	0	0	0	
Goshen	4	2	2	
Granby	8	1	7	
Granville	8	3	5	
Hadley	10	6	4	
Hampden	8	0	8	
Hatfield	15	10	5	
Holland	1	0	1	
Holyoke	49	40	9	
Huntington	8	6	2	
Longmeadow	4	4	0	
Ludlow	22	15	7	
Middlefield	9	0	9	
Monson	23	9	13	1
Montgomery	5	1	4	
Northampton	43	23	20	
Palmer	31	23	8	
Pelham	3	0	3	
Plainfield	2	0	2	
Russell	15	11	4	
South Hadley	11	7	4	
Southampton	10	2	8	
Southwick	3	2	1	
Springfield	59	48	11	
Tolland	0	0	0	
Wales	1	0	1	
Ware	16	7	8	1
West Springfield	26	26	0	
Westfield	36	25	11	
Westhampton	14	1	13	
Wilbraham	4	2	2	
Williamsburg	17	7	10	
Worthington	14	5	9	
Total 2014	678	401	275	2

Table 5-6 – 2000 - 2012 Estimated Urban Daily Vehicle Miles of Travel in the Pioneer Valley (in thousands)

Year	Interstate Highway	Other Urban Principle Arterials	Urban Principal Arterials and Rural Minor Arterials	Urban Minor Arterials and Rural Major Arterials	Urban Collectors and Rural Minor Collectors	Local Roads	Total
2003	3,223	593	2,574	2,568	624	1,427	11,008
2004	3,272	602	2,612	2,607	633	1,448	11,175
2005	3,303	608	2,637	2,631	639	1,462	11,280
2006	3,276	603	2,616	2,610	634	1,450	11,189
2007	3,275	603	2,615	2,609	634	1,450	11,186
2008	3,242	597	2,589	2,583	627	1,435	11,072
2009	3,262	601	2,605	2,599	631	1,444	11,141
2010	**3,248**	**598**	**2,594**	**2,588**	**629**	**1,438**	**11,094**
2011	3,275	603	2,615	2,609	634	1,450	11,185
2012	3,336	614	2,663	2,657	645	1,476	11,392
2013	3,368	620	2,689	2,683	652	1,491	11,503
2014	3,278	603	2,618	2,612	634	1,451	11,196
2015	3,261	600	2,603	2,598	631	1,443	11,136
2016	3,285	605	2,623	2,617	636	1,454	11,218
2017	3,267	601	2,608	2,602	632	1,446	11,156
2018	3,271	602	2,612	2,606	633	1,448	11,171
2019	3,274	603	2,614	2,608	633	1,449	11,180
2020	**3,283**	**604**	**2,621**	**2,615**	**635**	**1,453**	**11,212**
2021	3,289	606	2,626	2,620	636	1,456	11,234
2022	3,296	607	2,632	2,626	638	1,459	11,256
2023	3,302	608	2,637	2,631	639	1,462	11,278
2024	3,309	609	2,642	2,636	640	1,464	11,300
2025	3,315	610	2,647	2,641	641	1,467	11,322
2026	3,320	611	2,651	2,645	642	1,469	11,339
2027	3,325	612	2,655	2,649	643	1,472	11,355
2028	3,330	613	2,659	2,653	644	1,474	11,372
2029	3,335	614	2,662	2,656	645	1,476	11,388
2030	**3,332**	**613**	**2,661**	**2,655**	**645**	**1,475**	**11,381**
2031	3,330	613	2,659	2,653	644	1,474	11,372
2032	3,324	612	2,654	2,648	643	1,471	11,352
2033	3,321	611	2,652	2,646	643	1,470	11,343
2034	3,319	611	2,650	2,644	642	1,469	11,334
2035	3,320	611	2,650	2,644	642	1,469	11,337
2036	3,315	610	2,646	2,641	641	1,467	11,320
2037	3,307	609	2,641	2,635	640	1,464	11,295
2038	3,298	607	2,633	2,627	638	1,460	11,263
2039	3,288	605	2,625	2,619	636	1,455	11,230
2040	**3,278**	**603**	**2,617**	**2,611**	**634**	**1,451**	**11,195**

Sources: Massachusetts State HPMS (Highway Performance Monitoring System) Submittals to FHWA, Massachusetts Road Inventory Data, Massachusetts Statewide Travel Demand Model

The increase in DVMT is the result of several growth trends identified in the Pioneer Valley as well as other areas of the state and nation. Vehicle ownership is on the rise as vehicle occupancy rates decline. Generally speaking, this puts more single occupant vehicles on the roadway system, which increases the total daily vehicle miles of travel. There was a decrease in DVMT in the last two years from 2013 to 2015. After an increase in traffic volume of 0.97% in 2013, a decrease of -2.67% in 2014 followed. Another decrease of -0.54% is expected in 2015 before it starts increasing. This reflects the continued trend fluctuation presented above.

6. Average Daily Traffic Counts

The Pioneer Valley Planning Commission (PVPC) monitors traffic levels throughout the Region. Conducting close to 200 roadway segment counts annually as well as compiling counts from various local traffic studies; the PVPC continuously expands the data base. This information is used to measure Average Daily Traffic (ADT), Daily Vehicle Miles Traveled (DVMT), and identify seasonal, daily and hourly trends related to vehicle travel.

In addition to the selective ground counts conducted throughout the region, there are fourteen permanent monitoring stations maintained by MassDOT. The MassDOT locations collect counts hourly, 365 days a year. These permanent count locations are shown in Table 5-7.

Table 5-7 – MassDOT Permanent Count Stations in the Pioneer Valley

Community	Road	Location	Years Available
Longmeadow	I-91	South of Springfield City Line	1994-1997,1999,2006-2012
Chicopee	I-391	South of I-90 at Route 116	1995-2012
Chicopee	I-391	North of I-90	1994, 1996-2012
Chicopee	I-391	At Connecticut River Bridge	2005-2012
Chicopee	I-391	North of I-91	2002-2012
Northampton	Route 5/10	South of Hatfield Town Line	1996-2012
Northampton	I-91	North of King Street Interchange	2002-2012
Northampton	I-91	Between Route 9 and Damon Road	2002-2012
Northampton	I-91	Between Routes 5 and 9	2002-2012
Springfield	I-291	South of Roosevelt Avenue	2003-2012
Springfield	I-291	At Chicopee City Line	1993-2012
Springfield	I-291	West of Saint James Avenue	1993-2012
Brimfield	Route 20	0.8 km East of Holland Road	1993-2012
West Springfield	Route 5	At the Holyoke City Line	1998-2012
West Springfield	I-91	North of Route 5	1994-2012
Huntington	Route 112	South of Route 66/112	1995-2012
Goshen	Route 112	0.6 km South of Ashfield Town Line	1996-2012
Russell	Route 20	1.0 km West of Route 23	1998-2005,2001-2012
Hatfield	I-91	North of Chestnut Street	2002-2012

Source: MassDOT

Table 5-8 provides information on the percent change in traffic volumes at the above mentioned interstate locations.

Table 5-8 – Percent Change in Interstate Highway Traffic Volumes

Community	Road	Location	Range for % Change	% Change
Longmeadow	I-91	South of Springfield City Line	2002-2012	-1.21%
Northampton	I-91	North of King Street Interchange	2008-2012	-4.68%
Northampton	I-91	Between Route 9 and Damon Road	2007-2012	-5.05%
Northampton	I-91	Between Routes 5 & 9	2008-2012	-0.70%
West Springfield	I-91	North of Route 5	2011-2012	-5.94%
Hatfield	I-91	North of Chestnut Street	2002-2012	1.86%
Springfield	I-291	South of Roosevelt Avenue	2003-2012	3.24%
Springfield	I-291	At Chicopee City Line	2007-2012	0.31%
Springfield	I-291	West of Saint James Avenue	2010-2012	2.24%
Chicopee	I-391	South of I-90 at Route 116	2011-2012	14.46%
Chicopee	I-391	At Connecticut River Bridge	2011-2012	16.75%
Chicopee	I-391	North of I-90	2010-2012	3.76%
Chicopee	I-391	North of I-91	2002-2012	6.77%

By examining the change in traffic volumes at the permanent count stations, information can be developed on the amount of growth occurring at specific locations throughout the region. Locations have been grouped by the functional classification of the roadway and are shown in Figures 5-3 through 5-7. The functional classification of the roadway is an indication of the type and amount of traffic a roadway is expected to serve.

Figure 5-3 – Average Annual Traffic for I-91

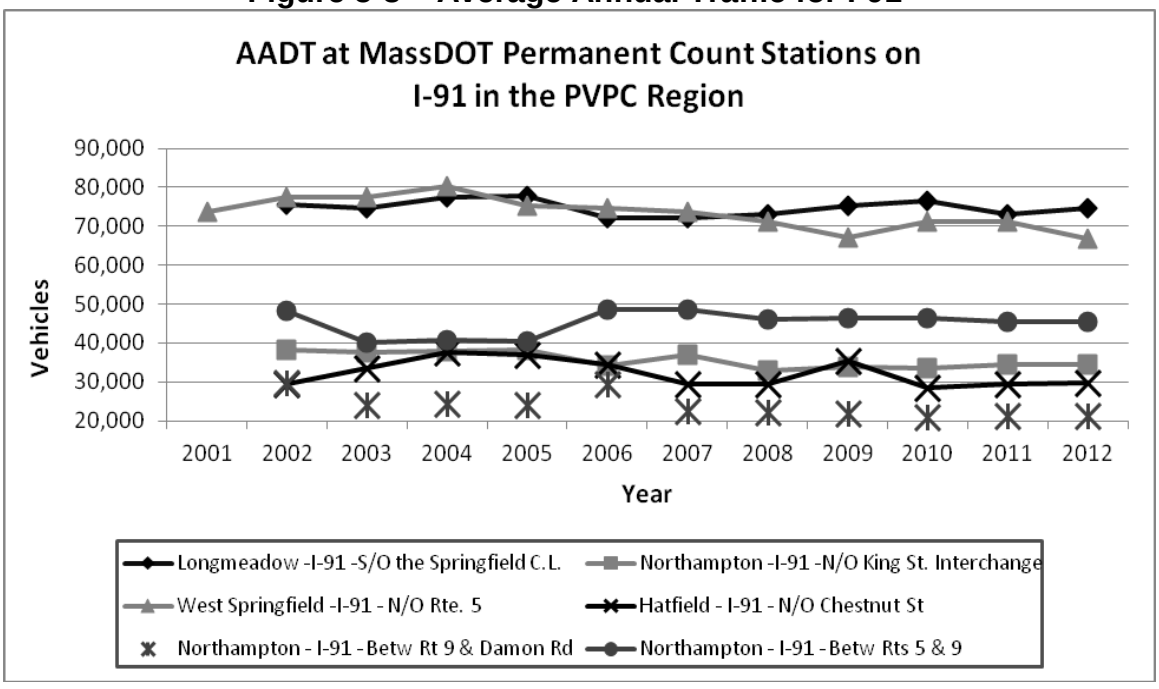


Figure 5-4 – Average Annual Traffic for I-391

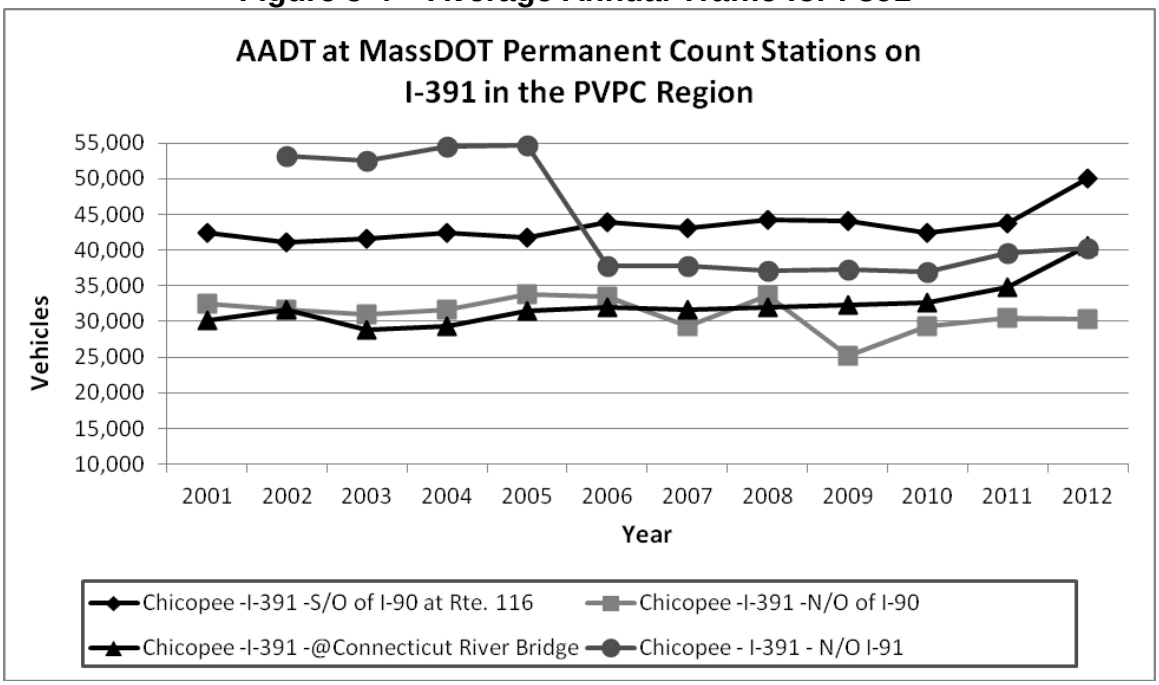


Figure 5-5 – Average Annual Traffic for I-291

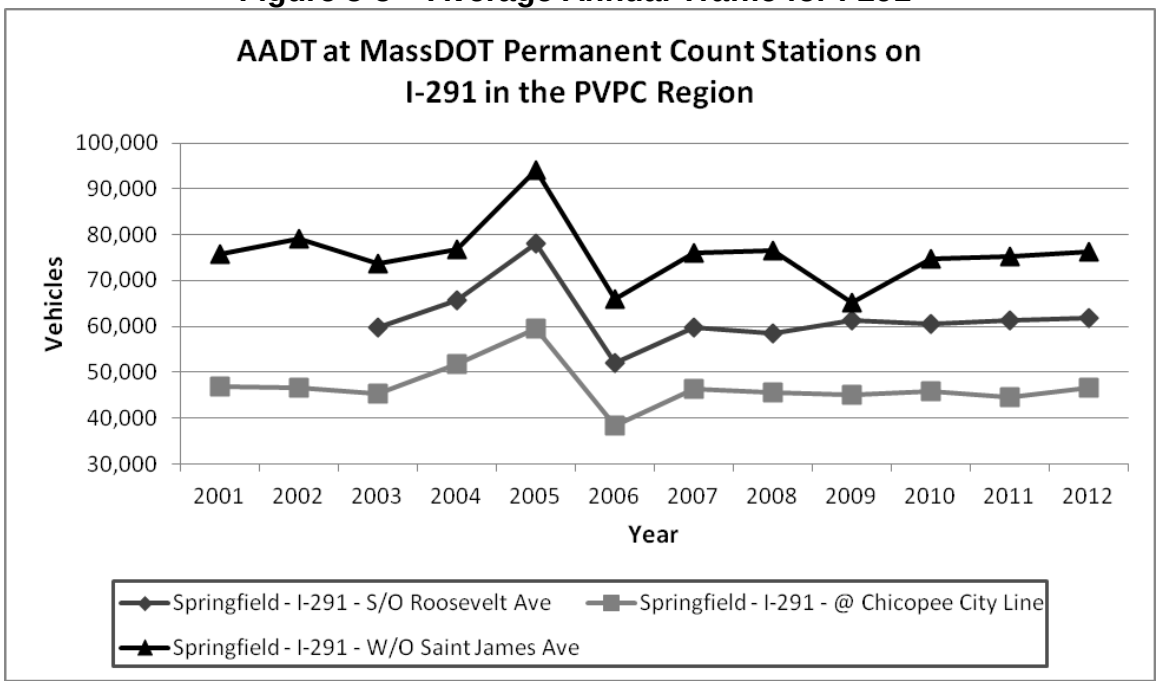


Figure 5-6 – Average Annual Daily Traffic for Arterial Roadways

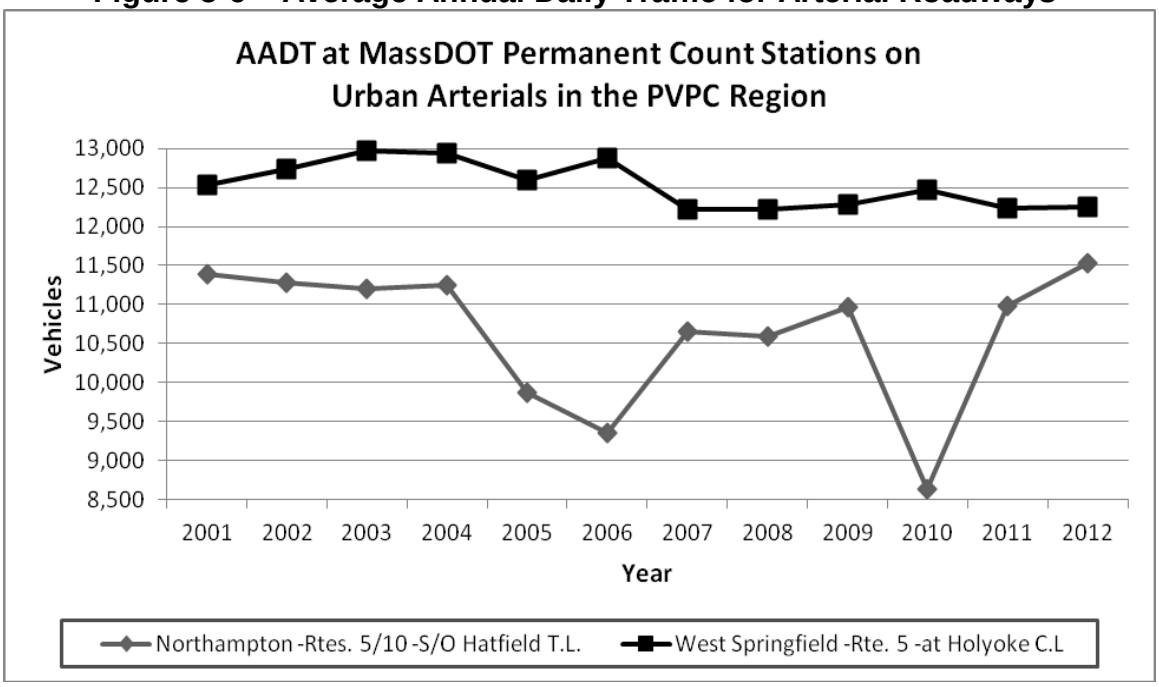
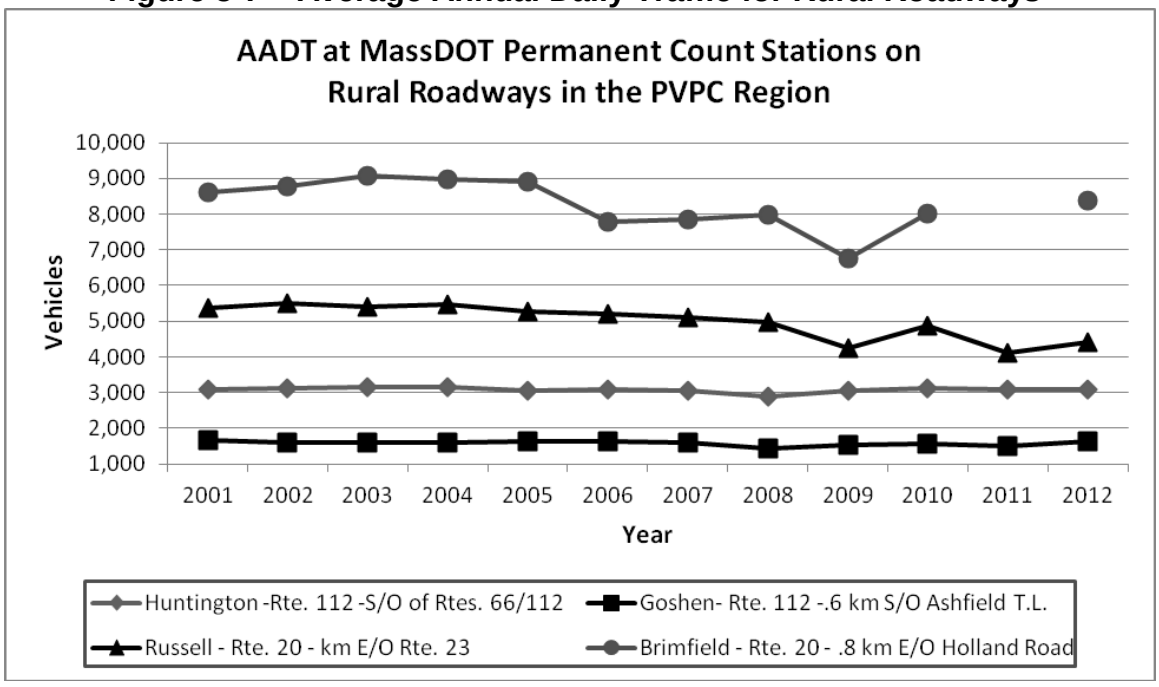


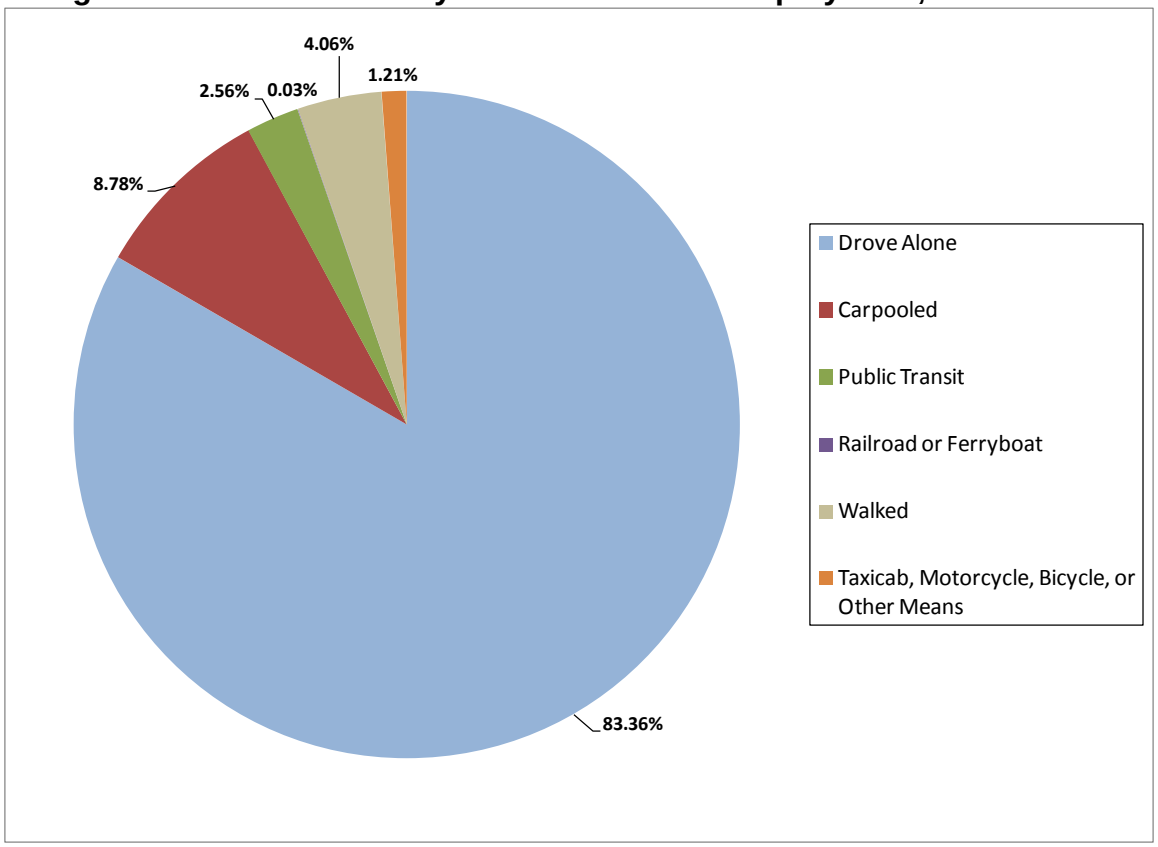
Figure 5-7 – Average Annual Daily Traffic for Rural Roadways



7. Mode Share

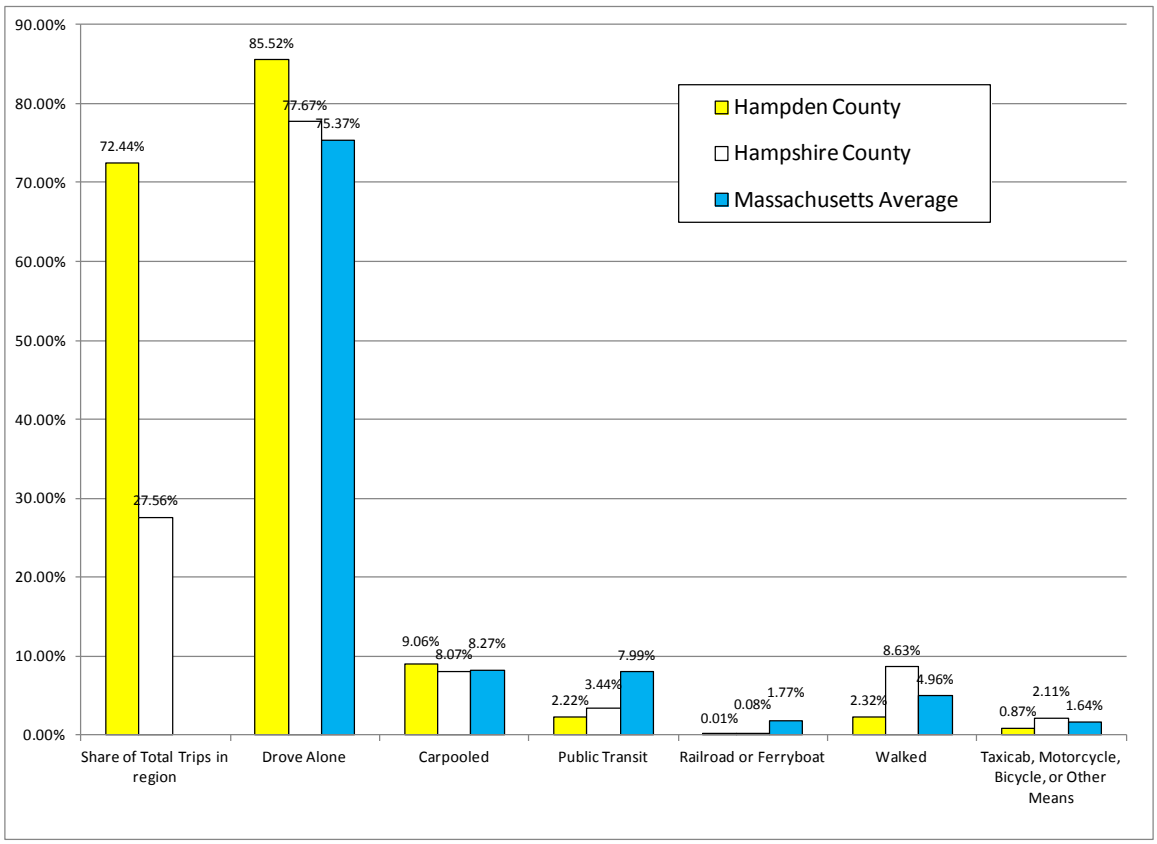
The mode of travel in the region skews heavily towards private autos. The 2009 – 2013 American Community Survey (ACS), which provides the most recent information on mode share, finds that approximately 84% of commuters in the region drive alone to work while only 2.5% take public transit. A summary of the mode share information by mode and county is provided in Figures 5-8 and 5-9.

Figure 5-8 – Pioneer Valley Travel Modes for Employment, 2009 - 2013



The mode share differences between Hampden and Hampshire Counties are significant. One reason may be a result of the commuting patterns of the students and faculty that attend the University of Massachusetts in Amherst who may have more travel options to campus. Significantly more people walk to work in Hampshire County, nearly double the state average. On a whole, the region is lagging the state average for railroad and public transit modes. This is a result of the extensive service options provided by the Massachusetts Bay Transportation Authority (MBTA) for commuters travelling to the Boston area.

Figure 5-9 – Hampden and Hampshire County Employment Travel Modes 2009 - 2013



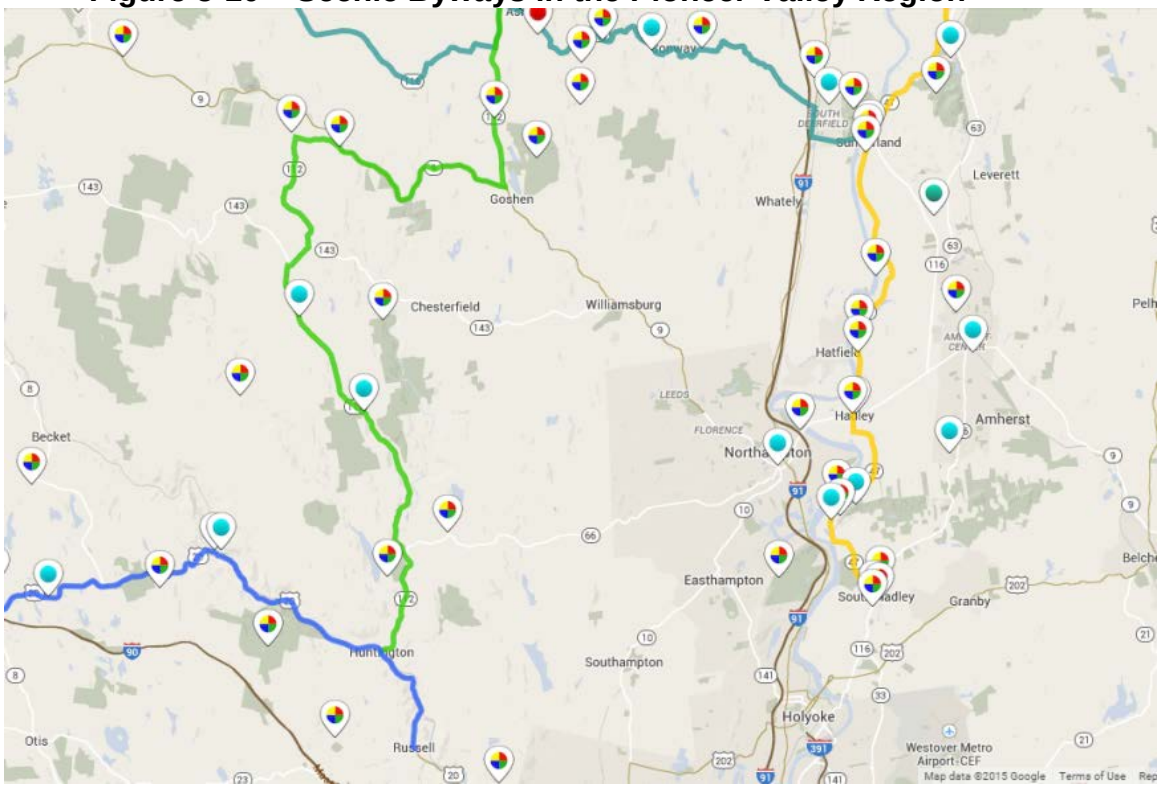
8. Scenic Byways

The National Scenic Byways Program is part of the U.S. Department of Transportation, Federal Highway Administration. The program is a collaborative effort to help recognize, preserve and enhance selected roads throughout the United States. Projects included in this program focus on the betterment of the services and facilities that attract and please the traveling public. Over the last fifteen years, the PVPC has taken an active role in the development of planning studies and project development to support the preservation of scenic roadways in the Pioneer Valley region. There are currently four designated scenic byways in the Pioneer Valley Region:

- The Jacob's Ladder Trail which follows Route 20 from Russell to Lee.
- The Route 116 Scenic Byway which follows Route 116 from Sunderland to Adams.
- The Route 112 Scenic Byway which follows Route 112 and part of Route 9 from Huntington to the Vermont State Line.
- The Connecticut River Scenic Byway which follows Route 47 and 63 from South Hadley to the Vermont State Line

More information on scenic byways, including an interactive mapping tool, in the Pioneer Valley region is available at: http://www.bywayswestmass.com/.

Figure 5-10 – Scenic Byways in the Pioneer Valley Region



9. Travel Time Contours

Travel Time Contours are a great visual tool for showing average travel times from a specific location within the Pioneer Valley Region. The following section summarizes the new travel time contour data. Travel time contours were developed for the Pioneer Valley Region based on the location of centers of employment in the region. A total of six employment centers were selected because of their significance and to achieve geographic diversity. Many employment centers were not selected due to their close proximity to a site that was already mapped. Travel contours are broken down into 15, 30, 45, and 60 minute intervals.

Pioneer Valley Region Travel Time Contours were created using the EsriArcGIS Online Spatial Analysis Use Proximity Tool Set - Create Drive-Time Areas. Create Drive-Time Areas identifies areas that can be reached within a specified drive time or drive distance. The tool measures out from up to 1,000 roadway points to create drive time buffers. Drive time buffers are calculated using the street location, density, and other physical/use attributes. They take into account one-way streets, stop signs, traffic signals, traffic volume, speed limit, physical barriers, and terrain. The information for both

the original contours (circa 2001) and the new contours (2014) are shown in the tables below. The latest Pioneer Valley Region Travel Time Contours are shown in Figures 5-11 – 5-16.

Table 5-9 – Travel Time Comparison Northbound Routes (2001 and 2015)

Northbound	2001 (Minutes)	2015 (Minutes)
North End Bridge Rotary	2.25	3.86
I-91 Exit 9 (Route. 20 - North End Bridge)	2.03	4.33
I-91 Exit 10 (Birnie Ave)	0.65	0.78
I-91 Exit 12 (I-391 - Chicopee)	1.05	1.09
I-91 Exit 13A (Route 5 - West Springfield	0.58	0.79
I-91 Exit 14 (Massachusetts Turnpike)	2.38	2.54
I-91 Exit 15 (Holyoke - Ingleside)	0.65	0.90
I-91 Exit 16 (Holyoke - Route 202)	1.48	1.60
I-91 Exit 17A (Holyoke - Route 141)	1.17	0.81
I-91 Exit 18 (Northampton - Route 5)	6.17	7.55
I-91 Exit 19 (Northampton - Route 9)	1.80	1.91
I-91 Exit 21 (Hatfield/Northampton)	2.10	2.32
I-91 Exit 22 (North Hatfield)	2.37	2.61
I-91 Exit 24 (Deerfield/Whately)	7.12	4.40
I-91 Exit 26 (Greenfield - Route 2A)	10.47	7.74
I-91 Exit 27 (Greenfield - Route 2)	2.37	2.58
I-91 Exit 28 (Bernardston)	4.12	4.67
Vermont State Line	4.17	4.13
I-91 VT Exit 1 (US Route 5)	6.93	6.88
Total	**59.85**	**61.49**

As can be seen in the tables, with the exception of southbound travel, the average travel times in the region over the past 15 years have not changed significantly. Travel times on average where measured to be approximately 45 seconds slower overall than in 2001 (not including southbound data.) This can be attributed to the fact that infrastructure improvements made in the past have been offset by an increase in vehicular volumes on the roadways. The significant decrease in travel times on roadways in the southbound direction can be attributed partially to less roadway congestion but also to better data. The 2001 data was manually collected by PVPC staff. The new data as discussed previously is calculated using GIS software and is based on a larger sample size. Westbound times also show a minor decrease in travel times while eastbound and northbound times have increased slightly.

Table 5-10 – Travel Time Comparison Southbound Routes (2001 and 2015)

Southbound	2001 (Minutes)	2015 (Minutes)
Memorial Bridge Rotary	5.10	1.86
I-91 Exit 3 (Route 5/57 - South End Bridge)	2.53	3.01
I -91 Exit 2 (Longhill Street)	0.37	0.89
I-91 Exit 1 (Route 5 - Longmeadow)	0.63	0.12
I-91 CT Exit 49 (US Route 5)		3.77
I-91 CT Exit 48 (CT Route 220)	1.27	1.53
I-91 CT Exit 47 (CT Route 190)	2.08	0.41
I-91 CT Exit 46 (US Route 5)	2.30	2.57
I-91 CT Exit 45 (Bradley Airport)	8.22	2.16
Total	**22.50**	**14.46**

Table 5-11 – Travel Time Comparison Eastbound Routes (2001 and 2015)

Eastbound	2001 (Minutes)	2015 (Minutes)
I-291 Exit 2 (Dwight/Chestnut Streets	4.67	5.51
I-291 Exit 3 (Armory Street)	0.73	0.68
I-291 Exit 4 (St. James Avenue)	1.07	1.37
I-291 Exit 5 (Page Boulevard)	1.72	1.76
I-291 Exit 6 (Shawinigan Drive)	1.38	1.26
I-90 Exit 6 (Chicopee/Springfield)	2.03	2.01
I-90 Exit 7 (Ludlow)	4.27	3.20
I-90 Exit 8 (Palmer)	5.88	7.02
I-90 Exit 9 (Sturbridge)	14.12	14.71
I-90 Exit 10 (Auburn/Worcester)	10.67	10.87
Total	**46.53**	**48.39**

Table 5-12 – Travel Time Comparison Westbound Routes (2001 and 2015)

Westbound	2001 (Minutes)	2015 (Minutes)
I-90 Exit 4 (Holyoke/West Springfield	12.78	10.73
I-90 Exit 3 (Westfield)	5.45	4.43
I-90 Exit 2 (Lee)	27.23	28.12
I-90 Exit 1 (West Stockbridge)	7.63	8.14
Total	**53.10**	**51.42**

Figure 5-11 – Travel Time Contours for the Springfield Central Business District

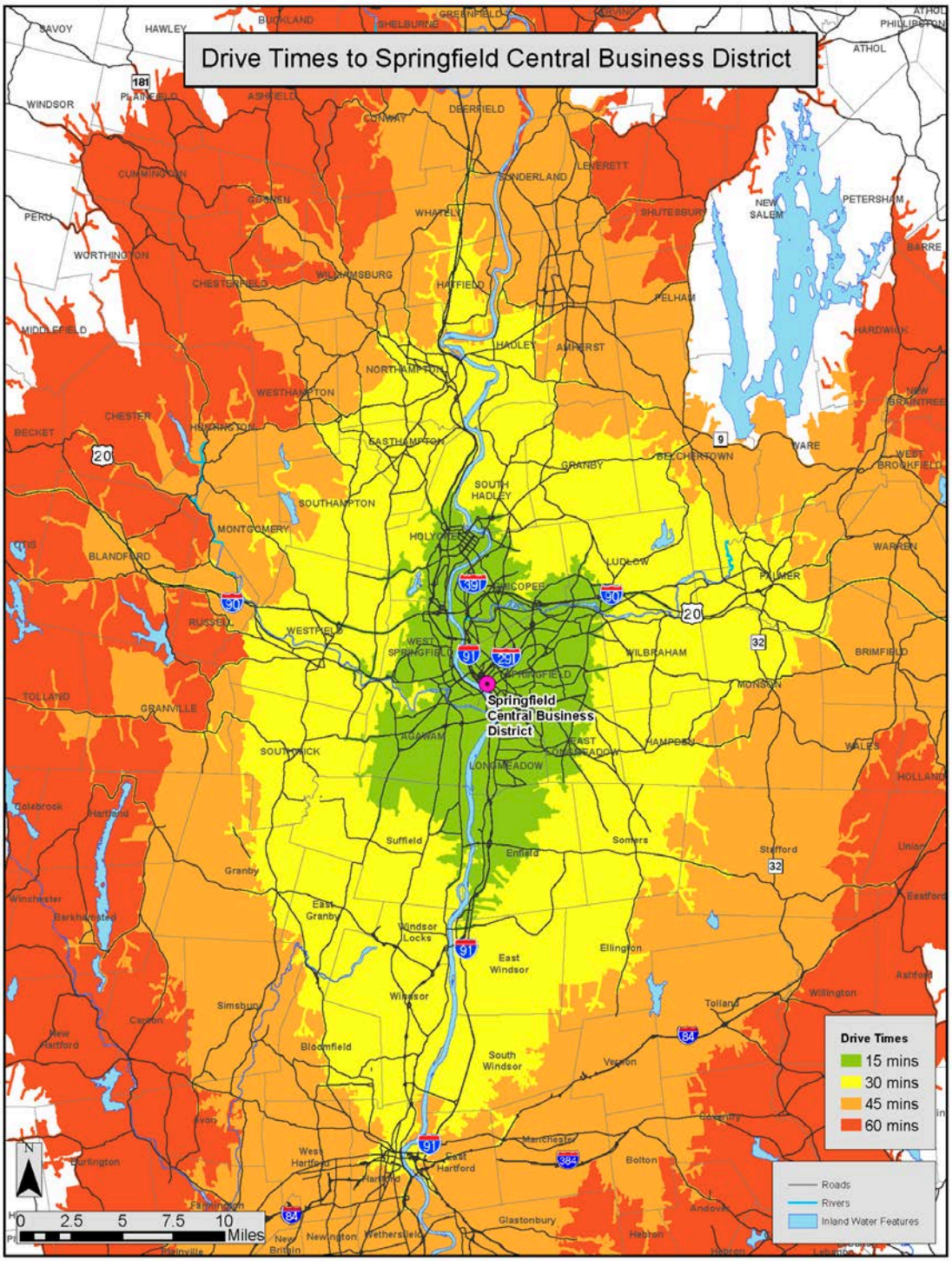


Figure 5-12 – Travel Time Contours for the University of Massachusetts - Amherst

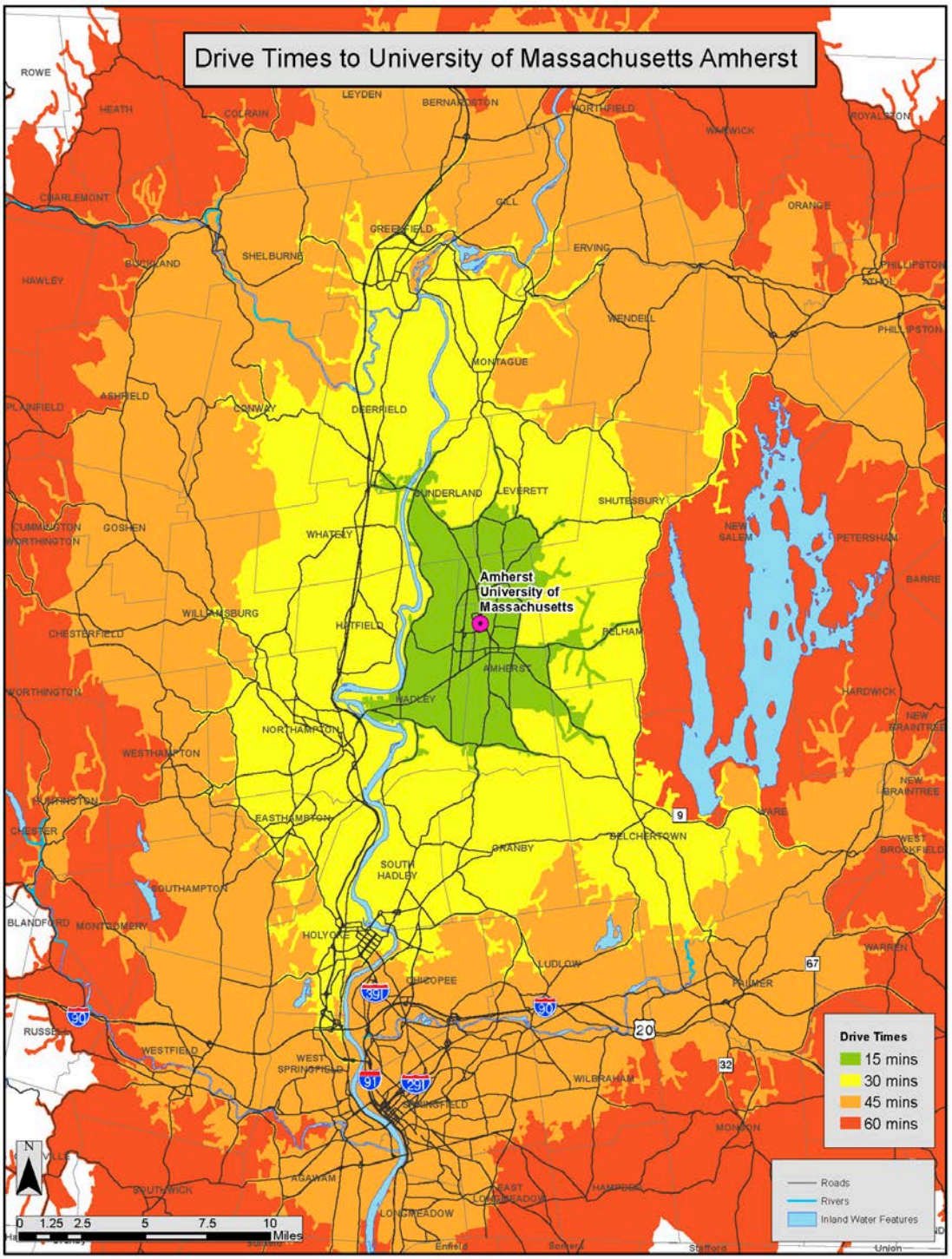


Figure 5-13 – Travel Time Contours for the East Longmeadow Industrial Park

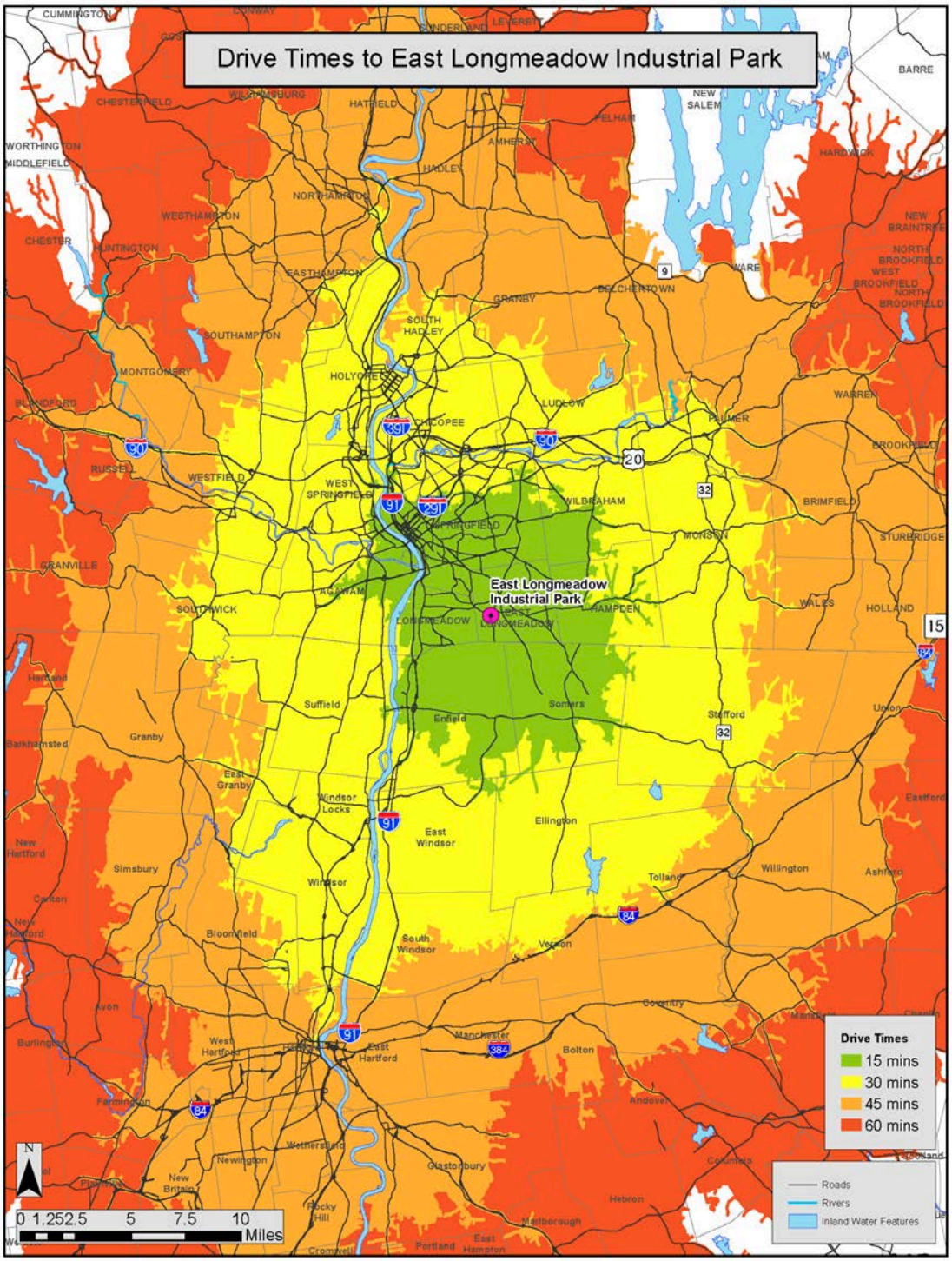


Figure 5-14 – Travel Time Contours for the Northampton Central Business District

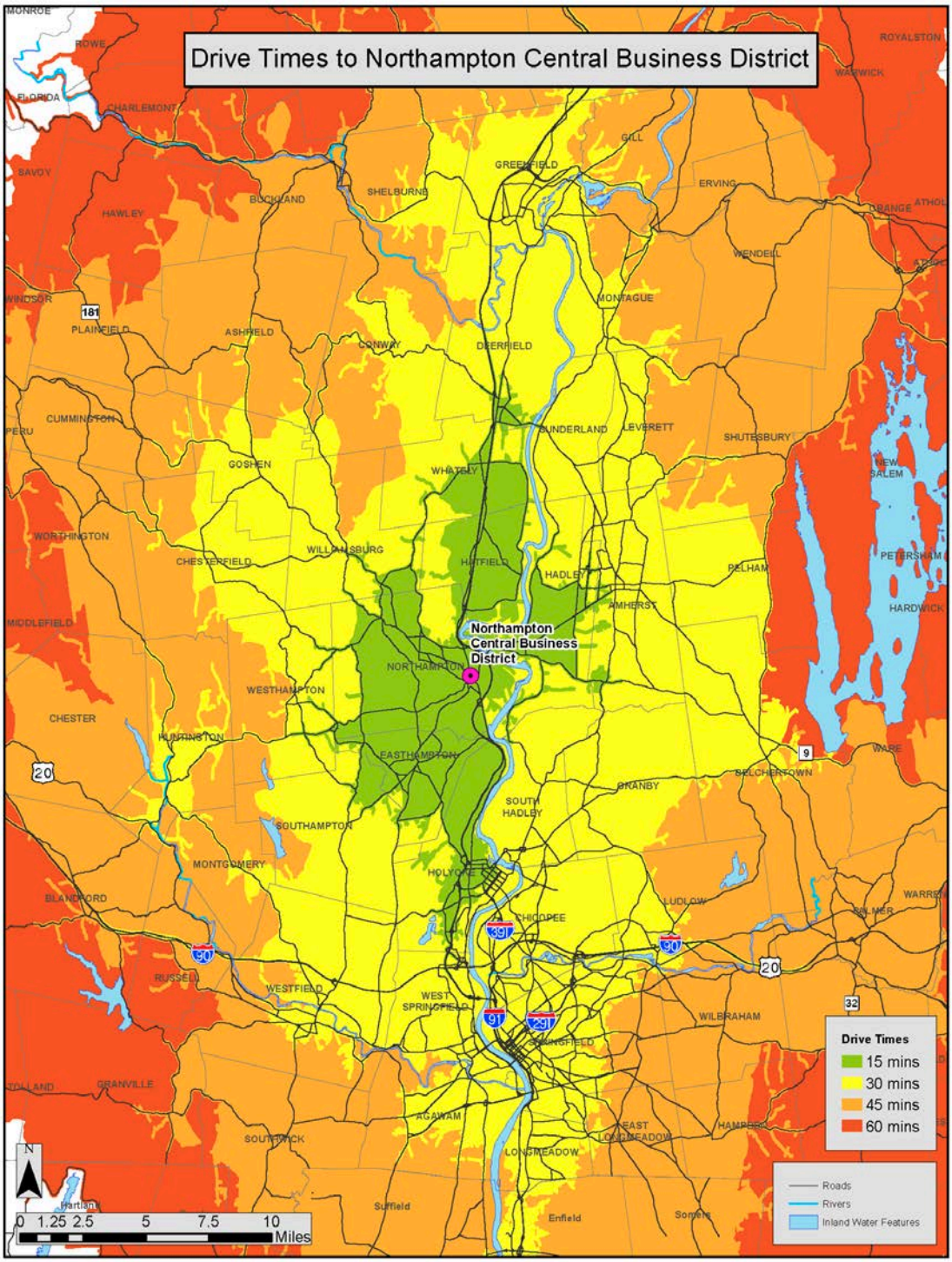


Figure 5-15 – Travel Time Contours for the Palmer Four Corners

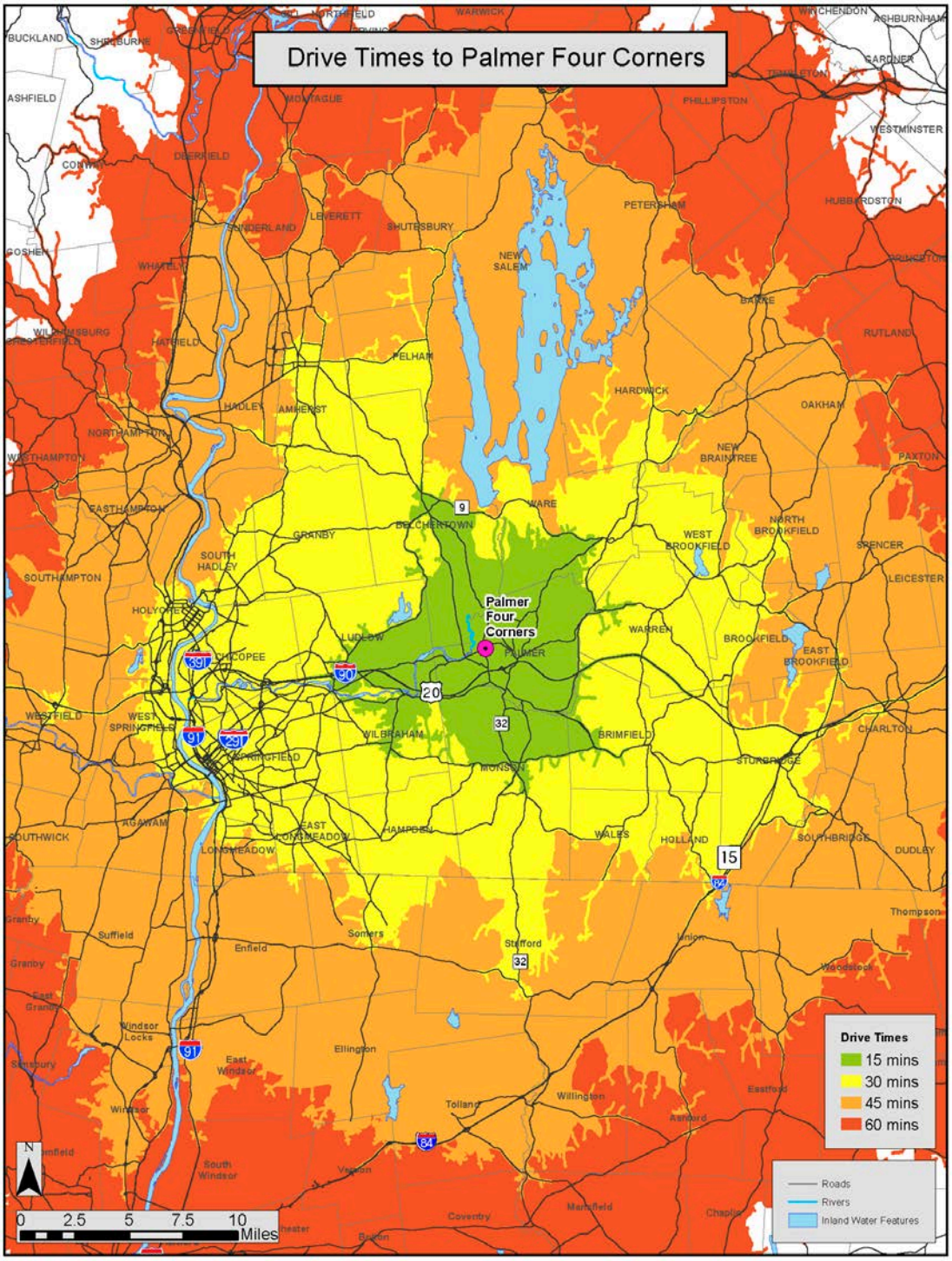
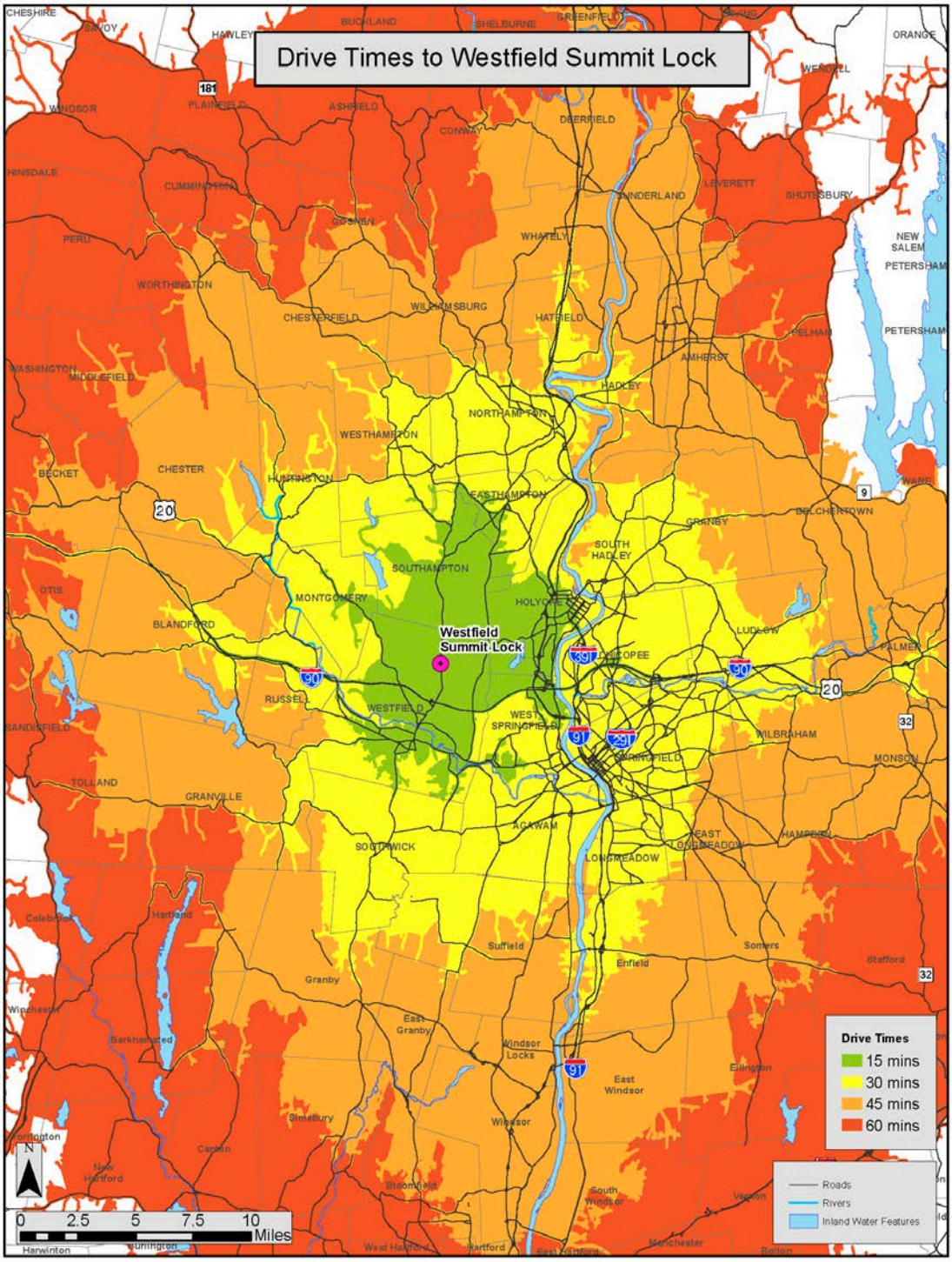


Figure 5-16 – Travel Time Contours for Westfield Summit Lock



C. PASSENGER TRANSPORTATION

The Pioneer Valley is home to an extensive transit system that offers many different modes of public transportation. Intra-county and Intercity buses, van service for seniors and disabled riders, ridesharing, and park and ride lots are all vital to the mobility of the regions residents. What follows is a summary of these services.

- Public buses operating on fixed routes and schedules
- Vans for disabled residents and senior citizens better known as Paratransit
- Commercial scheduled bus service within the region, as well as to destinations outside it
- Commercial and non-profit van shuttles, charter buses and taxis
- Passenger rail

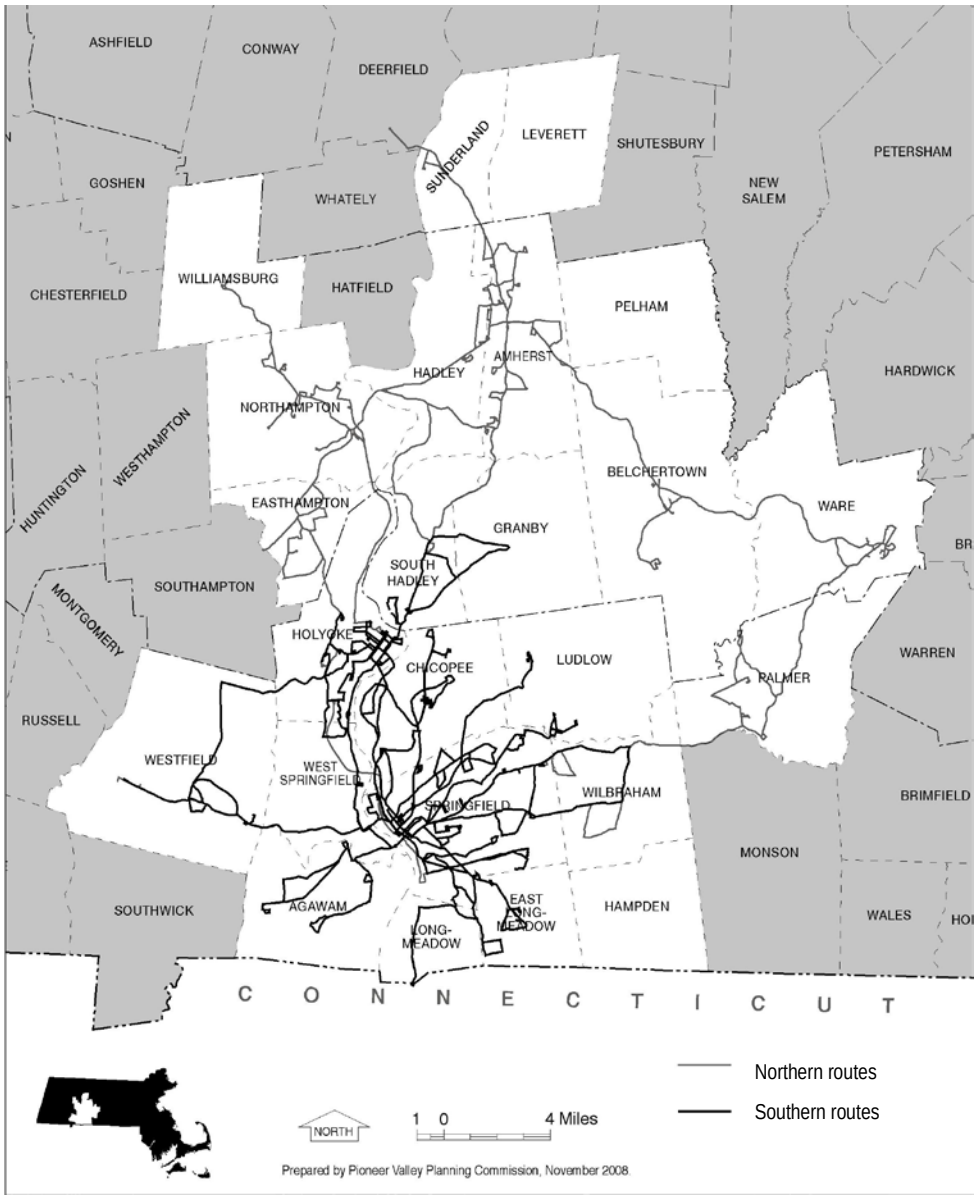
1. Pioneer Valley Transit Authority (PVTA) Bus and Paratransit Service

PVTA, located in western Massachusetts is the largest regional transit authority in the state. PVTA's service area begins at the Connecticut state line and stretches north to Sunderland. PVTA has 43 scheduled or fixed bus routes and on-demand paratransit van service in 24 communities with a total population of 538,827 (2013 U.S. Census estimate).

Funding for PVTA comes from several sources: federal, state and local governments; passenger fares; and advertising. The authority's operating budget in FY14 is $39.9 million. Member cities and towns contribute an annual assessment to PVTA based on the level of service that operates in their community. Passenger fares cover about 18% of the total cost of the service. Funds for capital improvements are received through various state and federal grant programs.

PVTA is prohibited from directly operating transit services so they contract with three private management companies: **First Transit** operates fixed bus routes based in Springfield and Northampton; **UMass Transit Services** operates fixed bus routes based at the University of Massachusetts serving the Amherst area; and **Hulmes Transportation** operates all paratransit van services, as well as community mini-bus shuttles in Easthampton, Palmer, and Ware.

Figure 5-17 – PVTA Service Communities and Scheduled Bus Routes



The following cities and towns make up PVTA's service area:

Agawam	Granby	Ludlow	Sunderland
Amherst	Hadley	Northampton	Ware
Belchertown	Hampden	Palmer	West Springfield
Chicopee	Holyoke	Pelham	Westfield
Easthampton	Leverett	South Hadley	Wilbraham
E. Longmeadow	Longmeadow	Springfield	Williamsburg

In 2014 PVTA contracted with a consultant to do a system-wide Comprehensive Service Analysis (CSA) of all of PVTA's fixed route service. The recommendations of that survey were implemented in the fall of 2014. Most of PVTA's routes were affected in some way. Three new routes were implemented, the X90 Inner Cross Town and the X92 MidCity Crosstown in the southern service area, and the X98 CrossTown Northampton in the northern service area. To read the complete CSA copy and paste the following link into your browser:

http://pvta.com/media/pdfs/PVTA_CSA_FinalReportAppendicesJune2014.pdf

PVTA's basic fare is $1.25 per ride. Transfers cost an extra 25 cents and are good for 90 minutes from time of purchase. Reduced fares of 60 cents per ride are offered for elderly and disabled customers, as well as Medicaid card holders (transfers are 10 cents). The fare for children age 6 to 12 is 75 cents; children younger than age 6 ride free with an adult. Monthly unlimited ride passes are $45, with a discounted price of $22 for elderly, disabled, and Medicaid card holders. PVTA also offers 1-day unlimited ride passes for $3 and 7-day passes for $12.50.

Fares for routes serving the University of Massachusetts are collected under a "proof of payment" system in cooperation with the University and other Five Colleges institutions (Smith, Mount Holyoke, Hampshire and Amherst Colleges). Instead of onboard collection, fares on these routes are collected through activity fees that are paid by students, as well as subsidies from the institutions. Students, faculty and staff of these institutions must be prepared to show their current school ID cards as proof of fare payment when riding the bus. Riders who are not affiliated with the 5 Colleges must purchase multi-ride passes or single ride tickets. Cash is not collected aboard UMass Transit buses in the Amherst area.

a) PVTA Bus Riders

Surveys have found that about half of all PVTA riders use the bus to commute to work or school. The remaining trip purposes are shopping, attending social and recreational events, and medical appointments. Nearly three-quarters of riders report earning less than $20,000 per year; three of every five riders say they do not own a car; and four of five riders say they have no other way to make their trip other than using PVTA.

Table 5-13 – PVTA Bus Route Ridership

Fiscal Year	Passenger Trips	% Change
2003	10,427,793	-6.51%
2004	9,221,309	-11.57%
2005	9,071,913	-1.62%
2006	9,108,550	0.40%
2007	9,435,885	3.47%
2008	9,722,016	2.94%
2009	9,897,009	1.77%
2010	9,743,568	-1.57%
2011	10,152,139	4.02%
2012	10,872,898	6.63%
2013	11,128,713	2.30%

Fiscal year: July 1 through June 30 Source: PVTA

Capital and service improvements implemented by PVTA during the 1970s-1990s resulted in a ridership peak of nearly 13 million in 1985. However, state-imposed budget reductions in 2002 necessitated deep service cuts, eliminating nearly one-fifth of bus service, including many Sunday trips. Ridership fell during the following two years to about 9 million rides. In the last 8 years PVTA has reinstituted all the service that it cut in 2002 and more. Since 2006, ridership held steady at approximately 10 million rides per year. Beginning in 2010 ridership has made modest gains with 2013 coming in at just over 11 million rides.

Because transit customers typically ride the bus or van every day (or at least most days), and usually make at least two trips per day (going to and from their destinations), the actual number of transit customers per year is actually much less than annual "ridership." Using survey information on rider frequency, PVPC estimates that there are 15,000 to 20,000 regular bus riders in the region; however, this varies widely, depending on whether or not school is in session.

b) PVTA Bus Fleet

PVTA's bus fleet consists of 176 vehicles from four manufacturers: 109 Gillig low-floor clean diesel vehicles manufactured after 2006, 8 General Motors Rapid Transit Series (RTS) diesel vehicles manufactured in the mid to late 1990, 56 late model New Flyer buses, and 3 late model Ford Mini buses. All buses provide comparable passenger amenities: all are air conditioned and equipped with wheelchair lifts or ramps. PVTA's buses are based at three garages, as shown in Table 5-14.

Table 5-14 – PVTA Bus Fleet

Bus Model	Springfield Garage (Southern Area)	Northampton Garage (Northern Area)	UMass Garage (Northern Area)	**Totals**
Gillig	82	9	18	**109**
RTS	*8	0	0	**8**
New Flyer	30	9	17	**56**
Ford Mini Bus	0	3	0	**3**
Totals	**120**	**21**	**35**	**176**

*The 8 RTS buses have exceeded their rated 12-year useful life and are outdated. These are the last of the buses that were purchased in the 1990's. They are scheduled to be retired as soon as conditions permit.

c) PVTA Paratransit Service

Paratransit is demand response door-to-door van service that is scheduled by the rider. PVTA's fleet consists of 145 vans. These vans are equipped with wheelchair lifts and other special equipment to insure the safety of disabled riders. As the average age of the region's residents continues to rise, the need and demand for paratransit services will increase substantially. Paratransit fares typically cover only about 10% of the service cost.

This section describes the two types of paratransit van service that PVTA provides to residents of its 24 member communities. Total ridership for the service is presented below.

Table 5-15 – PVTA Annual Paratransit Ridership

Fiscal Year	Annual Rides	% Change
2003	548,363	3.92%
2004	407,430	-25.70%
2005	373,622	-9.05%
2006	373,448	-0.05%
2007	299,529	-24.68%
2008	308,787	3.00%
2009	308,323	-0.15%
2010	317,733	2.96%
2011	318,869	0.36%
2012	316,208	-0.84%
2013	312,015	-1.34%

Fiscal year July 1 through June 30 *Source: PVTA*

The ridership numbers for FY 2012 and 2013 are actually going down when the number of seniors using the service is going up. A possible explanation for why ridership is going down is that the PVTA discovered that they were counting the "primary care attendants" (PCA's) as passengers when in fact they should not have been counted. They have since discontinued the counting of PCA's as riders.

- **Americans with Disabilities Act (ADA) Service --** Federal law requires that public transit providers offer paratransit service that is comparable to their fixed route bus service to disabled customers who are unable to use regular buses. Customers must be eligible to use the service, and an application and approval process is required. Trips must be scheduled at least one day in advance. ADA paratransit service is available only within three-quarters of a mile of a fixed bus route, and the trip must start and be completed during the same hours that the nearest regular bus route operates. The fare is $2.50, $3.00, or $3.50 per ride, depending on pickup and drop off locations.
- **Senior Dial-A-Ride Service --** PVTA also provides van service to people age 60 and over in its 24 member communities. This service is operated on a space-available basis Monday through Friday from 8:00 AM to 4:30 PM. Fares are $2.50, $3.00 and $3.50 per ride depending on the pickup and drop off locations. Tickets are available from local senior centers and the PVTA Information Center in $0.50 or $2.50 denominations and discounts are often available.

PVTA conducts quarterly Paratransit rider meetings. Meetings are held in both the southern and northern regions – usually within a day or two of each other. PVTA provides free rides to those who wish to attend these meetings. PVTA uses these meetings to pass on any new information to their Paratransit riders and to get feedback from them regarding any issues they may have with the service.

Councils on Aging (COAs) and Senior Centers in the PVTA service area also provide transportation to their senior residents. Below is a table showing the level and type of service provided by each COA.

Table 5-16 – Councils on Aging and Senior Centers in the PVTA Service Area

City or Town	Transportation Provided?	# of Vehicles	Hours of Service
Agawam	Yes	1 car	8:00-12:00 T-F
Amherst	Yes	No vans - volunteers	Varies
Belchertown	Yes	1 van	8:00 4:30
Chicopee	Yes	2 cars 2 vans	8:30-3:30
East Longmeadow	Yes	1 van	9:00 - 3:00
Easthampton	Yes	1 van	8:30 - 3:30
Granby	Yes	1 van 1 car	9:00 3:00
Hadley	Yes	1 van	Thursday only
Hampden	Yes	1 van	9:00 - 3:00
Holyoke	Yes	2 cars	8:00-4:00
Leverett	info not available		
Longmeadow	Yes	1 van	varies
Ludlow	Yes	3 vans	8:00 - 4:00
Northampton	Yes	No vans - volunteers	Varies
Palmer	Yes	2 vans	8:00 - 3:30
Pelham	info not available		
South Hadley	Yes	1 van	9:00 - 3:00 in town
Springfield	No		
Sunderland	No		
Ware	Yes	1 van	9:00 - 12:00
West Springfield	Yes	1 van	8:00 - 4:30
Westfield	No		
Wilbraham	Yes	1 van	varies
Williamsburg	Yes	No vans - volunteers	8:30-1:30 M-T

2. Franklin Regional Transit Authority (FRTA) Paratransit Service

There are 14 additional towns in the PVPC region that are not members of PVTA and instead contract with the Franklin Region Transit Authority (FRTA), based in Greenfield, for paratransit service. These towns are: Blandford, Chester, Chesterfield, Cummington, Goshen, Huntington, Middlefield, Montgomery, Plainfield, Russell, Southampton, Southwick, Westhampton, and Worthington.

Because these communities are located in the furthest western and southern portions of the PVPC region, they are not within the ¾ mile buffer of any fixed route bus service in the region and therefore no ADA paratransit service is available. Senior dial-a-ride service is offered for persons age 60 and older through municipal senior centers. In some cases, pre-certification of eligibility is required. Days, hours of operations, fares and service frequency vary by town. The FRTA paratransit fare varies by route. It is double the fare for the fixed route service. FY2013 ridership for these towns was 6,884 trips.

3. Regional Coordinating Councils

Massachusetts enacted Executive Order 530 in 2011 to enhance the efficiency of community and paratransit transportation services in the Commonwealth. The order seeks to align the paratransit needs of the Commonwealth with current levels of service and assess if the current services conform with federal and state requirements. A major product of Executive Order 530 was the Community, Social Service and Paratransit Transportation Commission Report. This report recommended the formation of Regional Coordinating Councils (RCC) to identify and address existing service gaps at the local level. RCCs are voluntary advisory bodies that seek to:

- Identify unmet service needs
- Develop regional priorities
- Coordinate existing services to serve more people at the local level
- Report unmet needs to the appropriate government agency (i.e. MassDOT)
- Raise awareness of the important role community transportation services play for all

More information on both RCC's in the Pioneer Valley region is provided in Table 5-17.

Table 5-17 – Regional Coordinating Councils in the Pioneer Valley

RCC	Coverage Area	Contact	Meeting Schedule
Pioneer Valley	Agawam, Amherst, Chicopee, East Longmeadow, Easthampton, Granby, Hadley, Hampden, Hatfield, Holyoke, Longmeadow, Ludlow, Monson, Northampton, South Hadley, Springfield, West Springfield, Westfield, Wilbraham	Theadora Fisher, HST	Every 4th Tuesday at the office of the Pioneer Valley Planning Commission
Hilltowns	Becket, Blandford, Chester, Chesterfield, Cummington, Dalton, Florida, Goshen, Granville, Haydenville, Hinsdale, Huntington, Middlefield, Williamsburg	Theadora Fisher, HST	Meeting dates and times vary

4. Commercial Scheduled Bus Service

The Pioneer Valley is served by three major commercial bus passenger carriers that provide scheduled service to destinations within the region, as well as cities and towns throughout New England and North America. These carriers serve three bus terminals and other stops in the region.

a) Bus Terminals and Service Locations

- **Springfield Bus Terminal –**Located at 1776 Liberty Street in downtown Springfield, this terminal is the regional hub for commercial bus service. The terminal is owned and operated by Peter Pan Bus Lines. It has 16 boarding gates, eight of which are leased to PVTA, and a limited number to other commercial carriers. There are waiting areas, a ticket counter and concession vendors for passengers. There are approximately 150 commercial bus departures serving an estimated 2,000 commercial passengers on weekdays, and approximately 7,500 PVTA customers traveling on some 550 public bus departures each weekday.
- **Northampton Bus Terminal –** This three-story building at One Roundhouse Plaza behind City Hall accommodates two intercity buses and includes an enclosed waiting area (PVTA service is available one block west at the Academy of Music). Approximately 12-15 trips per day depart this terminal. The building also contains commercial offices and a restaurant. The terminal was built in 1984 as a project of Peter Pan Bus Lines and the former Western Mass Bus Lines. Today, it is operated by Peter Pan and is also served by Greyhound.

- **Holyoke Intermodal Center –** This transit hub is located at 206 Maple Street in downtown Holyoke. It replaced the old Veterans Park location. The center opened in September 2010 and has six bus bays for PVTA, Peter Pan and Megabus vehicles. PVTA has 8 routes servicing the Holyoke Transportation Center. Each weekday there are 137 departures It has an enclosed waiting area, ticket and information desk and a coffee shop. It is a joint project of PVTA, Peter Pan and the City of Holyoke. Community and education facilities are located on the upper floors.
- **Other Commercial Bus Service Locations –** Frequent service provided by Peter Pan (typically every two hours) is available from the University of Massachusetts and Amherst Center via the Northampton Bus Terminal and Holyoke Mall. Daily service is available to South Hadley and Hampshire College.

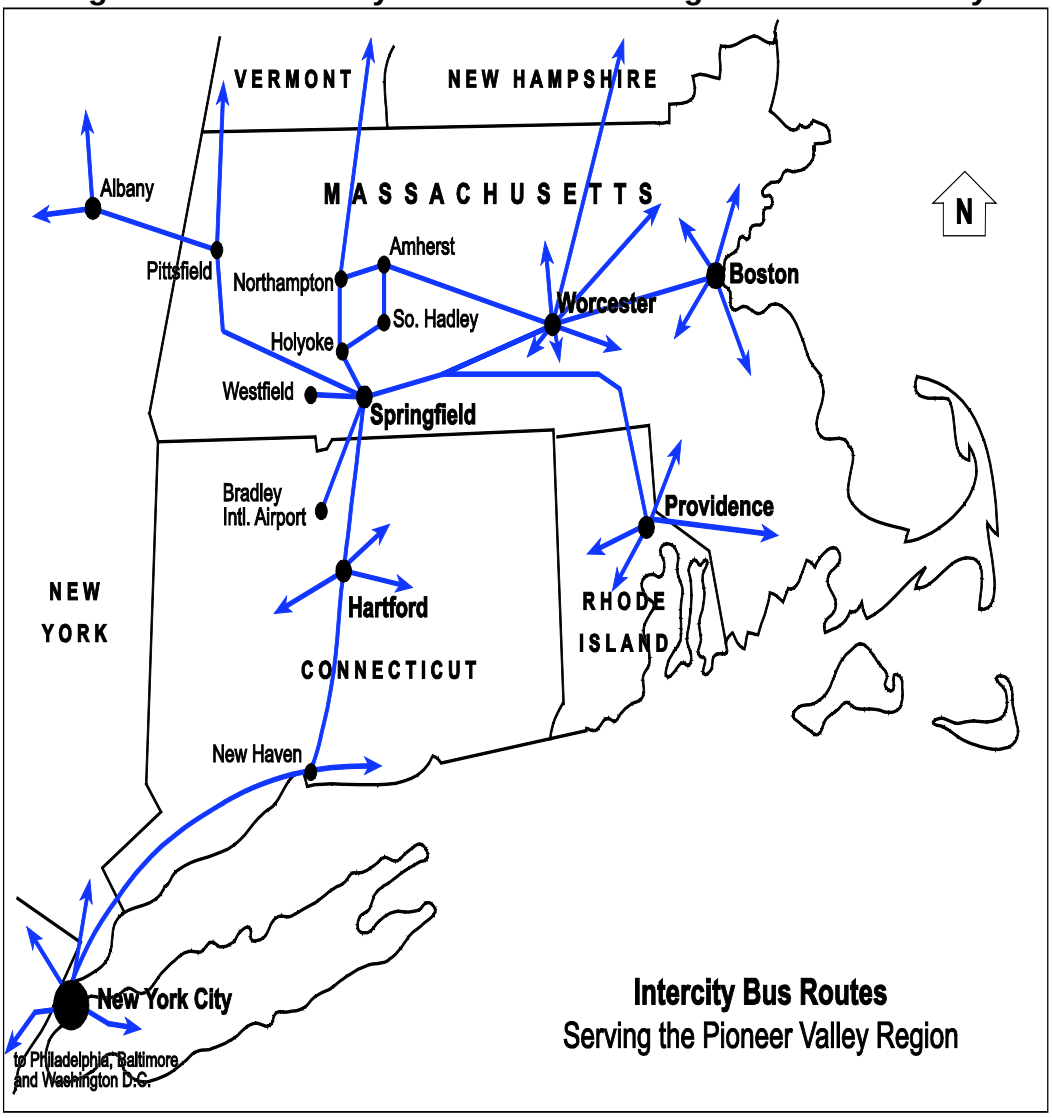
b) Commercial Carriers

The commercial bus passenger market in New England is highly competitive. In the Pioneer Valley, there are three intercity carriers. These are described below.

- **Peter Pan Bus Lines** has served the region for more than 75 years. The company carries the most commercial passengers in the region, providing frequent service to destinations within and outside the Pioneer Valley. The carrier has two primary routes with hourly service: Amherst to Boston (via Springfield), and Springfield to New York City. An average of 23 buses per day run in each direction on these two routes. Peter Pan also operates east-west service between Boston and Albany, New York. Travelers can obtain convenient connections from Amherst, Northampton, Springfield, Worcester, and Boston. Peter Pan also operates 16 nonstop trips per day between Springfield and Hartford, Connecticut via I-91, with a travel time of 35 minutes. Six of these 16 daily buses continue on to New Haven, Connecticut. Service is also provided to Foxwoods Casino in Ledyard, Connecticut and Washington DC.
- **Greyhound Lines, Inc.,** based in Dallas, Texas, serves approximately 3,700 destinations in North America. Greyhound is owned by the Scottish company FirstGroup. Greyhound acquired Vermont Transit Lines of Burlington, Vermont in 2008 and now operates those routes as part of its network. Greyhound has a reciprocal ticketing agreement with Peter Pan Bus Lines to offer riders hourly service between major destinations in the region. Through its own network and a shared ticketing agreement with Peter Pan, Greyhound offers service from the following locations in the region: Amherst Center, University of Massachusetts Amherst, Chicopee Park Inn, Hampshire College, Holyoke Mall, Northampton, Palmer (limited), South Hadley, and Springfield.

- **Megabus.** This UK-owned carrier began service from the Hampshire Mall to New York City via Hartford in 2010. The number of trips per day in each direction currently varies from two to four. Service is operated by DATCO of Connecticut.

Figure 5-18 – Intercity Bus Routes Serving the Pioneer Valley



5. Shuttles, Charters and Taxis

There are a variety of transportation services in the region that are geared to help people make trips for tourism, recreation or other special purposes. These are summarized below.

a) Shuttles

Van shuttles serve an important segment of the region's transportation market by serving destinations for which demand maybe relatively frequent; or involve passengers with special needs or schedule requirements. Commercial shuttle operators include Valley Transporter, which focuses on service to and from airports and rail stations in New England. Service to Bradley International Airport is provided hourly from most locations the Pioneer Valley. Service to Boston, Providence, and New York is also provided, though not on a scheduled basis. Non-profit organizations also operate shuttles, typically for their clients. Examples include municipal councils on aging, day care providers and social service agencies.

b) Charters and Tours

Charter and tour bus services in the region provide special trips for tourism and other purposes within and outside the region. Commercial companies offer package trips and private party excursions to many attractions throughout the Pioneer Valley, including Yankee Candle Company in South Deerfield, Basketball Hall of Fame in Springfield, gambling casinos in Connecticut, Six Flags Amusement Park in Agawam, senior tours to Atlantic City, and other recreational trips. Major charter and tour providers in the region include Peter Pan Bus Lines, King Ward Coach Lines and Laidlaw, Inc.

c) Taxis

There are more than 20 taxi companies operating in the region. Approximately half of these companies are based in Springfield, with another 9 operating in the Amherst/Northampton area, and one company each in Easthampton, Holyoke and Chicopee. Taxi companies provide a vital link in the transportation system by offering mobility during times and at locations where other transportation is not available.

d) Uber

Uber is a ridesharing application available in many major cities in the United States. Drivers register with the company and advertise their availability to provide rides through the smartphone app. Similarly, people looking for a ride can request one through the smartphone app. The pricing structure is similar to metered taxis, but is billed completely through credit cards via the smartphone app. Uber became available for communities in western Massachusetts in 2015.

6. Ridesharing

The Pioneer Valley has a number of facilities, organizations and programs to help people share rides, either on public transportation or by private autos.

Ride sharing is increasingly popular as more facilities and programs for it become available and the price of auto fuel fluctuates. There are several opportunities for ride sharing in the Pioneer Valley. These are summarized below.

- **MassRides** is a private non-profit organization working with MassDOT. The MassRides Employer Partner Program helps businesses and their employees cut commuting costs, shorten travel times, and improve the quality of commutes. MassRides holds commuter events at a participating business's worksites to provide information to employees. Also, MassRides can help set up carpooling, vanpooling, preferential parking, transit, teleworking, flexible work hour programs, or other cost-saving programs, such as pre-tax payroll deductions of transit costs. MassRides Partner Program participants currently include Westfield State College, Solutia, Mass Mutual, Holyoke Community College and PVPC.
- **NuRides** has partnered with MassRides to offer rewards to people who take greener trips. It provides ride matching services for people that would like to carpool to similar destinations.
- **UMASS Rideshare** helps University of Massachusetts employees and students form carpools, use the bus, or find other ways to get to campus. The goal of the program is to reduce the number of private cars on campus; UMass has approximately 11,000 on campus parking spaces (not including metered spaces), but 12,000 to 15,000 vehicles come to campus each day. The service is free to employees and students and includes carpool matching, reduced parking fees, preferred parking spaces, free one-day passes, guaranteed rides home, and information on alternative commuter options.
- **The Route 9 Corridor Transportation Management Association (TMA)** is an organization composed of the University of Massachusetts, Cooley-Dickenson Hospital, the City of Northampton and private businesses in the area that offers transportation and carpooling incentives to member employees.
- **Carpooling matching services** in the area help people find fellow travelers who are traveling to similar destinations so they may share rides—either for regular daily commutes within the region, or for one-time long distance trips. One of the region's leading such services is RideBuzz (www.ridebuzz.org); many other people use online bulletin boards, such as CraigsList, to find carpooling partners.
- **Commercial car sharing** provides a much needed alternative for private vehicle ownership to people desiring to live car free either by

choice or necessity. While rural public transit provides its users with mobility through the Pioneer Valley, it faces limitations in frequency and access to outlying areas. Nationwide, car-sharing companies are considering partnerships with local organizations and community centers to help meet the needs of the low-income population. In our region, car sharing has been established in partnerships with academic institutions to mainly serve their student population and reduce demand for parking on college campuses. The car sharing program in our region is offered by Zipcar, a Massachusetts based car rental company. Currently their local fleet includes 31 vehicles scattered about the Pioneer Valley with the majority located within the Five Colleges area in Hampshire County. Zipcar vehicles are currently available in Amherst, Northampton, South Hadley, Holyoke, and Springfield. Depending on vehicle availability, members can rent by the hour or by the day. The Zipcar Company maintains a policy which gives its members access to any car available in their system at any location in the United States, Canada, and select cities around the world. Members can access the reservation system through a variety of ways including phone, internet, and text messaging.

7. Park and Ride

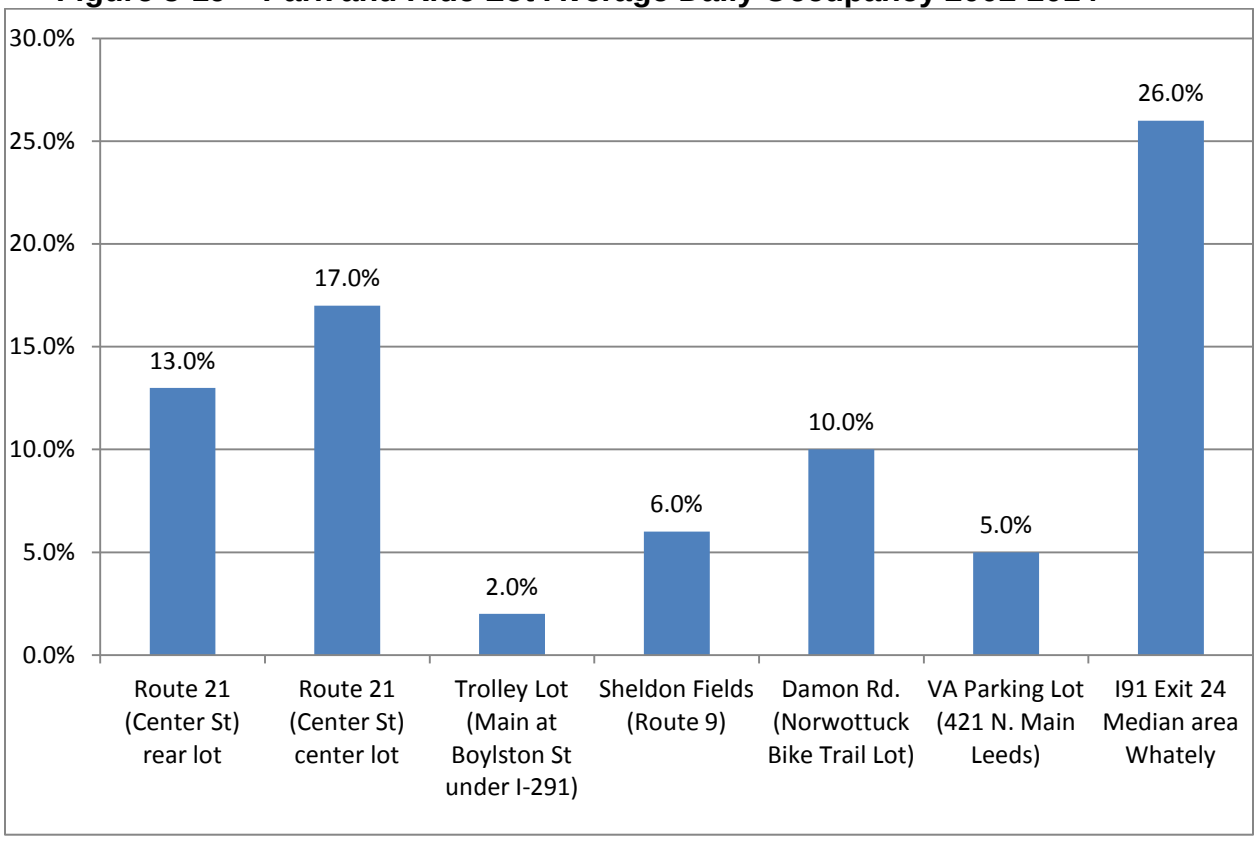
In the Pioneer Valley, there are several officially designated and "informal" park and ride lots. Those using these lots may be leaving their cars to board a PVTA bus for a local trip, catch a Peter Pan bus for an intercity trip, or join a carpool for a local or long distance trip. These lots are described below.

- **Northampton Sheldon Field Lot**—Bridge Street at Day Street. Connection with PVTA B43, M40 and 39. Designated by City of Northampton.
- **Northampton Norwottuck Rail Trail Lot**—Damon Road near Bridge Street (Route 9). Mainly used for carpooling; no convenient PVTA stop. Informal.
- **Northampton Veterans Administration Lot**—421 N. Main St. Leeds. Designated by City of Northampton.
- **Springfield Trolley Park Lot**—Main Street at Boylston Street. Connection with PVTA G1, G2, B4, G19, P20, P21). This lot is also near the intersection of I-91 and I-291, making it attractive for regional commuters who may not wish to drive in downtown Springfield. Designated by City of Springfield.
- **Ludlow MassPike Exit 7**—Center Street (Route 21) at Cherry Street near MassPike (I-90) Exit 7. Two lots near the rear and center areas of the McDonalds parking lot. Used principally for carpooling and those parking to ride Peter Pan buses to Boston. Rear lot is formally designated; center lot is informal.
- **I-91 Exit 24**— Median area in Whately near South Deerfield Center. Connection with PVTA Route 46. Formally designated.

There are also numerous “informal” park and ride lots, often at shopping malls and commercial businesses near major highway access points.

A summary of average weekday park and ride usage at known lots is presented below:

Figure 5-19 – Park and Ride Lot Average Daily Occupancy 2002-2014



8. Passenger Rail

The Springfield Union Station is currently served by 11 trains daily providing extensive service in the northeastern U.S. and connections nationwide. Passenger Rail service is provided on both East-West routes and North-South Routes through the region. Work is currently underway to restore the main terminal building of the station and to move the PVTA bus station as well as the Peter Pan buses to a single intermodal facility at Union Station. In addition, new train platforms are currently being constructed in Holyoke and Northampton to accommodate the realignment of the Vermonter service.

a) North - South Services

Most trains in Springfield are part of Amtrak's Northeast Corridor Business unit. This service includes six daily departures between 5:30 AM and 3:00 PM, and six arrivals between 10:00 AM and 10:30 PM. Amtrak provides frequent daily service between Springfield and Washington D.C., with major

stops at Hartford, New York City and Philadelphia. PVPC has been working with officials from the Connecticut Department of Transportation (ConnDOT) on expanded passenger rail service between New Haven Hartford and Springfield. Track improvements currently underway in Connecticut will allow trains to operate up to 110 mph. New service on this line is expected to begin by late 2016 and will reduce travel time between Springfield and New Haven to 79 minutes. When the service is launched in 2016, Springfield will see southbound trains every 45 minutes during the morning and evening peak hours and every 90 minutes during off-peak periods. When all the planned improvements are completed, trains will operate every 30 minutes during peak periods.

b) Vermonter

The Vermonter travels once a day in each direction between Washington D.C. and St. Albans Vermont. Massachusetts was successful in securing federal funding to return the Vermonter to its original Connecticut River alignment. Improvements to that line have been completed and service in expected to switch from the current alignment (CSX/NECR with stop in Amherst) in December of 2014. The return of the Connecticut River alignment will allow for stops in Holyoke, Northampton and Greenfield. This expansion of intercity passenger rail has the potential to be a major component in producing economic revitalization, spurring job creation, improving air quality, increasing overall mobility and reducing vehicular traffic congestion.

c) Commuter Rail

The Massachusetts State Legislature recently identified expansion of passenger rail in the Pioneer Valley region as a priority and secured $30 million in the Transportation Bond Bill to support this effort. It is envisioned that these funds will be used to rehabilitate surplus MBTA equipment that will then be used to operate service between Greenfield and Springfield. This new service would not begin before 2016.

d) East - West Service

In addition to the Northeast Corridor service, there is also a long distance train that serves the region. The *Lake Shore Limited* serves Springfield by providing daily service between Chicago and New York. Unlike all other Northeast Corridor trains out of Springfield, the Lake Shore Limited requires reservations.

The Pioneer Valley's East-West service is limited by a situation common to many Amtrak routes. Amtrak leases the tracks it must use from a local freight railroad. Amtrak owns the trains but does not own the track and physical infrastructure that they travel on. The track and ultimate control over trains is

held by the host freight railroad. Here in the Pioneer Valley CSX is the host freight railroad. Since CSX runs its own freight trains over tracks that are also used by Amtrak, opportunities for expanding service on the East-West line may be limited.

Despite the challenges, the Massachusetts Department of Transportation and the Vermont Agency of Transportation, in collaboration with the Connecticut Department of Transportation, are conducting a study to examine the opportunities and impacts of more frequent and higher speed intercity passenger rail service on two major rail corridors known as the Inland Route and the Boston to Montreal Route. The study of these two rail corridors has been designated the Northern New England Intercity Rail Initiative. The consulting firm HDR in Boston has been retained to conduct this study which is expected to be complete by 2015.

9. PVTA Performance Measures

As part of a Comprehensive Service Analysis developed by PVTA in conjunction with Nelson Nygaard, Service and Performance Guidelines were developed to bring clarity and consistency in developing, improving and adjusting transit services in the region. The full report can be found at http://www.pvta.com/media/pdfs/PVTA_CSA_FinalReportAppendicesJune2014.pdf

a) PVTA Services

PVTA services have been categorized into a hierarchy of route classifications to help better serve an array of travel markets and customer needs. These categories include:

- Bus Rapid Transit/ Key Regional Routes: Tier I
- Key Regional Routes: Tier II
- Urban Radial Routes
- Campus Services - Shuttles
- Campus Services - Five College Routes
- Village Connectors
- Community Circulators / Flex Services
- Express Routes

The above mentioned categories apply only to PVTA's fixed route services. Complementary ADA paratransit services must adhere to specific federal guidelines and therefore are not included in these service guidelines.

b) Bus Rapid Transit (BRT) / Key Regional Routes: Tier I

BRT and Tier I routes are considered the "backbone" of the PVTA system. These routes provide connections to four of the system's primary hubs(Springfield, Holyoke, Amherst, Northampton). Bus Rapid Transit

requires increased investment for corridor improvements such as transit signal priority and/or queue jump lanes. The Comprehensive Service Analysis has recommended corridors along State Street in Springfield and Route 9 between Amherst and Northampton as possible candidates for BRT implementation. Tier I routes offer high frequency and consistent weekday service with additional weekend service depending on needs of communities.

c) Key Regional Routes: Tier II

Tier II routes also have high ridership but service slightly less dense corridors and also a slightly lower frequency. Existing routes that traveled on these corridors are expected to increase service to a reliable seven days a week while operating at a slightly lower frequency than Tier I routes.

d) Urban Radial Routes

Urban radial routes typically operate to and from downtown Springfield. The primary function of these routes are to serve downtown Springfield. Some urban radials may extend to neighboring urban centers such as Holyoke, Westfield, Ludlow, etc. These urban radial routes come together in several high intensity transit corridors such as State Street, Liberty Street, Main Street, etc.

e) Campus Services - Shuttles

The majority of campus shuttle routes service the University of Massachusetts - Amherst campus, with the exception of the R10 and R10S shuttles serving Westfield and Westfield State's campus. These routes provide frequent connections between dormitories, residential areas, campus buildings, and Amherst's town center. Campus shuttle routes typically exhibit high ridership during the day due to a high student population, with higher frequency to accommodate this demand. Evening and weekend service is also provided where there is demand and late night service is also provided on some routes to ensure the safety of students. While these routes have a fare, students, faculty, and staff of any of the Five Colleges (Amherst College, UMass Amherst, Hampshire College, Mount Holyoke College, and Smith College) can ride the routes for free.

f) Campus Services - Five College Routes

Five College routes connect riders between UMass, Smith College, Mount Holyoke College, Hampshire, and Amherst College. While Five College routes behave similarly to Key Regional routes, they also adhere to specific guidelines to meet the needs of students and the college market. This results in service levels that reflect academic calendars, providing reduced or no service on various times of the year such as academic breaks and summer

time. Five college routes are similar to campus shuttles by offering free service to Five College students, faculty, and staff.

g) Village Connectors

Village Connectors operate primarily outside of Springfield. While some of these routes service the Springfield Bus Terminal, the primary function is to serve passengers outside of Springfield (e.g. Holyoke - Chicopee).

h) Community Circulators / Flex

Community Circulators and Flex services provide transportation and circulation within individual communities and lower density areas with a particular focus on areas with high senior and/or ADA paratransit users. These routes are typically more flexible than traditional fixed-routes and some may even be able to deviate from their designated path(by reservation). Passengers also have the ability to "flag down" an approaching vehicle anywhere along the route. The primary intention of these routes are to provide connections to Village Connectors and Key Regional Routes in incorporate rural areas with larger PVTA service areas.

i) Express Routes

Express routes primarily provide fast and direct service to commuters and others between the region's key urban and high activity centers. Express routes provide high speed service by traveling on freeways and major arterials, allowing for direct connections and faster more predictable trips. While these routes typically only provide service on weekday peak hours, demand may warrant some routes to operate for longer hours or during mid-day periods.

j) Service Design Guidelines

Service design guidelines have been developed to provide minimum thresholds that must be met in communities of various sizes and densities to ensure an attractive and effective service is provided in these areas. These guidelines can accurately assess whether additional service is required to meet minimum thresholds, and conversely reduction of service if minimum thresholds are not met. According to the new service design guidelines, PVTA service should be simple and easy to understand, fast and direct, minimize deviations, have appropriately spaced bus stops, provide symmetrical routes, serve well-defined markets by eliminating duplicative service, maximize service efficiency, assign appropriate vehicle sizes, be well-coordinated, consistent, and have major routes operate along major roadways/arterials.

k) Service Level Guidelines

Service level guidelines incorporate service design guidelines while also defining specifically when services are provided and how often they are provided. Four types of service level guidelines are used:

- Service Coverage
- Minimum Span of Service
- Minimum Service Frequencies
- Maximum Passenger Loadings

l) Service Coverage

The PVTA service area has a wide range of population densities from rural low population towns to large urban cities with high populations. To help determine service coverage, population and employment densities are two of the strongest indicators of potential transit demand. Typically once densities exceed three to six households per acre or four jobs per acre, fixed route bus services become more viable. According to PVTA's Comprehensive Service Analysis, increasing levels of density warrant different types of service as shown in Table 5-18.

Table 5-18 – Transit Supportive Population and Employment Densities

Population and Employment Density	Recommended Transit Mode
5 households/acre or 15 jobs/acre	Frequent Bus
10 households/acre or 20 jobs/acre	Bus Rapid Transit(BRT)
20 households/acre or 25 jobs/acre	Commuter Rail
20 households/acre or 25 jobs/acre	Rapid Streetcar
30 households/acre or 50 jobs/acre	Light Rail

m) Minimum Span of Service

The hours of operation that any given route runs has a significant role in determining how effective the service will be for a transit user. Minimum span of service guidelines are presented in Table 5-19 and define the minimum hours of operation different types of service are expected to run.

n) Minimum Service Frequencies

Service frequency is the time interval between two vehicles traveling in the same direction on the same route. Service frequency has a major impact on transit ridership, with high frequency being attractive to transit users. However, frequency has a direct correlation with operating costs. Service frequency is determined based on existing or potential transit demand. If scheduled correctly established frequencies provide enough vehicles to accommodate passenger volumes while still adhering to maximum load standards, which will discussed later in this section. Table 5-20 below presents the minimum service frequencies based on type of service.

Table 5-19 – Minimum Span of Service Guidelines

	BRT/ Key Regional Tier I	Key Regional Tier II	Urban Radial	Campus Shuttles	Five Colleges	Village Connectors	Community / Flex	Express
Weekdays								
Begin	6:00 AM	6:00 AM	6:00 AM	8:00 AM	7:00 AM	7:00 AM	8:00 AM	6:00 AM
End	10:00 PM	9:00 PM	7:00 PM	10:00PM*	9:00 PM	6:00 PM	5:00 PM	7:00 PM
Saturdays								
Begin	6:00 AM	7:00 AM	7:00 AM	8:00 AM	10:00AM	8:00 AM	-	-
End	9:00 PM	8:00 PM	6:00 PM	10:00PM*	9:00PM*	5:00 PM	-	-
Sundays								
Begin	9:00 AM	10:00AM	9:00 AM	8:00 AM	7:00 AM	-	-	-
End	5:00 PM 6:00 PM (BRT)	5:00 PM	5:00 PM	10:00PM	9:00PM	-	-	-

Notes: The beginning span of service refers to the departure of the first inbound trip, and the ending span of service refers to the departure time of the last peak direction trip. A black or "-" indicates that the guideline does not apply.

** Varies by night (i.e. Thursday, Friday and Saturday night may warrant later schedules).*

Table 5-20 – Minimum Service Frequency Guidelines (Minutes)

	BRT/Key Regional Tier I	Key Regional Tier II	Urban Radial	Campus Shuttles	Five Colleges	Village Connectors	Community / Flex	Express
Weekdays								
Early AM	30	60	60	60	60	60	-	60*
AM Peak	15/20	30	30	15	60	60	60	60*
Midday	15/20	30	60	15	60	60	60	60*
PM Peak	15/20	30	30	15	60	60	60	60*
Night	30	60	60	60*	60*	60	-	60*
Saturday								
Day	30	30	60	60	60	60	-	-
Night	30	60	60	60	60	60	-	-
Sunday								
All Day	60	60	60	60	60	-	-	-

Note: "-" indicates that the guideline does not apply.

** Varies by route (i.e. Thursday, Friday and Saturday night may warrant higher frequencies).*

o) Vehicle Loading

Vehicle Loading guidelines are designed to keep passengers on PVTA vehicles at a comfortable level, maintaining loads within the limits of safety. This may require passengers to stand during peak periods, while offering a seat to every passenger during non-peak periods. Two techniques that are commonly used by transit systems to keep passenger loads at acceptable levels are:

- Match vehicle types with ridership levels by providing larger vehicles on higher ridership routes.
- Provide more frequency on high demand times by providing more buses on higher ridership routes.

Tables 5-21 and 5-22 represent the loading maximums based on service level and also detailing the capacity of each vehicle type offered by the PVTA system.

Table 5-21 – Average Vehicle Loading Maximums

	BRT/Key Regional Tier I	Key Regional Tier II	Urban Radial	Campus Shuttles	Five Colleges	Village Connectors	Community / Flex	Express
Peak	120%	120%	120%	120%	120%	120%	100%	100%
Off-Peak	100%	100%	100%	100%	100%	100%	100%	-

Note: Maximums are averages over one-hour periods; individual trips may exceed averages

Table 5-22 – Vehicle Capacities

	60' Articulated Bus	40' Bus	35' Bus	30' Bus	24' Mini-Bus
100% of Seating Capacity	55	40	32	23	18
120% of Seating Capacity	66	50	39	28	22

p) Performance Guidelines

While Service Level Guidelines dictate how the PVTA system should be structured, it does not adequately provide measures of performance. Performance guidelines have been developed to accurately measure the productivity and cost-effectiveness of its various services. Productivity is measured by "Passengers per Revenue Vehicle Hour" for most services, and "Passengers per Trip" for Regional and Express services. Regional and Express services use a different measure of productivity because passengers typically travel for long distances with little to no turnover. The minimum productivity levels are detailed in Table 5-23.

Table 5-23 – Minimum Productivity Levels (Passengers per Revenue Hour/Passengers per Trip)

	Passengers Per Revenue Service Hour					Passengers Per Trip		
	Urban Radial	**Campus Shuttles**	**Five College**	**Village Connectors**	**Community / Flex**	**BRT / Key Regional Tier I**	**Key Regional Tier II**	**Express**
Weekdays								
All Day	20	20	15	15	5	20	20	25
Early AM	10	10	10	15	5	15	15	15
Late Night	10	10	10	15	5	15	15	15
Saturdays								
All Day	15	15	10	10	5	15	15	-
Early AM	10	10	10	10	5	15	15	-
Late Night	10	10	10	10	5	15	15	-
Sunday								
All Day	15	15	10	10	5	15	15	-
Early AM	10	10	10	10	5	15	15	-
Late night	10	10	10	10	5	15	15	-

Notes: "Early AM" and "Late Night" refers to service before and after the minimum span of service. "All Day" refers to the complete span of service, including early morning and late night service. "-" indicates that the standard does not apply. Productivity for Regional and Express routes is measured as a minimum number of passengers per trip.

Cost-Effectiveness, also known as Farebox Recovery is the percentage of operating expenses that are recouped by farebox revenues. The expected minimum farebox recovery percentages are detailed in Table 5-24.

Table 5-24 – Minimum Farebox Recovery

	BRT / Key Regional Tier I	Key Regional Tier II	Urban Radial	Campus Shuttles	Five Colleges	Village Connectors	Community / Flex	Express
Weekday	20%	20%	20%	n/a	n/a	20%	5%	n/a
Saturday	15%	15%	15%	n/a	n/a	15%	5%	n/a
Sunday	15%	15%	15%	n/a	n/a	15%	5%	n/a

Note: Campus Shuttles and Five College are noted as "n/a" because a fare is not collected on these services. Express is also noted as "n/a" for they are currently not measured for farebox recovery at this time or data cannot be distinguished for non-express farebox recovery of the same route.

D. INTELLIGENT TRANSPORTATION SYSTEMS

Intelligent Transportation Systems (ITS) utilizes technology in traffic control, communications, computer hardware and software to improve the performance of an existing transportation system. Through the dissemination of real-time travel information many benefits can be realized including increased safety, more efficient travel, and reduced congestion levels.

The Intelligent Transportation Systems (ITS) Strategic Deployment Plan for the Metropolitan Springfield and Pioneer Valley Region was completed in 1998. This project developed a plan of recommended ITS strategies and applications for the Pioneer Valley as well as a regional architecture to identify the various transportation management systems and the linkages between these systems.

In March of 2005, the Commonwealth of Massachusetts developed a Regional Intelligent Transportation Systems Architecture for Western Massachusetts. This Regional ITS Architecture identifies the existing and planned ITS components in the region and how they will interface. Key transportation agencies and other stakeholders provided input during this process to develop an architecture that represents a vision of an integrated transportation system for the Western Massachusetts region and the interagency agreements required to support it. An update to the regional architecture was completed in 2010. The webpage for the Western Massachusetts Regional ITS Architecture is located at: http://www.massdot.state.ma.us/regionalitsarchitecture/western/index.htm

1. Regional Traveler Information Center (RTIC)

The University of Massachusetts - Amherst and the Massachusetts Department of Transportation are also cooperating in a federally funded project that developed a Regional Traveler Information Center (RTIC) for the Pioneer Valley. The RTIC is located in the UMass Transit Operations Facility

and is responsible for the collection and dissemination of traffic, public transportation and travel advisory information. Currently, 24 cameras are positioned at the following locations:

- Route 9 in Downtown Northampton, facing East
- Route 9 at Bridge Road, Northampton, facing Eastbound
- Route 9 at Bridge Road, Northampton, facing Westbound
- Bridge Road at Route 9, Northampton, facing East
- Route 9 at the Coolidge Bridge, Hadley, facing West
- Route 9 at the Coolidge Bridge, Northampton, facing East
- I-91 Exit 19 off ramp at Route 9, Northampton, facing South
- Route 9, near Mt. Farms Mall, facing West
- Route 9 at Middle Street, Hadley, facing West
- Route 9 at West Street, Hadley, facing West
- Route 9 at Bay Road, Hadley, facing East
- Route 9 at Bay Road, Hadley, facing West
- Bay Road at Route 9, Hadley, facing South
- Damon Road at Bike Path, Northampton, facing North
- Damon Road at Bike Path, Northampton, facing South
- Damon Road near the I-91 overpass, Northampton, facing Route 9
- Damon Road near the I-91 overpass, Northampton, facing King Street
- UMass - Commonwealth Avenue at Mass Avenue, facing North
- UMass Commonwealth Ave/Holdsworth Way facing South
- UMass Governors Drive at North Pleasant Street facing West
- UMass North Pleasant Street at Governors Drive facing North
- UMass North Pleasant Street at Eastman Lane facing East
- Route 116 Amherst, near Waterfield Farms, facing North
- Route 116 Amherst, near Waterfield Farms, facing South

Real-time travel time information is also collected in both directions along Route 9 over a distance of 3.8 miles between the Mountain Farms Mall and Damon Road. Travel speed data for Route 9 is provided in the vicinity of the intersection of Route 9 with West Street in Hadley. RTIC also provides information on commuting alternatives, upcoming events, and current construction projects in the region. The RTIC website is: www.masstraveler.com.

2. I-91 ITS Project

MassDOT initiated a project to design and deploy a communications infrastructure and Intelligent Transportation System (ITS) along the entire length of Interstate 91 and portions of Interstate 291. This project was completed in 2011 and includes:

- 33 closed circuit television cameras (CCTV) and 17 Variable Message Signs
- A fiber-optic communications network connecting the field devices to the District Traffic Operations Center (DTOC) in MassDOT District 2 Headquarters, and to the Statewide Traffic Operations Center (TOC) in Boston,
- I-91 camera monitoring equipment in the State Police facilities in Springfield, Northampton and Shelburne,
- The development of additional capacity to address the needs of regional stakeholders via the installation of 4 empty conduits within the communications network, and
- Communications shared resource infrastructure to support future private telecommunications initiatives.

3. Pioneer Valley Transit Authority ITS Equipment

All PVTA vehicles are equipped with a mobile data terminal, global positioning system (GPS) locator, data radio and emergency alarm. Paratransit vans also have audible and visual navigation assistance. Significant features of PVTA vehicles as a result of ITS technology include:

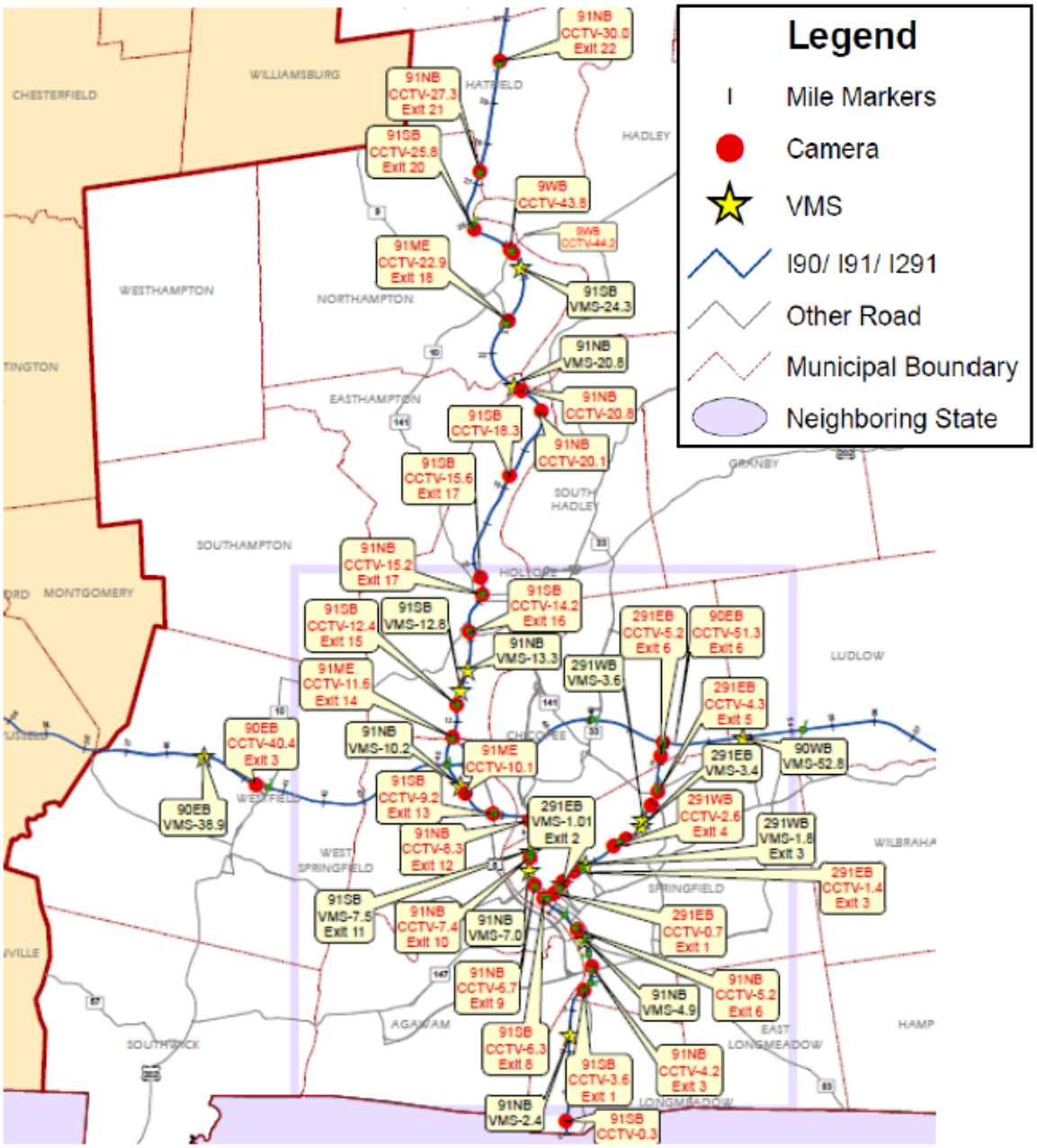
- Automatic audio and visual stop announcements
- Automatic passenger counters
- Video and audio monitoring

Each vehicle transmits its GPS location, passenger data and vehicle performance information via radio to the dispatch center. A central computer then processes the data from all vehicles to create a real time view of fleet operations and schedule adherence. In emergencies, real-time information is available for public safety responders. The audio and visual stop announcements make the PVTA system easier and safer for sight- and hearing-impaired passengers, as well as the general public.

Real time passenger information is on the status of existing transit routes is now available at both the Springfield Bus Terminal and Holyoke Transportation Center. PVTA also provides real time information on each bus route through the following website: http://bustracker.pvta.com/infopoint/

By increasing the availability of real-time customer information and generating new information on ridership and usage, PVTA will dramatically enhance the overall quality of public transit in the region and make the system more accessible to people who do not ride now.

Figure 5-20 – ITS Equipment Along I-91 in the Pioneer Valley



4. 511

On March 8, 1999, The U.S. Department of Transportation (USDOT) petitioned the Federal Communications Commission (FCC) to designate a nationwide three-digit telephone number for traveler information. On July 21, 2000 the Federal Communications Commission designated "511" as the single traffic information telephone number to be made available to states and local jurisdictions across the country. Access to 511 services for Massachusetts residents is available free of charge at:

http://www.mass511.com. Mass511.com allows drivers to set up custom travel alerts and receive real-time traffic information for all major routes. The website also includes a map with live-traffic conditions, planned construction events, and traffic incident updates.

5. Smart Work Zone Management

MassDOT utilizes portable ITS devices to monitor, measure and evaluate traffic conditions so as to provide real-time information to the public and control operations within the work zone. Smart Work Zones (SWZ) apply construction and traffic monitoring devices such as traffic and speed detectors measure performance and calculate traffic delays through existing work zones. Cameras and Variable Message Signs are also deployed to enable MassDOT personnel to gauge the impact of construction on traffic and greatly enhance the safety and efficiency of the work zones. The use of SWZ technology is determined on a project-by-project basis. SWZ technology will be utilized as part of the I-91 Viaduct project in Springfield.

E. NON-MOTORIZED TRANSPORTATION

Bicycling and walking are inextricably linked to quality of life in our communities. The Pioneer Valley region affords some of the best environments for walking and bicycling in Commonwealth. An expanding network of off-road trails, vibrant downtowns laced with sidewalks and scenic shared-use roadways create an unmatched potential. As a destination or as a place to call home, the Pioneer Valley offers a wide range of transportation choices. A central focus of this plan is to design and implement facilities that are safe and appropriate for all ages and abilities.

Interest and enthusiasm for walking and bicycling is reshaping many of our communities and not just through traditional infrastructure improvements. The walking school bus is an everyday reality for Jackson Street Elementary School in Northampton where parents and the administrator have implemented a “Safe Routes to School” program. Students and faculty at Springfield’s Alice Beal Elementary have installed bike racks and improved sidewalk connections to their school. Springfield’s Renaissance School has opened a bike coop to repair and re-circulate bicycles to the community, and students there have actively participated in Pioneer Valley Bike Week.

The support for bicycling and walking is not without its challenges. The most significant challenge for advancing regional goals for these modes is funding. While new state guidelines are “friendlier” to bicycle and pedestrian needs and federal programs are recognizing the importance of “inclusive” investments in transportation, infrastructure needs are growing while funding options are dwindling. The most dramatic impact has been at the municipal

level. Many of our communities have serious transportation funding gaps. Sidewalks, bridges and locally maintained roads have fallen into disrepair and gaps in the maintenance of these infrastructure needs are widening. Because bicycling and walking is inherently dependant on short local trips this degradation is a real threat to creating “walkable” or “bikeable” communities.

Another trend has been the increase in the use of single occupancy vehicles. While the region’s population remained fairly stable between 1990 and 2000, vehicle ownership increased 26% to an average of 0.81 vehicles per person. While many communities such as Springfield and Amherst have very "walkable" downtown areas, the traffic volumes in and around suburban communities can create significant obstacles and challenges for those bicycling or walking.

To get more people walking and biking PVPC has developed a strategic plan of policy-related actions and physical projects on which municipal and regional officials and citizens can collaborate to improve conditions for pedestrians and bicyclists in the Pioneer Valley. The Plan includes information and recommendations on incorporating bicycle and pedestrian features into road reconstruction projects, using zoning and development tools to help create environments that support bicycling and walking, increasing bicycle and pedestrian safety, and promoting bicycling and pedestrian activities as alternative transportation choices. The plan was developed by the Bike-Pedestrian Sub-Committee of the Pioneer Valley Planning Commission’s (PVPC) Joint Transportation Committee as the bicycle and pedestrian component to the Regional Transportation Plan.

1. Complete Streets

Streets are a vital part of livable, attractive communities. Regardless of age, ability, income, race, or ethnicity, everyone is served by safe, comfortable, and convenient access to community destinations and public places–whether walking, driving, bicycling, or taking public transportation. Complete Streets integrates people and place in the planning, design, construction, operation, and maintenance of our transportation networks.

In 2006 MassDOT completed an overhaul of the state’s highway design manual and with the new “Project Development and Design Guide” the Commonwealth instituted a comprehensive shift in policy. The “Design Guide’ has become a national model for developing better road and bridge projects through a “Complete Streets” approach that balances the need for access and mobility through context sensitive design solutions. The manual “ensures 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." In 2014 MassDOT announced a $5 million pilot project for the Complete Streets Certification Program. Cities and towns will be able to apply for funding to make local streets safer and more inviting for people to walk, run, and bike. This will result in better health for Massachusetts residents, who will have more opportunities to be active, thus reducing chronic disease.

Locally, many Pioneer Valley communities have followed MassDOT's lead by incorporating "Complete Streets" concepts into the planning and design of local road projects. In 2014 the City of Holyoke joined Northampton in formally adopting a Complete Streets Policy. Other communities currently developing or actively exploring a policy initiative in include Springfield, Easthampton, and Longmeadow.

2. Bicycle Facilities

The Pioneer Valley has much to offer for bicycling including; bike lanes, shared use paths, striped shoulders, wide curb lanes, bike racks on transit, bike lockers, bike parking racks, employer sponsored shower facilities, bike repair shops, maps and online rider resources, community bike share programs, bike rentals, organized rides, and sponsored races. Not far from the region's urban core, the rural roads of Western Massachusetts offer a vast array of quite scenic New England country roads that can be explored for days on end. At the same time, our communities face challenges in meeting public expectations in expanding and connecting the Region's bikeway network. Many of the off-road and on-road facilities are disconnected are hampered by pinch points that include bridges.

a) On-road Infrastructure

There are 4,364 miles of functionally classified roadway in the Pioneer Valley. Massachusetts law requires that bicyclists and pedestrians be accommodated on all roadways except limited access or express state highways. Currently there are 45 miles of designated on-road bicycle facilities. These include bike lanes and designated bike lanes and bike routes Agawam, Amherst, Brimfield, Holland, Wales, Holyoke, Monson, Granby, Springfield, South Hadley, and Northampton. Many more of these bicycle design treatments are in the planning stages as communities work to implement "complete street" approaches to design.

A major concern for pedestrians and bicyclists are the many bridges in the region. While most new or reconstructed bridge projects have followed state and federal guidelines for improving pedestrian and bicycle access, many bridges still lack sidewalks, and adequate shoulder width. The design and

maintenance of these bridges directly influences the ability of people to walk or bicycle.

b) Bicycle Compatibility Index

PVPC frequently uses the FHWA Bicycle Compatibility Index (BCI) to evaluate road conditions for bicyclists. The BCI uses data collected on the roadway including travel lane width, shoulder width, vehicle speed, traffic volume and parking along each roadway segment. The FHWA analysis tool assigns an alphanumeric score to each roadway segment ("A" through "F"). "A" roads represent "perfect" roads for bicycling and "F" is the least favorable. In the Pioneer Valley Region data has been collected for all the federal aid roadways. The BCI data is a useful tool for bicycle coordinators, transportation planners, traffic engineers, and others to evaluate existing facilities in order to determine what improvements may be required as well as determine the geometric and operational requirements for new facilities to achieve the desired level of bicycle service.

The BCI model has been used for the following applications in the Region:

- Springfield Complete Streets Bicycle and Pedestrian Plan
- South Hadley Bicycle and Pedestrian Plan
- Granby Master Plan
- Southampton Route 10 Corridor Study
- Pioneer Valley Regional Bicycle Map

c) Bicycle Parking Improvements

The PVPC has worked with local communities to upgrade and expand existing opportunities for bicycle parking. Through a series of Transportation Demand Management funding commitments, PVPC has worked with local communities to install parking for more than 700 bicycles. Parking racks have included “U” style racks, ribbon racks, “rib” racks and bicycle lockers. In 2014 PVPC purchased institutional bicycle racks for several “Save Routes to School” partner schools in Springfield. In 2015 PVTA initiated a bike rack purchase program to locate bike racks at high frequency bus stop locations. PVPC also coordinated the purchase of bike lockers for use at park-and-ride facilities.

To assist in the installation of bike racks PVPC created a series of training videos. These and other videos are available on the PVPC YouTube page: https://www.youtube.com/watch?v=um6oagL7bfk

d) Existing Bike Share and Bike Rental Programs

Bike sharing programs are increasingly popular in North America and around the world. As of April 2013, there were around 535 bike-sharing programs

globally, with an estimated fleet of 517,000 bicycles. Similarly several bike share and rental programs are in operation in the Pioneer Valley. While these programs have different cost structures, equipment, and rental times than a public bike share system, they demonstrate that Pioneer Valley residents and visitors are interested in using bicycles without having to make a permanent purchase. Current programs include:

- Private rental companies – Two bicycle shops in the Pioneer Valley offer bike rentals. Northampton Bicycle offers rental of town bikes for $25 for 1 day, $50 for 3 days, and $90 for 7 days, and road bike rentals for $35 for 1 day, $70 for 3 days, $130 for 7 days. Hampshire Bicycle Exchange in Amherst offers rentals of $35 for 1 day or $70 for 7 days if the bicycle has a price less than $350. For bicycles that cost greater than $350, the cost is 10 percent of the price per day, or 25 percent of the cost of the bike per week. Because the Hampshire Bicycle Exchange both buys and sells used bicycles, it is possible to "rent" a bicycle for a few months by purchasing and selling it back to the store. Both shops provide a lock and helmet with the cost of the rental.
- Smith College Bike Kitchen – the Bike Kitchen, open since 2005, offers Smith students and faculty with maintenance service, bike rentals, and safety education. Rentals are available for $20 per semester and include a lock and helmet. The program's 40 bicycles are in high demand and there is a waitlist to use the program.
- University of Massachusetts – Amherst – Since the fall of 2011, UMass has made available a fleet of 25 bikes to students. The program offers free rentals to students of up to 24 hours and provides helmets and locks. The bicycles, stored at the student union, were purchased through a gift from the Class of 2010. The program is currently supported by the Student Government Association and the Sustainable UMass program. The University is currently investigating implementation of a more formal bike share program on campus. Such a system could potentially be integrated with a regional public bike share system.
- Pioneer Valley Riverfront Club – The PVRC offers children and adult bicycle rentals for $5 per hour. Because the rentals are on an hourly basis, they are primarily meant for short-term, recreational use on the Connecticut River Walk, which is adjacent to the PVRC. Three-wheeled bicycles are also available for those who cannot ride a bike.

e) Bicycle Accommodations on Transit

The Pioneer Valley Transit Authority's bikes on bus program "Rack and Roll" has dramatically improved access for bicyclists to transit and given thousands of people another choice in their mode of travel. In 2010 PVTA expanded the popular program from the northern tier to its entire fixed route system. In 2014 PVTA's operator reported 55,030 trips using the bike racks. Increased marketing and promotion for the service included an instructional video to acclimate new users. The video is available online at: https://www.youtube.com/watch?v=pNcW-ZaoEfg

Installation of a bicycle on a PVTA bus

f) Pioneer Valley Commuter Bike Map

In May of 2008, PVPC released an update to the 2005 commuter bike map. The Pioneer Valley Regional Bike Map is designed to be a tool for active use by area cyclists. In addition to popular on-road cycling routes and bike paths in the region, the map shows popular destinations and local landmarks, along with safety and commuting information. These maps were produced as part of a MassDOT funded Transportation Demand Management program. Maps were distributed to the public at no charge through bike shops and select locations throughout the Pioneer Valley region and during at Pioneer Valley Bike Commute Week events.

g) Off-road Infrastructure (Bikepaths and Multi-use Trails)

Off-road facilities include multi-use trails and traditional bikepaths or rail trails. The Norwottuck Rail Trail, the region's largest bikeway project, opened in 1993. The Norwottuck was reconstructed by MassDOT in 2014 and connects the communities of Northampton, Hadley, Amherst, and Belchertown. The route facilitates travel between the communities, educational facilities, downtown commercial areas, and major employment centers. Volume counts on the trail range from 600 to 1200 per day during the peak season. A summary of on and off road bicycle facilities is included in Table 5-25.

The popularity of multiple use trails in the Pioneer Valley has brought new challenges and opportunities to those that use and manage these facilities. Interest in year round use has pushed many communities to explore options for snow removal, and while recreation use still dominates trail activity many

residents increasingly use the facilities for non-recreational trips. A Norwottuck trail survey in 2002 showed 25 percent of weekday trail use was for commuting to work, school or shopping. Many of these trips replaced travel that would otherwise have been made with a motor vehicle.

Off-road facilities including bike paths and multi-use trails have been popular in the region for a number of reasons. The facilities allow new users to be introduced to the benefits of walking and bicycling while isolating them from potential conflicts with motorized traffic. The facilities provide economic benefits through increased tourism; and increase the percentage of bicycling and walking trips. The census block groups in Northampton and Amherst where four off-road facilities exist averaged 23.7 percent of commuter trips by bike or on foot, compared to only 5.4 percent for the region as a whole.

Table 5-25 – Existing On and Off-road Infrastructure in the Pioneer Valley Region

Pioneer Valley Bicycle Facility	Communities	on/off road	Length (in miles)	Date Opened
CT. River Riverwalk and Bikeway	Agawam	off	1.50	9/17/04
Amherst Bike Route	Amherst	on	1.00	
Amherst Bikeway (Route 116)	Amherst	off	3.50	
Five College Bikeway	Amherst	on	6.00	
South Pleasant St. Bike Lanes	Amherst	on	0.25	7/15/01
UMass Connector Bikeway	Amherst	off	1.90	5/15/03
Norwottuck Belchertown Extension	Amherst/Belchertown	off	1.20	5/12/00
Chicopee Center Canal Walk	Chicopee	off	0.20	5/21/10
Redstone Rail Trail	East Longmeadow	off	1.57	9/9/10
Manhan Rail Trail	Easthampton	off	4.20	6/19/04
Dwight Street Bike Lanes	Holyoke	on	0.50	6/12/05
Hampden Street Bike Lanes	Holyoke	on	0.60	5/13/04
Route 5 Bike Lanes	Holyoke	on	1.20	7/8/06
Holyoke Canalwalk	Holyoke	off	0.30	6/25/10
Route 5 Bike Route	Holyoke/Northampton	on	8.00	6/25/86
Springfield (Ludlow) Reservoir Trail	Ludlow	off	3.10	
MBW Trail	Monson, Brimfield, Wales	on	17.00	6/10/98
Elm Street Bike Lanes	Northampton	on	0.80	6/15/00
Manhan Rail Trail Earl Street thru downtown	Northampton	off	2.10	7/1/05
Northampton Bike Path (Ryan Bikeway)	Northampton	off	2.50	6/6/84
Northampton Manhan Ice Pond Spur	Northampton	off	0.50	
Norwottuck Damon Road to Woodmont	Northampton	off	0.80	5/1/08
Norwottuck Look Park Extension to Grove St	Northampton	off	2.00	7/1/05
South Street Bike Lanes	Northampton	on	1.10	9/10/03
William P Nagle Walkway	Northampton	off	1.00	9/26/89
Norwottuck Rail Trail	Northampton/Hadley/Amherst	off	8.50	5/15/93
Southwick Rails to Trails Phase I	Southwick	off	3.14	5/3/10
CT. River Riverwalk and Bikeway	Springfield	off	3.70	7/18/03
Westfield Riverwalk	Westfield	off	2.00	4/16/98
116 Five College Bike Lane Extension	Granby/South Hadley	on	.25	4/25/15
Total Mileage			**80.56**	

Table 5-26 – Proposed Bikepaths for the PVPC Region

Pioneer Valley Bicycle Facility	Communities	on/off road
Agawam Connector Loop Bikeway	Agawam	on/off
North Campus Bikeway Extension	Amherst	on/off
Amherst Bike Route	Amherst	on
Five College Bikeway (including Notch)	Amherst, Granby, South Hadley	on/off
Brimfield Trail Expansion	Brimfield	on/off
CT. River Riverwalk and Bikeway	Chicopee	off
Chicopee Center Canal Walk	Chicopee	off
Redstone Rail Trail Extension	East Longmeadow	off
Route 47 Scenic Farm Bikeway	Hadley, South Hadley	on
CT River Greenway (River Run to Elm Court)	Hatfield/Northampton	off
Appleton Street Bikeway Improvements	Holyoke	on
Holyoke Canalwalk (segments 2 and 3)	Holyoke	off
Holyoke Canalwalk Route 5 extension	Holyoke/Northampton	on/off
Ludlow Mills Riverwalk	Ludlow	off
Elm Street Bikeway Extension	Northampton	on/off
Manhan Route 10 Spur to Burts Pit Rd	Northampton	off
Village Hill to Northampton High School	Northampton	off
Damon Road bicycle lanes and sidewalks	Northampton	on
Tunnel Norwottuck Manhan Rail Trail	Northampton	off
Southampton Greenway	Southampton	off
McKnight Neighborhood Trail	Springfield	off
Ware River Valley Rail Trail	Ware	on/off
CT. River Riverwalk and Bikeway	West Springfield	off
Columbia Greenway (segment 2, 3 and 4)	Westfield	off
Western Avenue Bikeway	Westfield	on/off

h) Bicycle Signage Projects

Manhan Rail Trail guide sign

PVPC has worked with MassDOT and local partners to install bike route signs along Route 5 in Holyoke, install "share the road" signs in on many popular cycling routes, installed directional signs in Northampton, and installed signs on the Connecticut Riverwalk and Bikeway. PVPC also partnered with MassDOT and DCR on the installation of "Bay State Greenway" signs on the Manhan Rail Trail, the Southwick Rail Trail, Norwottuck Rail Trail and sections of Route 9 in Williamsburg.

i) Pioneer Valley Share the Road Program


Share the Road video screen capture

The Pioneer Valley Planning Commission partnered with the Franklin Regional Council of Governments to produce a series of public service announcement and informational video on bicycling and bicycle safety entitled "Enjoy the Ride: Share the Road in the Connecticut River Valley" The effort is part of a promotional campaign to encourage bicycling instead of driving. The FRCOG and PVPC received $150,000 in funding to enhance bicycling in the regional, increase accessibility and awareness for commuting by bicycle in Franklin, Hampshire, and Hamden Counties. The goal of the project is to reduce the number of automobile trips by encouraging transportation by bicycle instead.

The videos were aired annually on local cable access channels during Bay State Bike Week and can be viewed here: https://youtu.be/b_0aJ61T8Ug

https://www.youtube.com/watch?v=3Eiye4XHMh8&feature=youtu.be

j) Massachusetts Bicycle Plan

The Massachusetts Bicycle Plan was updated by MassDOT in 2008. In 2014 the Massachusetts Bicycle and Pedestrian Advisory Board in coordination with MassDOT began the process of revising and updating both the Bicycle Plan and the Pedestrian Plan. The plan prioritizes on- and off-road bicycling improvements and identifies a statewide bicycling network. The network improves multi-modal transportation generally and bicycle transportation specifically, as well as recreation, tourism, and economic vitality. The Bay State Greenway was developed as a part of the plan to identify high priority corridors and bicycle connections.

3. Pedestrian Circulation

Pedestrian access and circulation are typically better in town or city centers due to the physical design of such places. Shops, offices, restaurants and

other amenities are generally clustered together and connected by a pedestrian network which is often more accessible and efficient than the vehicle network. The central business districts of Amherst, Northampton and Springfield offer good examples of downtowns sensitive to pedestrian circulation and access. Sidewalks and walkways are extensive; crosswalks are signalized and access points for persons with disabilities are incorporated.

Sidewalks are the most common infrastructure feature devoted to pedestrian circulation. Whether or not sidewalks are provided in a community can influence the area's overall character and function. In addition to the sidewalks themselves, crosswalks and points of access for persons with disabilities can influence the degree to which these pedestrian networks facilitate circulation. The provision of sidewalks in the region varies with respect to location, quality and function. Many communities in the Pioneer Valley have realized the benefit of encouraging walking through infrastructure improvements. The Town of Ludlow constructed sidewalks within a mile of every elementary school. With children walking to school the town revamped its crossing guard program and saved money on busing. With local funding sources in short supply, many communities have had to “get smart” when it comes to pedestrian improvements. To lower costs, East Longmeadow developed a prioritized sidewalk infrastructure improvement plan and began incorporating the cost of sidewalk improvements into larger roadway re-construction projects. In the Forest Park neighborhood of Springfield, public works officials replaced painted crosswalks with new long wearing thermoplastic designs. While more expensive initially, the new crosswalks will last 5 times as long as painted crosswalks.

a) Safe Routes to School

The Massachusetts Safe Routes to School program promotes healthy alternatives for children and parents in their travel to and from school. The program aims to reduce congestion, air pollution, and traffic conflicts near participating schools, while improving health and mobility of school-aged children population . Safe Routes to School is a national movement to create safe, convenient, and fun opportunities for children to bicycle and walk to and from schools. The program's goal is to reverse the decline in children walking or biking to schools. Nationally, only 15 percent of schoolchildren walk or bike to school compared to 50 percent in the 1950’s. The vast majority of parents prefer to drop their children off at school using their personal automobile. The result is often increased congestion and higher vehicle emissions around the schools.

Massachusetts Safe Routes to School logo

In 2014 PVPC purchased bike racks through the Live Well Springfield Community Transformation Grant to support the "The Safe Routes to School Program" in Springfield. The Springfield Safe Routes to School program is coordinated by the Springfield Safe Routes to School Alliance and is supported by the Springfield Housing Authority, the Talk/Read/Succeed program, Baystate Health Safe Kids program and Brightwood Health Center, the state Department of Public Health, Springfield Health and Human Services, Mass in Motion, Partners for a Healthier Community, the YMCA of Greater Springfield and other groups.

Statewide the Massachusetts Safe Routes to School program supports a number of initiatives. These initiatives include "Walking School Bus", "Footloose Fridays", "Fuel up to Play" and several educational campaigns.

The following Pioneer Valley schools are partners in the Safe Routes to School program:

- Amherst- Crocker Farm Elementary, Fort River Elementary, Wildwood Elementary
- Easthampton- The Center School, Neil A. Pepin School, Maple School, White Brook Middle School
- Hadley- Hadley Elementary School, Hopkins Academy
- Hatfield- Hatfield Elementary School
- Holyoke - HB Lawrence, Marcella Kelly Elementary School, Maurice A. Donahue Elementary, Sullivan School, William R. Peck School
- Longmeadow - Center Street School, Blueberry Hill, Wolf Swamp Road School, Williams Middle School, Glenbrook Middle School, Blueberry Hill
- Northampton - Bridge Street Elementary School, Jackson Street Elementary School, JFK Middle School, Leeds Elementary School, RK Finn Ryan Road School
- Palmer - Converse Middle School, Old Mill Pond School, Palmer High School
- South Hadley - Mosier Elementary
- Southampton - William E. Norris Elementary School
- Springfield - Elias Brookings Elementary School, Milton Bradley Elementary School, Dorman Elementary School, Edward P. Boland Elementary School, Mary Lynch Elementary School, Alice B. Beale Elementary School, Brightwood Elementary School, Rebecca M Johnson School, Gerena Community School, Indian Orchard Elementary.
- Westfield- Gibbs Elementary School, Southampton Road School

Schools who wish to participate in the program are asked to complete the form and return it to MassRides. The form, which can also be found on the MassRides website at www.commute.com, allows schools to select a level of participation within the Safe Routes to School Program. Schools have the opportunity to indicate their primary interests, identify stakeholders, and also report on the makeup of the student body. After the Safe Routes to School coordinators receive an application, a decision is then made on whether or not the school is a good fit for the program. Selected schools become partners with the program and can begin planning events and activities with the help of a Safe Routes to School coordinator.

The Massachusetts Safe Routes to School Program is a central source of Safe Routes services to all interested schools in the state and currently provides services to 43% of public K-8 schools. The program provides safety trainings, classroom visits, presentations to parents and community members, special events, encouragement programs, free promotional items, infrastructure improvements and summer programs.

4. Recreational Activities

Nestled among the forests, farmland, and mountains on the banks of the Connecticut River, the Pioneer Valley is ideally suited for recreational hiking and biking. Our small towns and larger city neighborhoods are where you find great coffee shops, historically preserved buildings, fun music, crowds of young and the young at heart, a strong local food movement, first-rate museums and art galleries, eccentric shops, eclectic restaurants, and residents eager to get outdoors in any season.

a) Regional Hiking Trail Map and Other Guides

The popularity of bicycling in the Pioneer Valley has led to the creation of a several guidebooks specific to the region including the Rubel Bike Map to Western Massachusetts, Bicycle Touring in the Pioneer Valley (Nancy Jane), Bicycling the Pioneer Valley (Marion Gorhan), Touring Jacob's Ladder by Bicycle or Car (PVPC) and Jacob's Ladder Trail Western Region Off-road Bicycle and Trail Guide (PVPC).

The “Pioneer Valley Trails: A Hiking and Biking Guide,” was released for sale at area book stores and outdoor recreation retailers in 2010. The guide retails for $7.99 and shows the locations of many hiking and biking trails in Hampden and Hampshire counties. The guide features a map on one side, showing the locations of 47 trails. The reverse side includes descriptions of each of the trails, including their location, whether they are paved or off-road, the length, types of permitted uses, and parking information. The guide is available at Broadside Books, Don Gleason Camper’s Supply and Booklink

Booksellers in Northampton; Amherst Books and Food for Thought Books in Amherst; New Horizons Sports in Westfield; Colorado Ski and Bike Shop in West Springfield and Nick's Sport Shop in Palmer. The guide is also available online at (http://www.pvpc.org/sites/default/files/2010-trail-hike-guide-sml.pdf)

b) Tourism and Commerce

The popularity of regional cycling clubs such as the Franklin-Hampshire Freewheelers, the Springfield Cyclonauts, MassBike, and Northeast Sport Cyclists are testimony to the unique quality and growing popularity of bicycling in the Pioneer Valley. The region is also home to a local fixed base touring company "Ride Noho" (http://www.ridenoho.com/welcome.html), located in Northampton providing cycling events and instructional training camps since 2000. Local bicycle shops provide a critical supporting role and many are active advocates and partners in the community. In 2015 Family Bike provided bike tune-ups for bike week events in Agawam, Highland Hardware, Colorado Ski and Bike and Mickey's hosted bike breakfasts, while New Horizons Bikes in Westfield hosted numerous events and activities. Joe's Garage in Haydenville, Competitive Edge, Northampton Bicycle, Full Circle Bike Shop, Peak Performance Bicycles, Pro Bike, FJ Roberts, Valley Bike & Ski Werks, Hampshire Bicycle Exchange, New England Bicycle, Southampton Bicycle, Custom Cycle Bike Shop and Laughing Dog Bicycles are just a few of the many bike shops that play a critical role in supporting a vibrant cycling economy.

5. MassDOT's ADA/Section 504 Transition Plan

MassDOT is undertaking a comprehensive re-evaluation of its policies, programs, services and facilities to determine the extent to which individuals with disabilities may be restricted in their access to these services and activities. MassDOT's ADA/Section 504 Transition Plan guides the planning and implementation of necessary program, activity and facility modifications over the next several years, which will expand on previous work. This work has included an extensive inventory of sidewalk ramps on jurisdictional roadways (over 35,000 ramps) as part of the ADA/Section 504 Self Evaluation and Prioritization. The data from this inventory is available on Cartegraph's VersaView.

F. AVIATION

The Pioneer Valley is well served by air transportation facilities located within or adjacent to the region. Most air travel from the region goes through Bradley International Airport in Windsor Locks, Connecticut situated 15 miles south of the City of Springfield.

Within the Pioneer Valley there are also a number of airports, the largest of which is the Westover Air Reserve Base and Metropolitan Airport facility in Chicopee and Ludlow. The second largest airport in the region is Westfield-Barnes Airport located and operated by the City of Westfield. It is the third busiest airport in Massachusetts, a general aviation facility home of the Air National Guard 104th Tactical Fighter Group.

The remaining airport in the region, the Northampton Airport, is privately owned and operated with much smaller and less sophisticated facilities. This airport serves both business and recreational uses.

1. Public Airports

a) Bradley International Airport

Bradley Airport located in Windsor Locks, Connecticut, is a state-owned facility that is operated by the Connecticut Department of Transportation and the Bureau of Aviation and Ports. It is New England's second largest airport, serving Connecticut, Massachusetts, New York, Vermont and New Hampshire, and was designated as a medium hub airport by the Civil Aeronautics Board. The airport opened as an Army Air Corps Base in 1941. After World War II it was taken over by the State of Connecticut and was converted to a commercial facility under the name Bradley Field. The name was changed to Bradley International Airport in the 1960s after a 9,500 foot paved runway was opened to accommodate jet aircraft. There are currently three runways and 17 taxiways. The total land area of the airport is 2,358 acres.

The airport, located 15 miles south of the City of Springfield, is the principal commercial airport serving people traveling to and from the Pioneer Valley Region. Survey data indicates that 30 percent of air travelers using Bradley are from the Springfield/Holyoke/Chicopee area and that about four out of five of the region's commercial air travelers use the Airport.

The nine major airlines that currently serve Bradley Airport are Air Canada, American Airlines, American Eagle, Delta, Jet Blue, Southwest, United Airlines, US Airways, and US Airways Express. Approximately 198 (2014) daily flights make Bradley the second busiest New England Airport Behind Logan International Airport in Boston. The airport served 5,421,975 in 2013 which is 89,643 more than the 5,332,332 travelers in 2009. There are no

landing/takeoff limitations or nighttime operational curfews. The airport can handle all types of commercial aircraft including Boeing 747, Concorde, and the Russian-built Antonov, the largest passenger aircraft in the world.

Table 5-27 – Bradley Airport Operational Statistics

Aircraft Based on Field	55	Aircraft Operations: Average Per Day	281*
Single Engine Airplanes	1	Commercial	52%
Multi Engine Airplanes	7	Air Taxi	29%
Jet Airplanes	26	Transient General Aviation	15%
Helicopters	4	Military	4%
Military Aircraft	17	Local General Aviation	<1%
		* for 12-month period ending 30 June 2012	

Source: http://www.airnav.com/airport/KBDL

The State of Connecticut employs approximately 100 people at Bradley Airport. Salaries are paid through the Bradley Enterprise Fund, which does not use taxpayer funds. Approximately 27,000 jobs are directly or indirectly dependent on airport operations. Bradley Airport generates 4 billion in economic activity yearly with $1.2 billion being in the form of wages.

Since 1982, funds for improvements have been provided through the Bradley Enterprise Fund. No state tax receipts are used in operating Bradley. Operating revenues are obtained from airline landing, parking and facility fees, airport owned parking facilities, land rental revenues from tenants, and fees from various airport concessions. Some of the accomplishments under this program are: a new terminal with ten boarding gates, the renovation of the existing terminal, the renovation of the concourse C, increased short and long term parking, and reconstruction of the main runway. Future plans include construction of a new terminal and concourse to replace terminal B which has been closed since April 2010 (Demolition of Terminal B and the roadway viaduct official started in December of 2014). The plan includes the construction of a 24 gate terminal consisting of two 12 gate concourses. A third phase of the plan will construct a west concourse which will connect the new Federal Inspection Station (FIS) facility to the rest of the airport.

In October 2008, the Embraer Executive Jet Service Center opened a 47,700 square foot center. The $10,000,000 center is one of three in the U.S. The center employs 60 highly skilled aircraft technicians to maintain and repair Embraer's line of business jets.

Bradley provides regular International service to two cities in Canada; Montreal and Toronto, as well as international flights to San Juan, Puerto Rico and Cancun, Mexico (seasonal). Direct international charter flights are presently available. International service facilities include customs, immigration and agriculture inspection services that are available for

international arrivals in the new Federal Inspection Station. A foreign trade zone is located adjacent to the airport.

Bradley Airport is well located to provide easy air access to both the Springfield and Hartford metropolitan areas. For more information on the airport please visit their website http://www.bradleyairport.com/index.shtml.

b) Westfield-Barnes Municipal Airport

Westfield-Barnes is a public airport operated by the City of Westfield and is the home base for the Massachusetts Air National Guard 104th Fighter Wing. The Region's second largest airport is located within the boundaries of the City of Westfield, north of Westfield's central business district and adjacent to the Massachusetts Turnpike (I-90). The airport is also within minutes of I-91. A total of about 1200 acres are owned by the facility. Approximately 600 acres are presently developed with pavement, hangers and airport buildings.

The airport is classified by the Massachusetts Airport System Plan as a general aviation airport providing general aviation service. It serves virtually all aircraft, including commercial jet liners and large, heavy and wide body aircraft. It is capable of handling precision instrument approach operations. The airport consists of two asphalt runways: 02/20 and 15/33. Runway 15/33 is a visual runway that is 5,000 feet long and 100 feet wide. It is equipped with medium intensity runway lights. The primary runway 02/20 is 9,000 feet long and 150 feet wide and equipped with high intensity runway lighting and precision instrument approaches.

Table 5-28 – Barnes Airport Operational Statistics

Aircraft Based on Field	148	Aircraft Operations: Average Per Day	142*
Single Engine Airplanes	112	Transient General Aviation	49%
Multi Engine Airplanes	7	Local General Aviation	38%
Jet Airplanes	11	Military	12%
Military Aircraft	18	Air Taxi	1%
		Commercial	<1%
		* for 12-month period ending 31 December 2012	

Source: www.airnav.com/airport/KBAF

Land-side development is concentrated in three quadrants: The Southwest quadrant, houses general aviation functions as well as fixed-base operators, based aircraft storage facilities, transient aircraft parking, and airport and Federal Aviation Administration administrative facilities.

The Northwest quadrant consists of the land leased to the Massachusetts Air National Guard (MANG) and Army Aviation Services. Located within this quadrant are the MANG facilities, aircraft parking aprons, alert facilities,

hangars, operations buildings, and office space. The F-15's on base now have a 24/7 air sovereignty alert mission. An industrial park is also planned for this area of the airport. In addition, the army aviation support facility operates here with two large hangars, 6 Blackhawk helicopters and 2 operations buildings.

Up until September 2007, the 131st Fighter Squadron (131 FS), 104th Fighter Wing (104 FW) of the Massachusetts Air National Guard at Westfield, operated 25 A-10 Thunderbolt II aircraft until they were realigned through the Department of Defense Base Realignment and Closure (BRAC) of 2005. The 104th changed its mission from Close Air Support to Air Superiority, and its A-10 aircraft were redistributed to other fighter units as a result of BRAC. The 104 FW has now received 15 F-15 Eagles from the former 102nd Fighter Wing.

The Northeast quadrant is the home of General Dynamics Aviation Services, a subsidiary of Gulfstream, which provides a full service maintenance facility to corporate aircraft with its four hangars and one support facility.

For more information on the airport please visit their website http://www.barnesairport.com

c) Westover Air Reserve Base and Metropolitan Airport

Westover is a joint-use civilian and military airport. Located in the City of Chicopee the Westover Airport is strategic to the state and federal aviation systems. Situated in the heart of the "Knowledge Corridor" in Western Massachusetts, with a population of 600,000 within a thirty mile radius, Westover Airport is a unique public use airport. While Westover's main runway is large enough to have been on the list of backup locations for landing the Space Shuttle, the airfield remains spacious enough for virtually any type of aircraft. It's also flexible enough to welcome the emergence of the very light jet era and all other general aviation air traffic.

Opened originally in 1940 as a World War II training base geographically positioned for European missions, the airport is one of the nation's most successful joint-use, civilian and military facilities. Westover continues its military use as home to the Air Force Reserve's 439th Airlift Wing. Under the joint-use agreement the Air Force Reserve retains the responsibilities for the runways, two Instrument Landing Systems (ILS), and a state-of-the-art air traffic control tower. The Westover Airport (civilian) has responsibility for three taxiways, its 13 large hangars, a fully equipped passenger terminal and overall civilian aviation operations.

Westover Airport is a navigational hub, located between Boston, Albany and the greater New York City region. By air, all major North American and

Western European cities can be reached within hours. The global marketplace is within easy reach of the Westover Airport. Westover Airport proudly demonstrates daily its importance to our region's economy and the state's transportation system.

Table 5-29 – Westover Airport Operational Statistics

Aircraft Based on Field	36	Aircraft Operations: Average Per Day	70*
Single Engine Airplanes	12	Military	72%
Multi Engine Airplanes	3	Transient General Aviation	21%
Jet Airplanes	2	Local General Aviation	5%
Helicopters	1	Air Taxi	2%
Glider Airplanes	2	Commercial	<1%
Military Aircraft	16	* for 12-month period ending 31 December 2013	

Source: http://www.airnav.com/airport/KCEF

Westover Airport runway system is long enough to accommodate all types of aircraft. Its primary runway 5-23 is 11,597 feet long by 300 feet wide and includes two Instrument Landing Systems. The Airport's second runway, 15-33, is 7,081 feet long by 150 feet wide. These runways provide pilots with a safe approach during variable wind and weather.

The Westover Metropolitan Development Corporation (WMDC) is the civil airport authority which holds the FAA Part 139 Airport Operating Certificate. The WMDC was organized in 1974 to facilitate the conversion of former military property at Westover to constructive civilian re-use. It is a public non-profit corporation governed by an autonomous 10 member Board of Directors. Over the past forty years WMDC has successfully developed three industrial airparks in both the Town of Ludlow (Airpark East) and the City of Chicopee (Airparks/North & West). The three airparks have more than 55 industries employing over 4,000 skilled workers. A new airpark consisting of 88 acres of land owned by WMDC and located south of the airport is currently in the early stages of site development.

The Westover Airport facilities include a passenger terminal with adjacent parking lots for 260 vehicles with plenty of room for expansion. On the airfield side of the terminal building there is a reinforced concrete apron over five acres in size to handle aircraft parking for arrivals and departures. Also there are 13 large aircraft hangars, ranging in size from 28,600 to 30,000 square feet with 28 foot high doors to accommodate based aircraft and transients.

The WMDC has proactively initiated efforts to protect the air space around Westover through participation in a FAA Part 150 Noise Study Program. A Noise Exposure map has identified the properties most impacted by aircraft noise and the program gives those eligible property owners the option to participate in the voluntary acquisition of their property. A total of 54 parcels

and 207 acres have been acquired through 2014. The funding of the program is provided by the FAA, MassDOT Aeronautics Division and a local matching share from WMDC. WMDC plans to continue the Noise Program into the future which will also have a sound insulation component.

For more information on the airport please visit their website at http://www.westoverairport.com/

2. Private Airports

a) Northampton Airport

The Northampton Airport, operating under the names of both Paradise City Aviation and Pioneer Valley Balloons in the past, is privately owned and operated. In August 2004, a local corporation, Seven Bravo Two, LLC purchased the assets of the airport. Along with this purchase, a new flight school/FBO office was established at the airport know as Northampton Aeronautics, Inc. The airport has been running since the early 1920's and became an official airport on April 1, 1929. It is classified as a Basic Utility II airport that serves general aviation uses, both business and recreational. Located in the City of Northampton, the airport covers 55 acres, has one asphalt runway 3,365 feet long and 50 feet wide with variable high intensity, pilot operated runway lighting. Northampton Airport has an estimated 73 flights per day and estimated 60 based aircraft. The runway underwent a $1.2 million reconstruction in 2000. In spring of the 2010 the ramp in front of the maintenance hangar was expanded allowing for more operating space. A new hangar is also currently under construction as of July 2010. Northampton Airport offers 24 hour self service fueling, and minor and major maintenance service. The airport is closed to aircraft and helicopters with a gross operating weight in excess of 12,500 lbs. Seaplanes can operate on the Connecticut River, which is parallel to the runway.

Table 5-30 – Northampton Airport Operational Statistics

Aircraft Based on Field	80	Aircraft Operations: Average Per Day	84*
Single Engine Airplanes	71	Local General Aviation	95%
Multi Engine Airplanes	7	Transient General Aviation	3%
Ultralights	2	Military	1%
		Air Taxi	<1%
		* for 12-month period ending 31 December 2011	

Source: http://www.airnav.com/airport/7B2

The Northampton Airport normally employs between 15 and 17 employees with as many as 30 during the peak summer months. Besides its large commercial business the airport has chartered flights flying 24 hours a day, 7 days a week to destinations all over the country. It also has an FAA approved

part 141 flight school, which is the largest flying school in Western Massachusetts.

For more information on the airport please visit their website at http://www.northamptonairport.com/

G. TRANSPORTATION OF GOODS

The major interstates and rail lines in the Pioneer Valley Region enable the quick delivery of goods to some of the world's largest economies of New York, Boston, and Philadelphia. The regions economics are also influenced by the surrounding mid sized cities such as Albany, Hartford, Worcester, and New Haven. The proximity of these major and middle sized cities allows goods from the Pioneer Valley to be quickly transported to competitive markets. With the emergence of the European Union and the Free Trade Agreement with neighboring Canada and Mexico, the region is uniquely positioned to take advantage of the growing international trade. In 1960 the international market accounted for 10% of the United States GDP. In 2006, the international market had increased to 28% of the United States GDP. To participate successfully in this new economy, the region must maintain an efficient road and rail network while encouraging the creation of an efficient multimodal transportation network. Enhancement and preservation of these multi modal connections with these cities is important as the regional, national and global market continue to evolve and integrate.

Freight is moved in and out of the Pioneer Valley primarily by truck with rail, air and pipeline carrying the remaining goods. Exporting and importing of goods in the Pioneer Valley region is accomplished by the use of one of these modes, or a combination of several modes. The Freight Analysis Framework (FAF) integrates data from a variety of sources to summarize freight movement by state and by mode. Freight shipments within, from, and to the state of Massachusetts are summarized in Table 5-31 by domestic mode share for 2007 and 2012. Truck continues to be the dominate mode for transporting freight.

In 2008, MassDOT (formerly the Executive Office of Transportation and Public Works) identified challenges within the freight industry in the Pioneer Valley. One of the first identified challenges was the lack of intermodal regional transportation links, where goods can be transferred from one mode to another. The region has two transloading facilities which is one method to attain this intermodal relationship. The region's freight movement is dominated by trucking. Expanding and maintaining rail service with the region's class one shippers of Pan Am and CSX potentially could reduce the amount of trucking currently required to transport goods in the region. The

region's intermodal facilities are based and are expected to continue to focus on truck and rail. The Connecticut River is not adequate to serve as a major waterway to transport goods. Furthermore, the region does not have a major airport to move goods. The lack of these alternate modes limits the intermodal facility choice. The changing economic landscape of the state has also affected the practices of freight movement. The state and its regional economies have transitioned from a manufacturing based to a service based economy. The freight sent with this type of economic base will typically ship smaller packages and are high value commodities. The service industry runs on the "just in time" model, where freight is delivered to vendors as consumer demand dictates. This reduces vendors carrying costs, inventory required and overall logistical costs. This model places a heavy reliance on the current freight network to transport goods that the local economy requires.

Table 5-31 – Shipments Within, From, and To Massachusetts by Domestic Mode Share

			Within		From		To	
State	Trade	Mode	2007	2012	2007	2012	2007	2012
Massachusetts	Domestic	Truck	98.98%	98.98%	79.84%	79.58%	72.19%	71.39%
		Rail	0.09%	0.10%	4.90%	4.31%	6.99%	7.06%
		Water	0.00%	0.00%	0.05%	0.05%	0.23%	0.24%
		Air (include truck-air)	0.00%	0.00%	0.08%	0.09%	0.13%	0.13%
		Multiple modes & mail	0.12%	0.12%	2.30%	2.23%	2.55%	2.44%
		Pipeline	0.00%	0.00%	11.65%	12.58%	16.99%	17.86%
		Other and unknown	0.81%	0.80%	1.18%	1.16%	0.91%	0.89%
	Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	Imports	Truck	70.08%	69.79%	95.60%	94.91%	70.24%	71.58%
		Rail	0.00%	0.01%	0.13%	0.14%	23.25%	20.90%
		Water	0.00%	0.00%	0.01%	0.01%	0.00%	0.00%
		Air (include truck-air)	0.00%	0.00%	0.00%	0.00%	0.07%	0.04%
		Multiple modes & mail	0.10%	0.14%	4.00%	4.60%	5.25%	6.13%
		Pipeline	29.01%	29.15%	0.00%	0.00%	0.00%	0.00%
		Other and unknown	0.81%	0.92%	0.26%	0.34%	1.19%	1.36%
	Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	Exports	Truck	66.82%	67.48%	80.15%	80.40%	68.07%	68.28%
		Rail	0.06%	0.06%	5.83%	6.10%	2.31%	2.23%
		Water	0.00%	0.00%	0.03%	0.04%	0.00%	0.00%
		Air (include truck-air)	0.00%	0.00%	0.26%	0.22%	0.02%	0.02%
		Multiple modes & mail	3.45%	3.51%	8.35%	8.76%	23.37%	23.45%
		Other and unknown	29.68%	28.95%	5.37%	4.49%	6.23%	6.02%
	Total		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: FAF Version 3.5

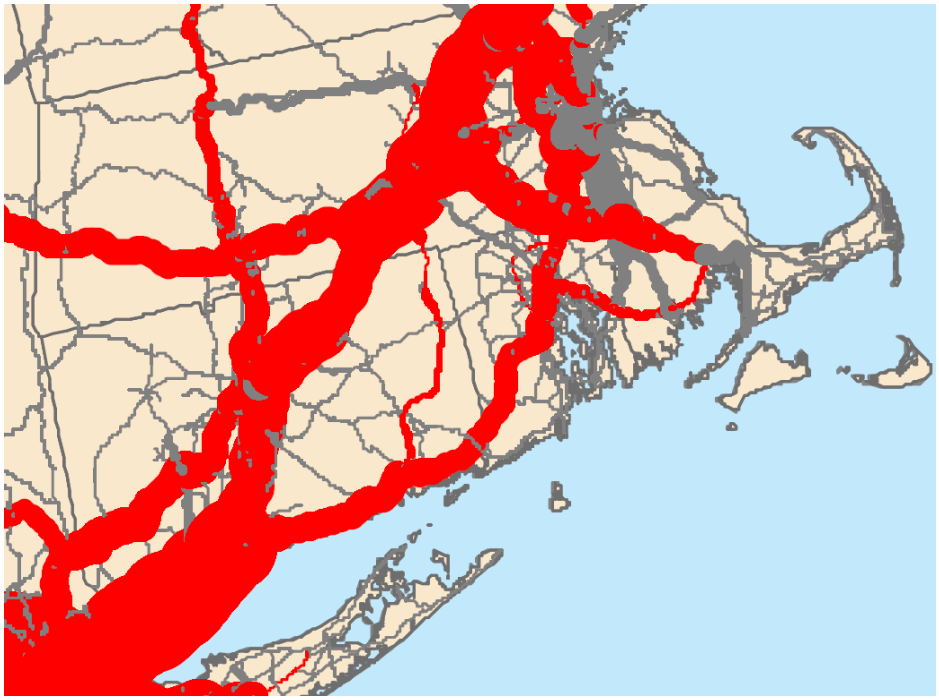
The freight within the Pioneer Valley is further influenced by global economic trends. Fuel prices continue to be a growing issue for truck freight shipments. Fuel is one of the largest costs for freight companies; this commodity is an important variable in predicting costs. This particular commodity has had large price fluctuations in recent years. The industry is continuing to develop and improve as technology advances. Freight loads are increasing the ability to carry more freight and facilities are improving their efficiency. Governmental influence such as federal deregulation of the carrier industry would have massive impacts on the freight industries ability to generate capital.

1. Trucking

Trucking is the dominant mode for moving freight in the Pioneer Valley. Urbanized communities in the region have at least one trucking firm, the majority of these carriers are small, short haul carriers handling feeder and distribution traffic. They provide both full truckload and less than truckload deliveries. This mode has the ability to transport goods to the northeastern United States and southeastern parts of Canada by overnight service. These freight companies carry goods for a variety of industries outside Hampden and Hampshire County. Franklin County possesses few freight companies and often employ/hire Hampden and Hampshire based trucking companies to transport their goods. Essentially, this transportation service sector is exported to other areas, in turn producing regional income. The future competitiveness of the industry hinges on the investment in the maintenance and development of interstate, state and local roadways, multimodal facilities and all related infrastructure.

Truck traffic is expected to grow throughout the state over the next twenty years (Figure-5-21). This increase in freight trucking movement will occur mainly on Interstate 91 and Interstate 90. These highways already carry the largest volumes of freight movement in the two counties. These routes currently carry freight trucks, however as regional production and demand of goods is expected to increase, the volume of freight trucks needed will also increase. The modal split of freight movement is expected to rely on trucking more in the future. Even if freight is imported or exported by rail or air in the region, trucks typically provide the final trip between freight terminals, manufacturers or distributors.

Figure 5-21 – Long Haul Freight Traffic on the National Highway System - 2040 Forecast



Source: Freight Analysis Framework Data.

A portion of freight goods the Pioneer Valley exports stays within the state's borders. A 2009 TRANSEARCH report to MassDOT quantified that 99% of all in-state shipments are performed by trucks. This reliance on in-state truck shipments is mainly due to the short distance between origin and destination of the commodities. The Greater Boston area is the destination for the largest share of these goods originating in the Pioneer Valley. The top commodities transported by truck to the Greater Boston area include (percent share of goods in parentheses): Rubber or miscellaneous plastics (31%) Fabricated Metals (31%), Food/Kindred Products (30%), Clay, Concrete, Glass or Stone (17%) and Nonmetallic minerals (14%). The Worcester area also receives 19% of the total share of Clay, Concrete, Glass and Stone produced in the Pioneer Valley. Some freight is moved within the borders of the Pioneer Valley. Similar to in-state shipments, the freight moved within the two counties is transported almost entirely via trucking. Approximately 63% of the non metallic minerals that originate in the region are transported within the region. Lumber and chemical or allied products have 13% and 11% of their total product respectively moved internally in the valley.

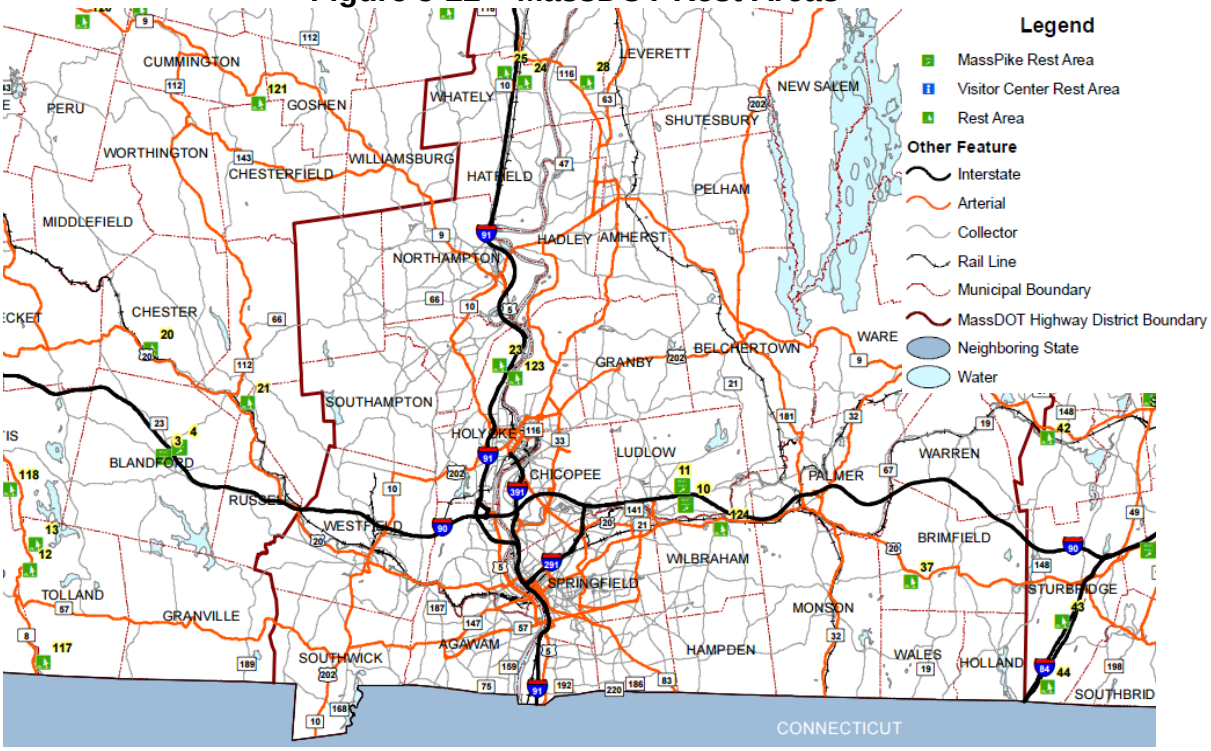
a) Rest Stops

Drivers of commercial motor vehicles must follow strict hours of service regulations established by the Federal Motor Carrier Safety Administration

(FMCSA). As a result, safe, convenient rest areas are important for long-haul drivers to meet hours of service regulations. MassDOT rest areas in the Pioneer Valley region are show in Figure 5-22.

In addition, the Pride Traveler Center is located on Burnett Road in the City of Chicopee off Massachusetts Turnpike Exit 6. Another private truck stop with an associated rest area is proposed in the City of Westfield off Massachusetts Turnpike Exit 3.

Figure 5-22 – MassDOT Rest Areas



Source: MassDOT

2. Rail

Five rail carriers provide freight service in the Pioneer Valley Region: CSX Transportation, Pan Am Southern, New England Central, Pioneer Valley Railroad, and MassCentral Railroad.

a) CSX Transportation

In June 1999 the assets of Conrail were split between CSX and Norfolk Southern. The break-up of Conrail ended its virtual monopoly on northeastern rail service and allowed new opportunities for price and service competition for the regions rail shippers. CSX took over Conrail's operation in Massachusetts and now owns and operates the east-west mainline between

Selkirk, New York and Boston. CSX also owns and operates a spur line between Springfield and Ludlow.

Height clearances above the rail on the Boston and Albany Main line through the region allow for short double stack container service (9'6''+ 8'6") to both West Springfield and Palmer. Clearance improvements would be needed to allow full double stack service (9'6''+ 9'6") in the region.

b) Pan Am Southern Railways

In 2008, the Surface Transportation Board approved the merger between Pan Am Railways and Norfolk Southern Railway creating a new joint venture railroad consisting of a portion of Pan Am Railways in New York, Vermont, Massachusetts, and New Hampshire. Pan Am Southern Railways now owns the Boston & Maine Railroad (B&M) and its subsidiary Springfield Terminal Railway Company (STRC). B&M is the region's second largest rail carrier, operating a north-south mainline along the Connecticut River from Springfield, to East Deerfield. Pan Am Southern also owns secondary lines that run from Chicopee to Chicopee Falls and from Holyoke to Westover Industrial Airpark in Chicopee. Lying north of the region, but also important to the region's rail system is the B&M east-west mainline. This Pan Am Southern line is now known as the Patriot Corridor and provides Norfolk Southern the opportunity to compete with CSX for New England Traffic.

c) New England Central.

The New England Central Railroad (NECR) is owned by RailAmerica and offers freight service between St. Albans, Vermont near the Canadian border, and New London, Connecticut via the eastern portion of the Pioneer Valley region. Although the line is not heavily traveled, it has been rehabilitated and operates profitably.

d) Pioneer Valley Railroad

The Pioneer Valley Railroad (PVRR) is owned by the Pinsly Company and provides short line service on tracks formerly owned by Conrail. The PVRR took over two lines in 1982, each approximately 15 miles long, connecting Westfield with Holyoke and Northampton. The PVRR can accommodate intermodal transfers at the ends of each route, has 48-state motor carrier authority, and directly connects to both CSX and the B&M railroads.

e) MassCentral Railroad

MassCentral (Massachusetts Central Railroad Corporation) is an independent firm based in Palmer, Massachusetts. The operation of the railroad is

managed by the Finger Lakes Railroad. Like PVRR, MassCentral Railroad provides short line service on a former Conrail line. Since 1979 this railroad has operated the former Ware River secondary line, which runs 24 miles from Palmer, through Ware, to North Barre, Massachusetts. MassCentral connects with CSX in Palmer. After abandonment by Conrail, the line was purchased and rehabilitated by the Commonwealth of Massachusetts. The Commonwealth maintains ownership of the majority of the line and leases the tracks to MassCentral.

f) Yards Terminals

The region's major freight and intermodal yard is located in West Springfield (CSX). CSX is currently making significant infrastructure improvements to the West Springfield facility. Another major freight and switching yard important to the region but located outside the region, is B&M's East Deerfield Yard in Franklin County. Within the Pioneer Valley other smaller freight yards are located in Holyoke, Palmer, and Westfield

g) Services

Much of the freight moved in Massachusetts is interstate traffic with either Selkirk, New York (CSX) or Mechanicville, New York (Pan Am Southern) providing connections to long haul lines. In addition to traditional general freight (boxcar) service, all of the region's railroads offer contract rates for volume shipments, consultation services for custom-designed transportation packages, and intermodal freight facilities allowing the transfer of goods from rail to truck and vice versa. The geographic location of the Pioneer Valley at the crossroads of interstate highways (I-90 and I-91) and long-haul rail lines (CSX and B&M) creates a strategic and attractive location for businesses and industry participating in the local or international marketplace.

3. Air Freight

Air freight serves particular markets, which are primarily focused on time-sensitivity issues and accommodating high-value commodities (typically light weight). Due to this limited market, this mode typically carries a much smaller share of goods than truck or rail, however air freight annually generates billion of dollars. The air freight industry is the most expensive method of freight movement. Air cargo needs to be light and high value to maximize profits. Lighter weight goods require fewer resources to transport which reduces overall shipping costs. Traditionally retail, service and manufacturing sectors are more likely to use air freight.

Air freight can be sent in two different methods. The first option would be to transport air freight by companies which own and maintain their own all-cargo

aircraft fleet, such as AirNet or DB Schekner. The second option is via scheduled passenger aircraft for which the shipper places the cargo with a freight forwarding (pooling) company. The forwarder contracts for blocks of space on commercial airlines for specific routes. According to the U.S. Department of Transportation, for identification purposes, air freight services are categorized into whether goods are time sensitive, or less time sensitive; whether they are sent by integrated or nonintegrated providers; or by the major type of cargo carrier, which are identified as being one of the following: express carrier, scheduled, mail or chartered air service providers.

Currently there are no major air freight facilities in the region. This lack of this particular regional shipment method does not limit the air freight and package services options for Pioneer Valley residents. Air freight inbound or outbound of the region typically travels through these airports: Bradley International Airport in Windsor Locks, Connecticut, Logan Airport in Boston, or New York City's metropolitan airports. Westover Metropolitan Airport in Chicopee, MA seldom has automotive or large machine parts shipments. This limited amount of freight is not tracked or reported by the airport.

Bradley International Airport is a medium-hub airport located 15 miles southwest of Springfield, MA, in Windsor Locks, CT. Bradley's convenient location near Interstate 91, and air cargo facilities, make it the primary choice for the regions shippers. In 2012, more than 122,000 tons of air cargo enplaned or deplaned at Bradley International. Airport choice for air cargo transport is dependent on a number of factors, including destination coverage/schedule factors, tariff structure, logistical and contractual considerations, and access time and distance of individual airports. Therefore, some of the region's shippers may choose Boston's Logan airport, or one of New York City's metropolitan airports for air cargo services.

4. Pipeline

There are presently three pipelines serving the Pioneer Valley. One provides natural gas, while the other two provide petroleum products. Pipeline goods are critical to the national and regional economy. These lines provide energy resources for buildings, motor vehicles and power plants to maintain the economy and existing infrastructure. The Research and Innovative Technology Administration predict that the role of pipelines will remain critical as freight demand is anticipated to increase.

a) Natural Gas

Natural gas pipelines, owned by Tennessee Gas Pipeline Company (An El Paso Corporation Company), runs along the region's southern edge. The

system's trunk lines originate in the southern Louisiana/Texas/Gulf of Mexico area, travels northeast through the country and region, divides in Hopkinton, Massachusetts, and terminates in Gloucester, Massachusetts, Providence, Rhode Island and Concord, New Hampshire. The main lines cut through ten area communities from Tolland in the west to Holland in the east. These mainlines are 24-inch and 30-inch diameter pipelines.

A lateral line also runs north from Southwick to Northampton. This lateral is 8-inch diameter pipeline and becomes a 12-inch diameter pipeline north of Cook Road in Easthampton. This lateral serves Berkshire Gas, Holyoke Gas, Westfield Gas and Bay State Gas Companies. Additionally, Tennessee Gas has two laterals originating from its compressor station in Agawam, MA: a 10-inch lateral that feeds Bay State Gas in Agawam, MA and an 8-inch lateral that feeds the Berkshire Power plant located in Agawam, MA.

The Federal Energy Regulatory Commission (FERC) approves expansion plans based on a demonstrated increase in demand, with approval limited to only the facilities necessary to satisfy any increased demand. The current system is operating at capacity.

There are several natural gas distribution companies in the Pioneer Valley providing service to the region's communities via their own network of pipelines. Identification of these individual pipeline networks is outside the scope of this report. All, however, are fed by the main Tennessee Gas trunk lines.

b) Jet Fuel

Buckeye Pipeline Company is a common carrier of petroleum products within the states of Connecticut and Massachusetts. Buckeye Pipeline Company is a wholly owned subsidiary of Buckeye Partners, L.P. (NYSE: BPL). Buckeyes' local office is located in East Hartford, Connecticut, but management control is directed from Brenigsville, Pennsylvania.

The Buckeye Pipeline Company system includes a trunk line of approximately 111 miles in length. Of this, 93 miles are 12-inches in diameter, 7 miles are 10-inches in diameter, and 11 miles are 8-inches in diameter. There are also a number of spur lines to individual shippers that vary in length and diameter. Petroleum products enter the system at Buckeye Pipeline Company's New Haven Harbor receiving terminals. These products originate from refineries at various locations including the East and Gulf Coast of the United States. The trunk line terminates in Ludlow, Massachusetts.

The products can be taken off at any of the several delivery locations located along the line, plus three branch lines. The delivery locations are (in order

traveling northward along the trunk line) Portland, Rocky Hill, Wethersfield, East Hartford, Hartford, Melrose, Enfield, (all in Connecticut) Springfield and Ludlow (both in Massachusetts). The branch lines extend to the Kleen Energy power plant in Middletown, CT, Bradley International Airport in Windsor Locks, CT, and Westover Air Force Base in Chicopee, MA

c) Gasoline, Kerosene, Distillates

Mobil Pipeline Company, Inc. operates a petroleum product pipeline between Providence, Rhode Island and Western Massachusetts. The branch office that operates this pipeline is located in East Providence, Rhode Island. The branch office has limited authority and the pipeline is primarily managed at the Mobil Pipeline Company's main headquarters, located in Houston, Texas. The pipeline located in the Pioneer Valley is 6-inches in diameter. Petroleum products are generally delivered to the pipeline by water at Providence, Rhode Island. The products then travel in a northwest direction and terminate in Springfield, Massachusetts

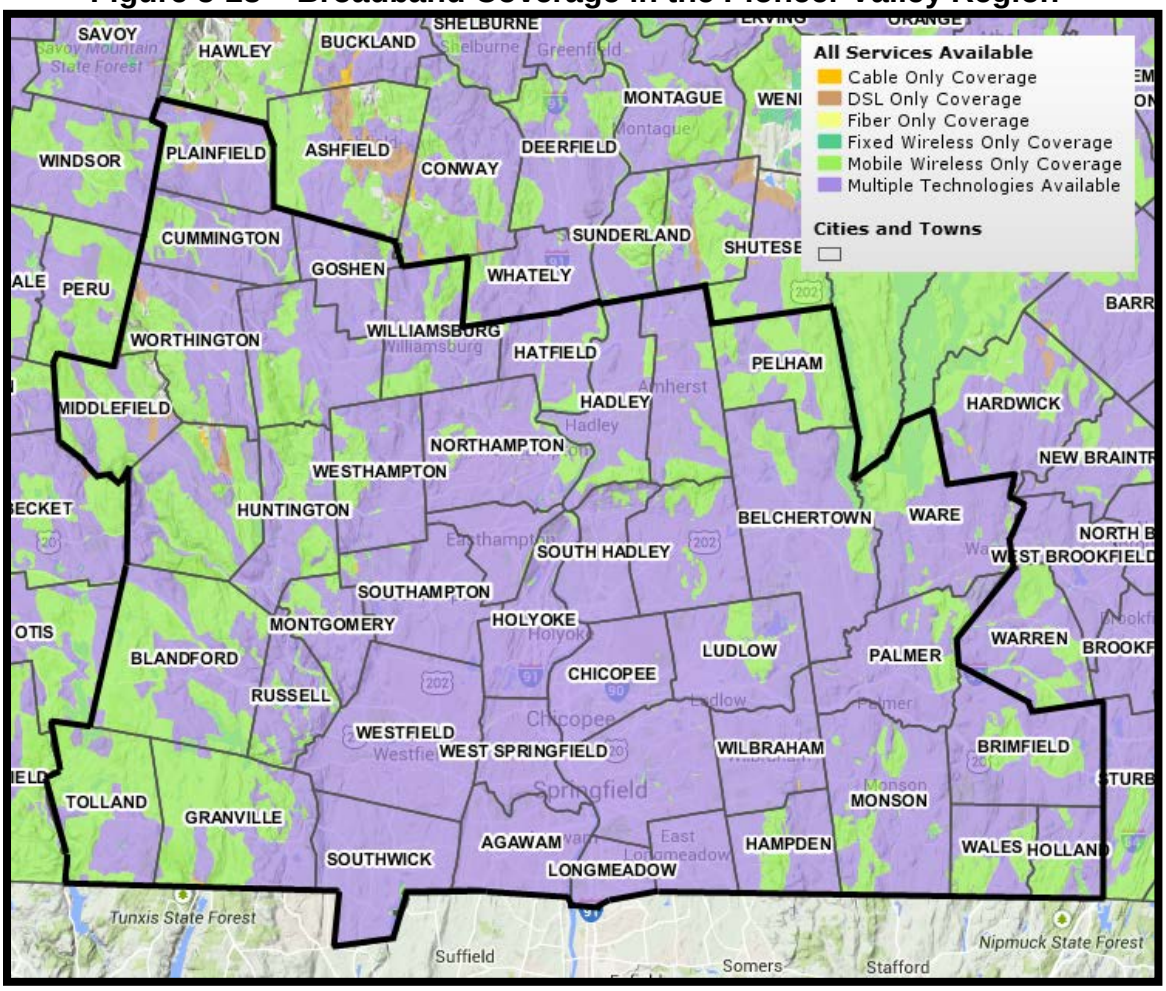
H. INTERNET INFRASTRUCTURE

The availability of reliable, high-speed internet service is important to enhance the connectivity and economic vitality of the Pioneer Valley region. The Massachusetts Broadband Institute (MBI) has been working since 2008 to connect those that are currently unconnected to broadband internet access. A map of broadband coverage in the Pioneer Valley Region is shown in Figure 5-23.

1. Western MA Connect

WesternMA Connect, Inc. (formerly Berkshire Connect, Inc. and Pioneer Valley Connect) is a regional non-profit organization with the mission to provide affordable, reliable and redundant high capacity broadband services throughout Berkshire, Franklin, Hampden and Hampshire counties. Previously, both Berkshire Connect and Pioneer Valley Connect worked independently to encourage the deployment of infrastructure and access to broadband services for businesses, governments, and residents in unserved areas. A formal collaborative effort of the two organizations began in 2005 to address broadband access inequity in western Massachusetts. In 2009, Pioneer Valley Connect dissolved and secured representation on the Berkshire Connect Board of Directors. To better reflect the magnitude of the region it serves and the scope of its activities, Berkshire Connect, Inc. changed its name to WesternMA Connect, Inc. This also resulted in the creation of the Massachusetts Broadband Institute as a regional solution to achieve more efficient and effective results in providing high-speed internet access to all.

Figure 5-23 – Broadband Coverage in the Pioneer Valley Region

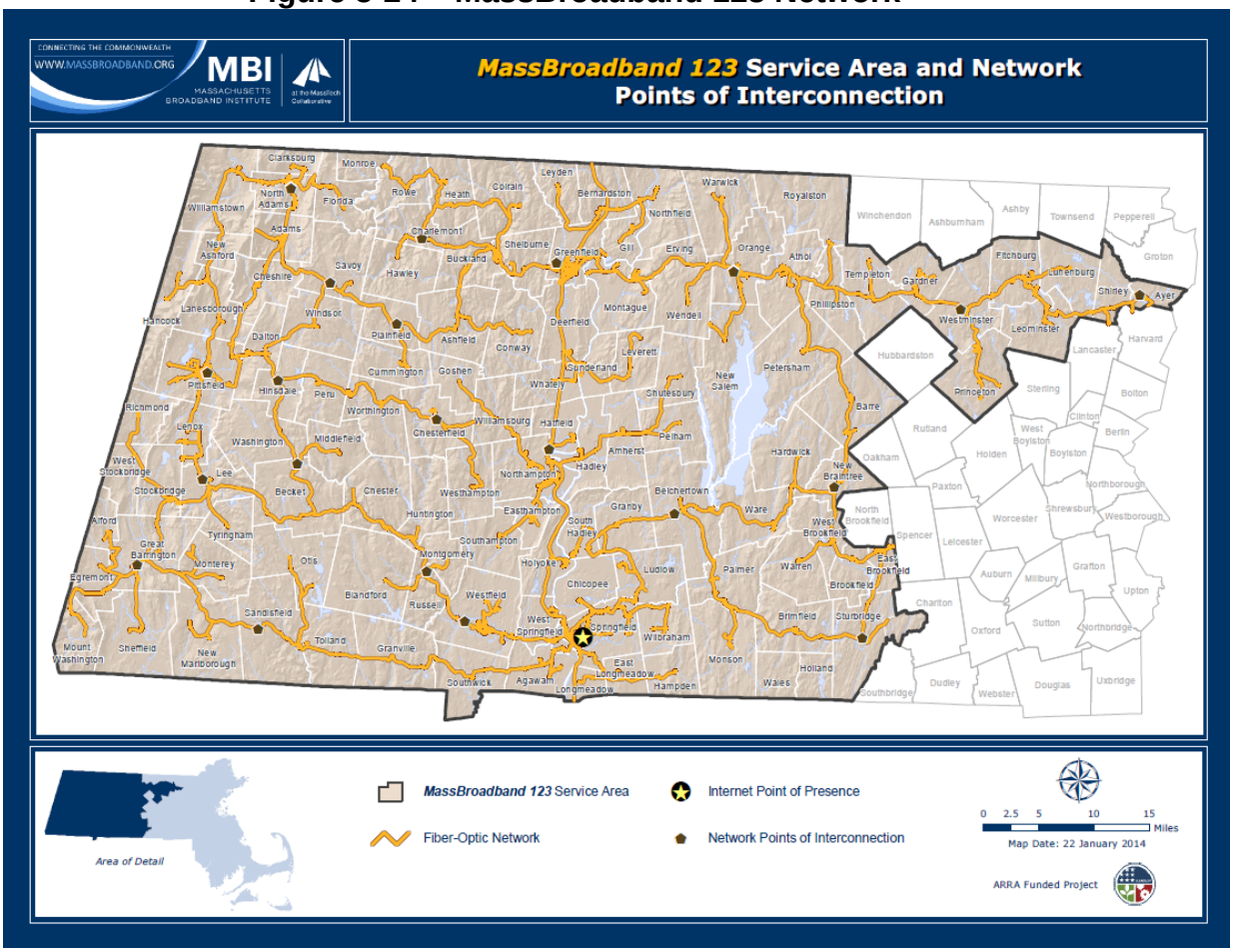


Source: MBI

2. Commonwealth of Massachusetts

The Commonwealth of Massachusetts is the owner of the ***MassBroadband 123*** network, which is operated by Axia NGNetworks USA. The ***MassBroadband 123*** network is open access to allow any broadband service provider to connect and offer its services, which will increase competition and affordability of options. The MBI signed an agreement with Axia NGNetworks USA to serve as the network operator for the ***MassBroadband 123*** network. Axia will provide wholesale services to broadband service providers on the ***MassBroadband 123*** network and maintain and refresh the fiber optic network to ensure its operability and efficiency.

Figure 5-24 – MassBroadband 123 Network



Source: MassBroadband 123 Map Dated January 22, 2014

a) Massachusetts Broadband Institute

The Massachusetts Broadband Institute (MBI) is working to improve affordable high-speed Internet access across the Commonwealth. Governor Patrick and the Legislature created the Massachusetts Broadband Institute when signing the Broadband Act into law in August 2008. The Act gives the MBI the authority to invest up to $40 million of state bond funds in necessary and long-lived infrastructure assets, such as conduits, fiber-optic cable and wireless towers.

The MBI built the MassBroadband 123 network to expand broadband connectivity to over 120 communities in western and north central Massachusetts. The network will provide the necessary broadband infrastructure to foster economic growth, improve health care and education, and strengthen public safety.

The MBI is continually collecting, verifying and mapping detailed information about broadband availability in Massachusetts. This information will be used to gain new investments for broadband coverage in underserved homes and business in the state of Massachusetts.

In early 2014, the MBI completed its MassBroadband 123 1,200 mile fiber optic backbone project. The completion of this project will connect over 120 communities in western and north central Massachusetts. The network will expand high-speed Internet access to improve the lives of residents, close the digital divide and bring new economic opportunities to the region.

b) Axia Networks

The MBI signed an agreement with **Axia NGNetworks USA (Axia),** to serve as the network operator for the ***MassBroadband 123*** fiber-optic network. Axia will manage and maintain the Internet backbone network that the MBI has developed in western and central Massachusetts

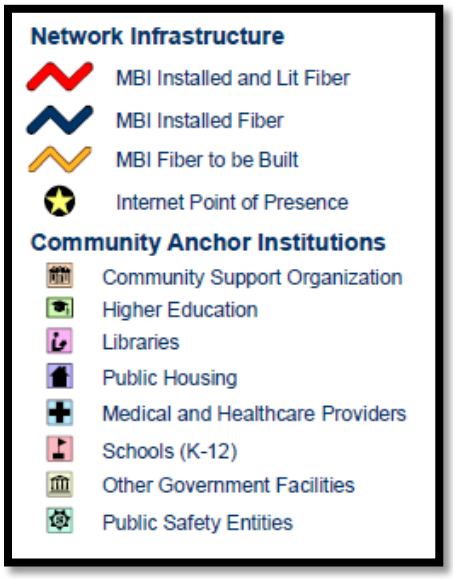
Axia was selected through an open, rigorous and highly-competitive process. Axia will offer wholesale services to broadband service providers using its proven, open access, "do not compete with your customer" approach. This fundamental digital economy infrastructure will spur investment by broadband service providers and generate economic growth in the region. Axia will invest in the ongoing operations of MassBroadband 123 and provide fiber extensions to the network in response to market demand.

c) The MassBroadband 123 Network

The MassBroadband 123 network connects over 1,200 public safety entities, community colleges, libraries, medical facilities, and town halls. All total, it serves 333,500 households and 44,000 businesses over a geographic area covering over one-third of Massachusetts with more than one million residents. This network provides the necessary broadband infrastructure to foster economic growth, improve health care and education, and strengthen public safety.

Information on the location and proposed locations of MassBroadband 123 fiber is provided on their website. This information is mapped by community along with the fiber status and the location of community anchor institutions to be connected in that community. The link to the MBI website is: http://broadband.masstech.org/news-and-updates/map-gallery/massbroadband-123-maps-data. Each map is based on the legend shown in Figure 5-25. A summary of the status of fiber for PVPC communities is provided in Table 5-32.

Figure 5-25 – Key to MassBroadband 123 Network Municipal Maps



Currently, only two communities, the Towns of Holland and Wales do not have any proposed projects to install fiber. Eight communities were reported to have at least apportion of their fiber network installed and lit as of January 2014. Eighteen were reported as having at least a portion of their fiber network installed, while fifteen are still waiting for their fiber network to be built.

Table 5-32 – MassBroadband 123 Fiber Status by PVPC Community

Community	Fiber Installed and Lit	Fiber Installed	Fiber to Be Built	No Information
Agawam		X		
Amherst			X	
Belchertown			X	
Blandford			X	
Brimfield			X	
Chester			X	
Chesterfield		X	X	
Chicopee	X		X	
Cummington		X		
East Longmeadow		X	X	
Easthampton	X		X	
Goshen		X		
Granby			X	
Granville		X		
Hadley		X	X	
Hampden		X		
Hatfield	X	X		
Holland				X
Holyoke	X		X	
Huntington			X	
Longmeadow	X	X	X	
Ludlow			X	
Middlefield			X	
Monson			X	
Montgomery			X	
Northampton	X	X	X	
Palmer		X	X	
Pelham		X		
Plainfield		X		
Russell			X	
South Hadley			X	
Southampton			X	
Southwick		X		
Springfield	X		X	
Tolland		X		
Wales				X
Ware		X		
West Springfield	X	X	X	
Westfield			X	
Westhampton		X		
Wilbraham		X		
Williamsburg		X	X	
Worthington		X		

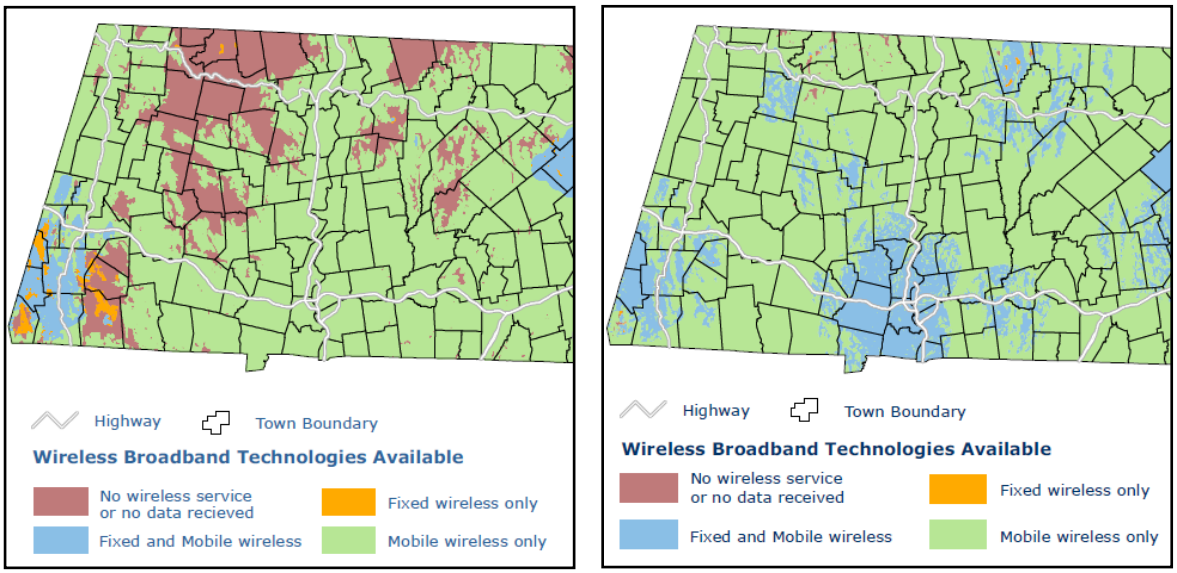
Source: MBI Maps January 22, 2014

3. Last Mile Grant Program

The MBI's Last Mile Broadband Solutions Program provides grants that help municipalities and broadband service providers deploy new high-speed Internet access in the western and north central parts of the State. Providers will use a wide array of broadband technologies and utilize existing infrastructure, and eventually ***MassBroadband 123***. In 2011, the MBI issued $335,000 in competitive grant awards as part of ongoing efforts to advance last mile solutions and expand broadband connectivity in underserved areas of Massachusetts. The grant recipients were selected through an open, rigorous, and highly competitive process. The MBI funded broadband planning and deployment grants up to a maximum of $50,000 per provider and project, supported by a 25% funding match from the grant recipient.

Figure 5-26 compares the availability of wireless technology in western Massachusetts from June 2010 to June 2014. As can be seen from the figure, there has been a significant reduction in the areas designated as having no wireless service.

Figure 5-26 – Change in Wireless Broadband Coverage 2010 - 2014



June 2010 June 2014

I. POPULATION

1. Trends

While the population in the Pioneer Valley region grew at a modest rate during the 1980s—increasing 3.6% to 602,878 residents—population growth slowed to a trickle in the 1990s. Between 1990 and 2000, the region's population grew by 0.9 percent, reaching 608,479 persons. This is compared to a 5.5 percent increase for the Commonwealth of Massachusetts and a 13.2 percent increase for the nation as a whole. Between 2000 and 2010, the region's population grew by 2.4%. Population growth has remained steady since 2010.That the population of the Pioneer Valley region grew at all is a direct result of foreign immigration. Every year of the 1990s the region experienced a net loss in domestic migration (more people moved away to other parts of the country than moved into the region from other parts of the country). Apart from the arrival of 16,025 foreign born persons in the 1990s, the region would have experienced a 1.7 percent loss in population during the decade. Table 3-33 shows the region's population in the last seven decades. While population grew in the early part of the 2000s to reach 627, 125 in 2009, almost 4,000 people had left by 2010, for an effective growth rate of 2.4%. Massachusetts growth rate for this same period of time was higher at 3.4%.

Table 5-33 shows the shift of population from urban areas to suburban and rural areas over the past 50 years. Suburbanization of the region became prominent in the 1950's when the communities adjacent to the urban core cities experienced unprecedented rates of growth. In the 1990's, with ongoing expansion, the highest rates of growth were found at the edges of the traditional suburbs, in the region's rural communities. Belchertown, for example, which has the largest land area of any community in the region had a population increase of 22.6 percent between 1990 and 2000.

Suburban growth has continued in the 2000s in towns like Belchertown and East Longmeadow, which grew by 12.9 percent and 11.7 percent respectively. More rural towns such as a Goshen, Montgomery and Tolland have also seen significant population increases (16.6%, 28.2% and 13.3 %). Interestingly, since 2000 urban core communities have seen more modest growth; Springfield and Holyoke have seen increases of 1.06% and 1.03% respectively. Northampton's population has declined slightly. The population of Amherst, on the other hand, has grown by 11.6%. These trends have continued since 2000 with communities such as Montgomery, Belchertown, Brimfield, Southampton, and Granville experiencing sizable population change between 2000-2013 (up 31.2 percent, 13.7 percent, 11 percent, 11 percent, and 6 percent respectively). .

Table 5-33 – Pioneer Valley Region Population Change

	1950	1960	1970	1980	1990	2000	2010	2013
Agawam	10,166	15,781	21,717	26,271	27,323	28,144	28,452	28,705
Amherst	10,856	13,781	26,331	33,229	35,228	34,873	38,689	38,919
Belchertown	4,487	5,186	5,936	8,339	10,579	12,968	14,645	14,735
Blandford	597	636	863	1,038	1,187	1,214	1,234	1,246
Brimfield	1,182	1,414	1,907	2,317	3,001	3,339	3,616	3,708
Chester	1,292	1,155	1,025	1,123	1,280	1,306	1,338	1,360
Chesterfield	496	556	704	1,000	1,048	1,201	1,226	1,239
Chicopee	49,211	61,553	66,676	55,112	56,632	54,653	55,264	55,717
Cummington	620	550	562	657	785	1,004	872	867
East Longmeadow	4,881	10,294	13,029	12,905	13,367	14,100	15,746	16,022
Easthampton	10,694	12,326	13,012	15,580	15,537	15,994	16,040	15,971
Goshen	321	385	483	651	830	903	1,053	1,058
Granby	1,816	4,221	5,473	5,380	5,565	6,132	6,237	6,290
Granville	740	874	1,008	1,204	1,403	1,521	1,570	1,612
Hadley	2,639	3,099	3,750	4,125	4,231	4,793	5,248	5,271
Hampden	1,322	2,345	4,572	4,745	4,709	5,171	5,143	5,179
Hatfield	2,179	2,350	2,825	3,045	3,184	3,249	3,275	3,282
Holland	377	561	931	1,589	2,185	2,407	2,483	2,495
Holyoke	54,661	52,689	50,112	44,678	43,704	39,838	39,902	40,249
Huntington	1,256	1,392	1,593	1,804	1,987	2,192	2,179	2,168
Longmeadow	6,508	10,565	15,630	16,301	15,467	15,633	15,807	15,882
Ludlow	8,660	13,805	17,580	18,150	18,820	21,209	21,147	21,451
Middlefield	295	315	288	385	392	580	521	528
Monson	6,125	6,712	7,355	7,315	7,776	8,359	8,566	8,722
Montgomery	157	333	446	637	759	656	841	862
Northampton	29,603	30,058	29,664	29,286	29,289	28,978	28,616	28,495
Palmer	9,533	10,358	11,680	11,389	12,054	12,497	12,140	12,157
Pelham	579	805	937	1,112	1,373	1,403	1,320	1,319
Plainfield	228	237	287	425	571	576	648	650
Russell	1,298	1,366	1,382	1,570	1,594	1,655	1,776	1,789
South Hadley	10,145	14,956	17,033	16,399	16,685	17,196	17,712	17,740
Southampton	1,387	2,192	3,069	4,137	4,478	5,387	5,802	5,984
Southwick	2,855	5,139	6,330	7,382	7,667	8,835	9,509	9,634
Springfield	162,399	174,463	163,905	152,319	156,983	152,082	153,451	153,703
Tolland	107	101	172	235	289	428	485	489
Wales	497	659	852	1,177	1,566	1,737	1,841	1,875
Ware	7,517	7,517	8,187	8,953	9,808	9,708	9,868	9,844
West Springfield	20,438	24,924	28,461	27,042	27,537	27,899	28,354	28,684
Westfield	20,962	26,302	31,433	36,465	38,372	40,072	41,115	41,301
Westhampton	452	583	793	1,137	1,327	1,468	1,606	1,603
Wilbraham	4,003	7,387	11,984	12,053	12,635	13,473	14,225	14,477
Williamsburg	2,056	2,186	2,342	2,237	2,515	2,427	2,481	2,466
Worthington	462	597	712	932	1,156	1,219	1,157	1,167
Pioneer Valley Region	**456,059**	**532,708**	**583,031**	**581,830**	**602,878**	**608,479**	**623,200**	**626,915**
Massachusetts	**4,691,000**	**5,149,000**	**5,689,170**	**5,737,037**	**6,016,425**	**6,349,097**	**6,563,26**	**6,692,82**

Table 5-34 – Rate of Population Change by Community

	1950 to 1960	1960 to 1970	1970 to 1980	1980 to 1990	1990 to 2000	2000 to 2010	2010 to 2013
Agawam	55.2%	37.6%	21.0%	4.0%	3.0%	1.1%	0.9%
Amherst	26.9%	91.1%	26.2%	6.0%	(1.0%)	10.9%	0.6%
Belchertown	15.6%	14.5%	40.5%	26.9%	22.6%	12.9%	0.6%
Blandford	6.5%	35.7%	20.3%	14.4%	2.3%	1.6%	1.0%
Brimfield	19.6%	34.9%	21.5%	29.5%	11.3%	8.3%	2.5%
Chester	(10.6%)	(11.3%)	9.6%	14.0%	2.0%	2.5%	1.6%
Chesterfield	12.1%	26.6%	42.0%	4.8%	14.6%	2.1%	1.1%
Chicopee	25.1%	8.3%	(17.3%)	2.8%	(3.5%)	1.1%	0.8%
Cummington	(11.3%)	2.2%	16.9%	19.5%	27.9%	(13.1%)	(0.6%)
East Longmeadow	110.9%	26.6%	(1.0%)	3.6%	5.5%	11.7%	1.8%
Easthampton	15.3%	5.6%	19.7%	(0.3%)	2.9%	0.3%	(0.4%)
Goshen	19.9%	25.5%	34.8%	27.5%	8.8%	16.6%	0.5%
Granby	132.4%	29.7%	(1.7%)	3.4%	10.2%	1.7%	0.8%
Granville	18.1%	15.3%	19.4%	16.5%	8.4%	3.2%	2.7%
Hadley	17.4%	21.0%	10.0%	2.6%	13.3%	9.5%	0.4%
Hampden	77.4%	95.0%	3.8%	(0.8%)	9.8%	(0.5%)	0.7%
Hatfield	7.8%	20.2%	7.8%	4.6%	2.0%	0.8%	0.2%
Holland	48.8%	66.0%	70.7%	37.5%	10.2%	3.2%	0.5%
Holyoke	(3.6%)	(4.9%)	(10.8%)	(2.2%)	(8.8%)	0.2%	0.9%
Huntington	10.8%	14.4%	13.2%	10.1%	10.3%	(0.6%)	(0.5%)
Longmeadow	62.3%	47.9%	4.3%	(5.1%)	1.1%	1.1%	0.5%
Ludlow	59.4%	27.3%	3.2%	3.7%	12.7%	(0.3%)	1.4%
Middlefield	6.8%	(8.6%)	33.7%	1.8%	48.0%	(10.2%)	1.3%
Monson	9.6%	9.6%	(0.5%)	6.3%	7.5%	2.5%	1.8%
Montgomery	112.1%	33.9%	42.8%	19.2%	(13.6%)	28.2%	2.5%
Northampton	1.5%	(1.3%)	(1.3%)	0.0%	(1.1%)	(1.2%)	(0.4%)
Palmer	8.7%	12.8%	(2.5%)	5.8%	3.7%	(2.9%)	0.1%
Pelham	39.0%	16.4%	18.7%	23.5%	2.2%	(5.9%)	(0.1%)
Plainfield	3.9%	21.1%	48.1%	34.4%	0.9%	12.5%	0.3%
Russell	5.2%	1.2%	13.6%	1.5%	3.8%	7.3%	0.7%
South Hadley	47.4%	13.9%	(3.7%)	1.7%	3.1%	3.0%	0.2%
Southampton	58.0%	40.0%	34.8%	8.2%	20.3%	7.7%	3.1%
Southwick	80.0%	23.2%	16.6%	3.9%	15.2%	7.6%	1.3%
Springfield	7.4%	(6.1%)	(7.1%)	3.1%	(3.1%)	0.9%	0.2%
Tolland	(5.6%)	70.3%	36.6%	23.0%	48.1%	13.3%	0.8%
Wales	32.6%	29.3%	38.1%	33.1%	10.9%	6.0%	1.8%
Ware	0.0%	8.9%	9.4%	9.5%	(1.0%)	1.6%	(0.2%)
West Springfield	21.9%	14.2%	(5.0%)	1.8%	1.3%	1.6%	1.2%
Westfield	25.5%	19.5%	16.0%	5.2%	4.4%	2.6%	0.5%
Westhampton	29.0%	36.0%	43.4%	16.7%	10.6%	9.4%	(0.2%)
Wilbraham	84.5%	62.2%	0.6%	4.8%	6.6%	5.6%	1.8%
Williamsburg	6.3%	7.1%	(4.5%)	12.4%	(3.5%)	2.2%	(0.6%)
Worthington	29.2%	19.3%	30.9%	24.0%	5.4%	(5.1%)	0.9%
Pioneer Valley	**16.8%**	**9.4%**	**(0.2%)**	**3.6%**	**0.9%**	**2.4%**	**0.6%**
Massachusetts	**9.8%**	**10.5%**	**0.8%**	**4.9%**	**5.5%**	**3.4%**	**2.0%**

Source: U.S. Census Bureau

2. Ethnic and Racial Diversity

The Pioneer Valley region's ethnic and racial diversity continues to grow. Continuing an established trend, the region's Hispanic and Latino population grew by 53% between 2000 and 2013, a rate of growth that was significant, though slightly lower than that of the state and slightly higher than the national rate. While the rate of growth in the Hispanic and Latino population has been slightly slower than that of the state, at approximately 17.6% of the total population, the Hispanic and Latino population is actually slightly higher than that of the nation. In this sense, the Pioneer Valley region looks less like the rest of the state as a whole and more like nation-wide demographics. Conversely, the proportion of the Pioneer Valley region population identifying exclusively as White (70.7%) is closer to that of the state (74.6%) than to the nation (62.4 percent).

While the proportion of people who identify as White (of any ethnicity) in the Pioneer Valley region is now just over 80%, slightly higher than that of Massachusetts as a whole, the breakdown of people who identified as races other than White were varied somewhat.

The Pioneer Valley region was nearly identical to the state in the proportion of people who identify as African Americans (7.6%), Native Americans or Pacific Islander (0.1%), 3% lower in the proportion of people who identify as an Asian race (2.7) and 2.1%% higher in the proportion of people who consider themselves a race other than the main five classifications recognized by the U.S. Census Bureau (6.3% of the region's population identify this way).

The region's population who identify other than white and non-Hispanic continue to be concentrated in either the urban core area or its surrounding communities. With the region's population increase attributed primarily to growth in minority groups, it can be inferred that the bulk of new residents are located in or around the Springfield-Chicopee-Holyoke urbanized area. Given that the core cities diminished in population, this implies a significant out-migration of white people from the urban core. In addition, the average annual income for persons of color is, generally, less than that for white persons. Combined, these factors indicate that the region's urban area may experience an increase in demand for transit service.

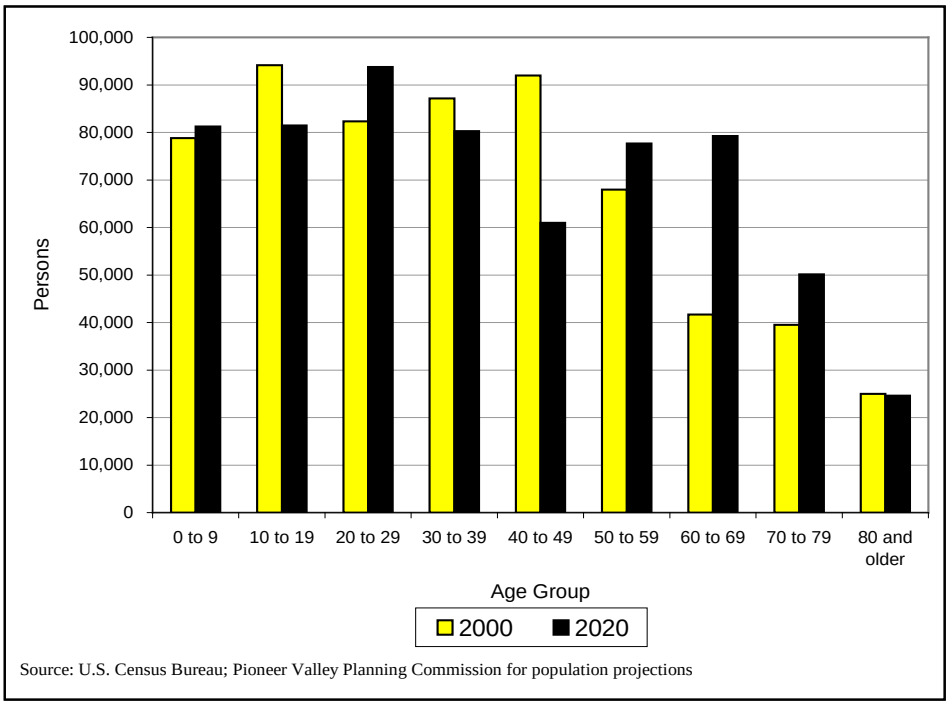
3. Age

Reflecting a national trend, the Pioneer Valley region's population is aging. In 1990, the region's median age was 32.8, had risen to 35.9 in 2000, and reached 37.8 in 2013. This trend is projected to continue for the next several decades because fertility rates are low and baby boomers are becoming seniors. Figure 5-27 shows the actual 2000 population and the projected

2020 population by age group. All four age groups over age 50 show increases in population between 2000 and 2020.

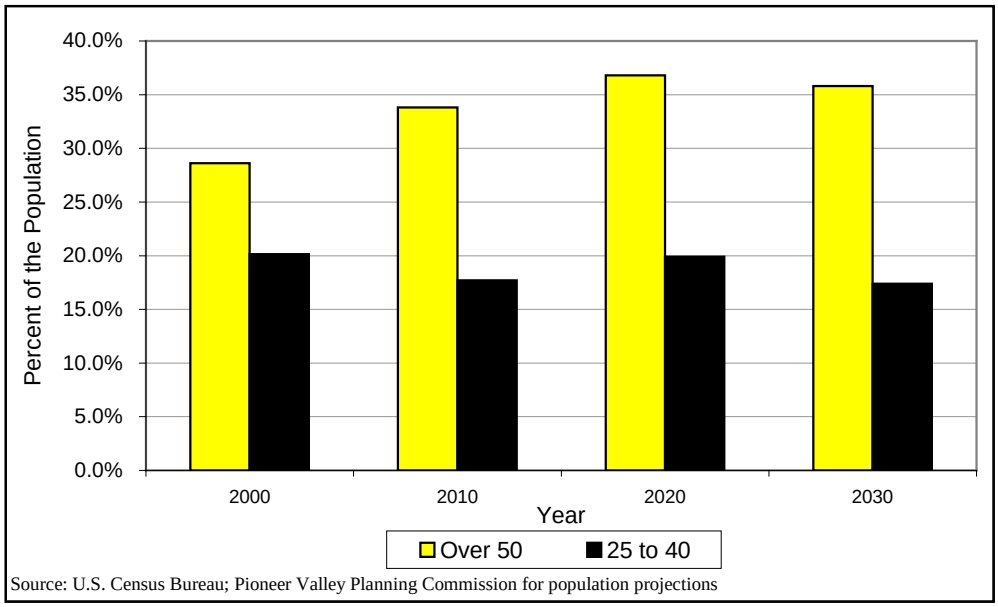
Decreases in the size of the region's young adult population are also expected to continue. Figure 5-28 contrasts the change in the elder population with that of the 25 to 40 year old population.

Figure 5-27 – Projected Population by Age Group for the Pioneer Valley Region



Source: U.S. Census Bureau; Pioneer Valley Planning Commission for population projections

Figure 5-28 – Projected Percent of the Population in select Age Groups



Source: U.S. Census Bureau; Pioneer Valley Planning Commission for population projections

J. HOUSING

1. Household growth

Population growth of 2.4 percent between 2000 and 2010 also resulted in an increase in the number of households in the Pioneer Valley. Between 2000 and 2010, the number of households increased from 231,430 to 238, 629, a 3.1 percent rise. Households are defined as persons who occupy a housing unit in which the occupants live and eat separately from any other persons in the building and they have direct access to the unit from outside of the building or through a common hall. Between2000 and 2010, Montgomery and Westhampton had the largest percentage increase in households (28.4 percent and15.6 percent respectively), while Holyoke and Northampton experienced more modest increases of 2.4 percent and 1.2 percent. Springfield experienced the greatest decrease during this time of .7 percent. . (See Table 3-35). Since 2010, many towns experienced notable declines in the number of households; these contribute to the overall .76 percent decline in the number of households in the Pioneer Valley. Blandford, Amherst, Huntington and Williamsburg have experienced the largest drops, with 10.16 percent, 7.3 percent, 5.07 percent and 5.19 percent respectively.

Table 5-35 – Total Households, 1980-2013

	Total Households					Percent Change			
	1980	1990	2000	2010	2013	1980 to 1990	1990 to 2000	2000 to 2010	2010 to 2013
Agawam	9,355	10,432	11,271	11,664	11,497	11.5%	8.0%	3.5%	(1.4%)
Amherst	7,606	8,477	9,150	9,259	8,583	11.5%	7.9%	1.2%	(7.3%)
Belchertown	2,824	3,825	4,904	5,595	5,798	35.4%	28.2%	14.1%	3.6%
Blandford	343	424	460	492	442	23.6%	8.5%	7.0%	(10.2%)
Brimfield	820	1,078	1,252	1,429	1,478	31.5%	16.1%	14.1%	3.4%
Chester	409	464	490	543	547	13.4%	5.6%	10.8%	0.7%
Chesterfield	368	360	446	511	492	(2.2%)	23.9%	14.6%	(3.7%)
Chicopee	20,353	22,625	23,115	23,739	23,003	11.2%	2.2%	2.7%	(3.1%)
Cummington	259	317	406	404	443	22.4%	28.1%	(0.5%)	9.7%
East Longmeadow	4,271	4,670	5,236	5,851	5,798	9.3%	12.1%	11.7%	(0.9%)
Easthampton	5,715	6,170	6,859	7,224	7,295	8.0%	11.2%	5.3%	1.0%
Goshen	204	301	368	416	455	47.5%	22.3%	13.0%	9.4%
Granby	1,703	1,939	2,259	2,374	2,547	13.9%	16.5%	5.1%	7.3%
Granville	404	483	542	608	607	19.6%	12.2%	12.2%	(0.2%)
Hadley	1,511	1,633	1,895	2,107	2,084	8.1%	16.0%	11.2%	(1.1%)
Hampden	1,490	1,620	1,823	1,898	1,908	8.7%	12.5%	4.1%	0.5%
Hatfield	1,075	1,266	1,378	1,483	1,544	17.8%	8.8%	7.6%	4.1%
Holland	542	791	900	994	1,017	45.9%	13.8%	10.4%	2.3%
Holyoke	16,562	15,850	15,000	15,361	15,846	(4.3%)	(5.4%)	2.4%	3.2%
Huntington	611	703	813	868	824	15.1%	15.6%	6.8%	(5.1%)
Longmeadow	5,020	5,360	5,738	5,741	5,720	6.8%	7.1%	0.1%	(0.4%)
Ludlow	5,975	6,957	7,666	8,080	8,223	16.4%	10.2%	5.4%	1.8%
Middlefield	139	146	219	218	213	5.0%	50.0%	(0.5%)	(2.3%)
Monson	2,373	2,642	3,099	3,279	3,403	11.3%	17.3%	5.8%	3.8%
Montgomery	204	250	257	330	342	22.5%	2.8%	28.4%	3.6%
Northampton	10,235	11,164	11,863	12,000	11,538	9.1%	6.3%	1.2%	(3.9%)
Palmer	4,227	4,781	5,090	5,099	4,968	13.1%	6.5%	0.2%	(2.6%)
Pelham	383	492	537	549	575	28.5%	9.1%	2.2%	4.7%
Plainfield	153	209	247	269	264	36.6%	18.2%	8.9%	(1.9%)
Russell	540	557	598	656	629	3.1%	7.4%	9.7%	(4.1%)
South Hadley	5,242	5,884	6,584	6,793	7,126	12.2%	11.9%	3.2%	4.9%
Southampton	1,353	1,543	1,966	2,249	2,306	14.0%	27.4%	14.4%	2.5%
Southwick	2,464	2,713	3,312	3,710	3,623	10.1%	22.1%	12.0%	(2.3%)
Springfield	55,158	57,769	57,178	56,752	55,894	4.7%	(1.0%)	(0.7%)	(1.5%)
Tolland	90	108	183	197	214	20.0%	69.4%	7.7%	8.6%
Wales	378	550	660	736	723	45.5%	20.0%	11.5%	(1.8%)
Ware	3,381	3,836	4,020	4,120	4,394	13.5%	4.8%	2.5%	6.7%
West Springfield	10,488	11,485	11,866	12,124	11,703	9.5%	3.3%	2.2%	(3.5%)
Westfield	12,409	13,823	14,798	15,335	15,028	11.4%	7.1%	3.6%	(2.0%)
Westhampton	379	442	539	623	630	16.6%	21.9%	15.6%	1.1%
Wilbraham	3,893	4,474	4,941	5,309	5,377	14.9%	10.4%	7.4%	1.3%
Williamsburg	798	933	1,031	1,118	1,176	16.9%	10.5%	8.4%	5.2%
Worthington	318	412	471	522	541	29.6%	14.3%	10.8%	3.6%
Pioneer Valley Region	202,025	219,958	231,430	238,629	236,818	8.9%	5.2%	3.1%	(0.8%)

Source: U.S. Census Bureau, Decennial Census 1990, 2000, 2010, and ACS 2009-2013 5 year estimates

2. Size

While the number of households has declined and population grown, , the average size of households in the region has remained relatively stable between 2000 and 2010 (See Table 5-36). Household size has been decreasing throughout the nation over the past forty years. In 1970, 47 percent of households had one or two people, by 2000 this number increased to 60.1 percent of all households. Large households (5 or more people) decreased from 20.1 percent of all households in 1970 to 7.7 percent of all households in 2013.

The trend toward more and smaller households (particularly single person households), and increased development in the region's rural areas, indicates increases in the total number of commuters as well as those inclined to commute alone, the number of vehicles, and the number of vehicle miles traveled. Table 5-37 shows the number of households in each community by type (family, non-family) and person size.

Another important factor in housing size is the number of dwelling units per household. The communities of the region represent a wide range of situations. In the urban areas, such as Springfield and Holyoke, there is a high density of multi-family dwellings, while some rural and suburban communities are almost exclusively single family homes. Of the total housing units in the region, [157,772, or 62.1 percent], are single family and [93,606, or 36.8 percent, are multi-family]. The communities of Amherst and Northampton are an exception to the pattern described above. These communities have high college student populations which results in a disproportionate concentration of multi-family homes.

Table 5-36 – Household Size, 1960 to 2013

Year	Number of Households						
	1 Person	2 People	3 People	4 People	5 People	6 or more People	Total
1960	21,425	42,454	31,047	28,406	18,306	15,232	156,870
	13.7%	27.1%	19.8%	18.1%	11.7%	9.7%	
1970	32,998	50,799	31,071	27,378	17,644	18,092	177,982
	18.5%	28.5%	17.5%	15.4%	9.9%	10.2%	
1980	47,036	62,661	35,616	31,060	15,514	10,393	202,280
	23.3%	31.0%	17.6%	15.4%	7.7%	5.1%	
1990	55,863	68,760	39,324	34,276	14,429	7,306	219,958
	25.4%	31.3%	17.9%	15.6%	6.6%	3.3%	
2000	65,759	73,290	37,960	32,613	14,334	7,474	231,430
	28.4%	31.7%	16.4%	14.1%	6.2%	3.2%	
2010	70,040	76,617	39,531	31,384	13,304	7,753	238,629
	29.4%	32.1%	16.6%	13.2%	5.6%	3.2%	
2009-2013	69,988	77,483	38,218	32,763	11,865	6,501	236,819
	29.6%	32.7%	16.1%	13.8%	5.0%	2.7%	

Source: U.S. Census Bureau

Note: 2013 value is the 2009-2013 American Community Survey estimate.

Table 5-37 – Number of Households by Type and Size, 2013

	Family Households by Size							Nonfamily Households by Size								Total All Households
	2 People	3 People	4 People	5 People	6 People	7 or more People	Total	1 Person	2 People	3 People	4 People	5 People	6 People	7 or more People	Total	
Agawam	3,174	1,676	1,793	475	67	178	7,363	3,664	450	14	0	0	6	0	4,134	11,497
Amherst	2,123	904	879	203	76	40	4,225	2,177	840	500	700	72	69	0	4,358	8,583
Belchertown	1,688	1,048	1,053	334	55	0	4,178	1,295	289	19	17	0	0	0	1,620	5,798
Blandford	139	112	72	8	0	0	331	82	25	4	0	0	0	0	111	442
Brimfield	424	315	156	116	0	0	1,011	378	71	12	6	0	0	0	467	1,478
Chester	146	104	92	41	14	0	397	117	33	0	0	0	0	0	150	547
Chesterfield	188	79	66	20	5	0	358	117	14	3	0	0	0	0	134	492
Chicopee	6,097	3,180	2,729	1,041	339	217	13,603	7,743	1,523	134	0	0	0	0	9,400	23,003
Cummington	109	80	42	18	2	2	253	170	20	0	0	0	0	0	190	443
East Longmeadow	1,908	993	953	300	177	54	4,385	1,296	108	9	0	0	0	0	1,413	5,798
Easthampton	2,069	1,074	857	283	0	0	4,283	2,235	690	87	0	0	0	0	3,012	7,295
Goshen	139	68	81	19	2	2	311	126	18	0	0	0	0	0	144	455
Granby	651	483	412	95	53	25	1,719	712	104	12	0	0	0	0	828	2,547
Granville	220	80	83	40	31	6	460	119	28	0	0	0	0	0	147	607
Hadley	440	335	254	95	11	26	1,161	692	140	38	41	12	0	0	923	2,084
Hampden	670	446	306	62	21	33	1,538	357	13	0	0	0	0	0	370	1,908
Hatfield	399	265	177	23	0	11	875	563	106	0	0	0	0	0	669	1,544
Holland	333	128	121	46	20	3	651	251	111	4	0	0	0	0	366	1,017
Holyoke	4,014	2,418	2,098	731	346	115	9,722	5,059	964	69	32	0	0	0	6,124	15,846
Huntington	244	161	91	35	23	15	569	218	37	0	0	0	0	0	255	824
Longmeadow	1,822	1,022	959	434	126	30	4,393	1,195	132	0	0	0	0	0	1,327	5,720
Ludlow	2,438	1,508	1,202	398	55	17	5,618	2,174	389	22	12	0	8	0	2,605	8,223
Middlefield	83	35	25	2	0	0	145	54	14	0	0	0	0	0	68	213
Monson	885	526	490	219	13	6	2,139	830	367	67	0	0	0	0	1,264	3,403
Montgomery	138	49	64	15	7	0	273	55	14	0	0	0	0	0	69	342
Northampton	2,684	1,403	1,087	369	118	64	5,725	4,351	1,288	95	46	33	0	0	5,813	11,538
Palmer	1,346	775	688	174	94	62	3,139	1,604	203	22	0	0	0	0	1,829	4,968
Pelham	194	95	48	48	5	0	390	141	31	13	0	0	0	0	185	575
Plainfield	97	27	23	13	8	0	168	57	37	0	2	0	0	0	96	264
Russell	251	64	130	31	8	3	487	115	27	0	0	0	0	0	142	629
South Hadley	2,179	884	634	361	66	30	4,154	2,593	379	0	0	0	0	0	2,972	7,126
Southampton	856	355	574	96	13	0	1,894	368	44	0	0	0	0	0	412	2,306
Southwick	1,105	698	663	134	25	41	2,666	708	217	18	14	0	0	0	957	3,623
Springfield	13,507	9,158	7,106	3,573	1,510	1,012	35,866	16,694	2,774	217	282	61	0	0	20,028	55,894
Tolland	83	48	29	14	0	0	174	34	6	0	0	0	0	0	40	214
Wales	263	114	77	60	6	2	522	174	27	0	0	0	0	0	201	723
Ware	1,335	608	498	249	57	0	2,747	1,467	153	14	0	0	13	0	1,647	4,394
West Springfield	3,237	1,581	1,633	458	242	102	7,253	3,814	574	32	0	12	18	0	4,450	11,703
Westfield	4,133	2,588	2,110	599	245	249	9,924	4,278	608	119	85	14	0	0	5,104	15,028
Westhampton	196	106	108	27	8	2	447	124	47	12	0	0	0	0	183	630
Wilbraham	1,743	799	895	331	107	49	3,924	1,229	154	70	0	0	0	0	1,453	5,377
Williamsburg	343	179	123	47	26	0	718	401	48	5	4	0	0	0	458	1,176
Worthington	230	36	41	24	0	10	341	157	43	0	0	0	0	0	200	541
Pioneer Valley Region	**64,323**	**36,607**	**31,522**	**11,661**	**3,981**	**2,406**	**150,500**	**69,988**	**13,160**	**1,611**	**1,241**	**204**	**114**	**0**	**86,318**	**236,818**

K. EMPLOYMENT

1. Type

The region's economic base continues to demonstrate the transition from the manufacturing to the service industry. Manufacturing once dominated the Valley's economy, employing over 28 percent of the work force in 1980. By 1990, nearly one-quarter of those manufacturing jobs had been lost or relocated out of the Region. This trend continued into the 1990s as the number of manufacturing jobs decreased by 25.3 percent between 1990 and 2000. By 2013, manufacturing accounts for only 8.4 percent of jobs in the region. At the same time service employment has increased. Today, services employ more of the region's work force than manufacturing, with services comprising more than half of all jobs in 2013. Table 5-38 shows employment in the region's communities by employment sector, total payroll, and average wage for 2013. At $51,480, Springfield has one of the highest average annual wages within the region because it is home to many of the region's largest and most successful employers.

Several important implications for transportation can be derived from this information. First, the shift from primarily manufacturing jobs to high paying service jobs means that during that period the average annual income for many of the region's residents was increasing. This, in turn, has improved residential flexibility and choice for residents. Since the cost of housing in urban areas is typically less than that for suburbs or outlying areas, residents with increased incomes can afford to live outside the urban core and commute. This was clearly shown in Census 2000 data as population decreases in the urban core are accompanied by increases in outlying suburbs and rural towns. The trend is beginning to reverse, as higher gasoline prices and the 2008-09 recession encouraged workers to live closer to employment centers by the 2010 Census.

Finally, increases in the number of two-income households and the number of women in the work force indicate increases in the number of vehicles and vehicle miles traveled. Often the workers in a two income household are unable to share a commute due to the distance or time inconveniences. Therefore, the number of vehicles and miles traveled increases. In addition to more trips to and from work, the number of incidental or side trips also increases (particularly during rush hour) as children are taken to and from day care facilities and errands are combined with the commute. Due to the need to access child care, retail and business facilities during the workday, the single occupant vehicle remains the primary choice for transportation of the region's work force. Employer-based childcare facilities could enhance the opportunity for many people to use an alternative to the single occupant

vehicle. Likewise, the provision of retail and business establishments near employment centers (such as drug stores, banks, restaurants) could reduce the need for all employees to have cars in order to take care of personal business during the work day.

5. Growth

As Figure 5-29 illustrates, the early 1990s saw sharp decreases in employment levels across the Pioneer Valley region, largely the result of economic recession. Consequently, people began leaving the region, provoking a steep drop in the size of the region's labor force between 1990 and 1996. This had potential to be disastrous for growth in the region as employers grew frustrated at the lack of qualified workers to fill open positions. However, declines in employment and labor force size leveled off in the second half of the 1990s and, beginning in 2000, both measures appeared to be sharply increasing. About a year after the March 2001 return of recession, employment levels in the Pioneer Valley began to fall again, and then more extremely during the 2008-2009 recession. Neither employment levels nor the labor force have recovered fully from the recession, though they do seem to be headed in the right direction now. While the unemployment rate has dropped since 2009, it remains elevated at 7%,

The recession of 2008-09 resulted in a net decrease in employment between 2000 and 2010. Sectors that managed to grow included state and local government (8.9 percent), education (31.8 percent) and health care (29 percent). Projected growth will likely take place in the health care, education and construction industries as the economy recovers (BLS, Employment Projections, Table 2. Employment by Major Industry Sector, 2012 - national) [Manufacturing employment will most likely continue to decrease, though perhaps not as quickly as it has in the last two decades.]

Table 5-38 – Pioneer Valley Regional Employment by Industrial Sector, 2013

	Agriculture, Forestry, & Fishing	Utilities	Con-struction	Manufact-uring	Whole-sale Trade	Retail Trade	Transport & Ware-housing	Inform-ation	Finance & Insurance	Real Estate and Rental/ Leasing	Prof-essional & Technical Services	Manage-ment of Companies and Enterprises	Adminis-trative & Waste Services	Edu-cational Services	Health Care and Social Assistance	Arts, Entertain-ment, & Recreation	Accomo-dation & Food Services	Other Services	Public Adminis-tration	Total Employ-ment	Establish-ments	Average Annual Wage
Agawam	19		659	2,234	672	902	190	32	153	114	721	54	722		1,893		717	260		11,850	787	$42,068
Amherst	66		178	47	39	819	100	200	188	234	316		103	8,960	1,557	545	1,568	388	359	15,701	950	$47,112
Belchertown			85	83	157	262	517		62	24	87		139		350		163	76	204	2,713	310	$35,204
Blandford			8								12									217	19	$16,224
Brimfield			70		8	38	35		9	8	4		28		37		31	15		513	83	$37,388
Chester			11												6					110	24	$29,692
Chesterfield			21												28					148	24	$24,024
Chicopee			1,322	2,806	1,105	2,533	928	468	379	215	187	111	449	2,085	2,271	121	1,833	594	1,240	18,764	1,424	$41,444
Cummington							11							67	8					183	27	$31,460
East Longmeadow			302	1,760	317	771	184	115	224	80	324		150		1,485	152	540	370		7,647	583	$43,836
Easthampton	21		325	757	83	398			196	112	113		321	611	610	40	424	205		4,760	419	$38,012
Goshen			15												34					162	26	$25,792
Granby			92		47	86		7	16		34		62		62	5	77	17		883	142	$33,072
Granville			13												9			5		162	30	$27,560
Hadley	132		145	30	90	1,901	37	68	106	37	395		86	1,104	490	97	878	109		6,070	358	$36,192
Hampden			72	20	2	60	8		14		37		73		148		131	22		824	129	$35,828
Hatfield	94		66	60	899	90	56				98		142		268	20	60	23		2,110	120	$43,056
Holland						18									4					124	26	$32,292
Holyoke		696	603	1,705	448	3,807	229	66	435	247	422	238	828	2,591	6,386	198	1,534	494	752	21,679	1,815	$41,132
Huntington			12			24									86		26	7		397	44	$34,944
Longmeadow			83		21	424			220	43	84		55	927	1,025	209	360	75		3,699	346	$38,688
Ludlow			718	555	302	610	88		150	42	95		586		621	68	575	167		6,501	506	$42,120
Middlefield																				42	7	$21,840
Monson			112	163	48	123	60				18		46		87		85	42		1,276	182	$39,208
Montgomery			12																	41	12	$27,248
Northampton		45	697	1,146	169	2,180	144	404	418	179	662	243	413	2,074	4,984	297	1,839	739	1,048	17,688	1,240	$42,692
Palmer			290	600	137	588	131	140	63	21	212	120	127	443	1,143	27	439	136	161	4,781	420	$41,080
Pelham			15								7				18					132	30	$25,636
Plainfield															4		11			47	18	$25,116
Russell			13			18									8					147	29	$33,748
South Hadley			263	157	197	362	82	48	109	42	70	37	140	1,686	532		399	156	191	4,529	370	$40,404
Southampton	17		161	83	32	311	17		20	5	49		13		49		127	30		1,115	134	$32,292
Southwick	122		107	448	35	411	38	15	45	26	14		53		193	116	328	101		2,577	283	$35,100
Springfield		440	1,457	3,952	1,322	5,684	3,251	1,654	5,818	857	2,124	1,456	3,085	8,373	26,014	616	4,915	2,776	3,322	77,122	6,488	$51,480
Tolland*																				34	5	$24,960
Wales			7												7					147	38	$29,848
Ware			66	363	20	757	38	15	73		31		58		480	11	231	53		2,640	252	$38,740
West Springfield			727	1,506	629	3,666	679	229	602	299	495	54	1,266		3,001	436	1,965	561		17,382	1,237	$39,104
Westfield			860	3,108	540	2,230	1,527	247	167	191	667	202	348	2,228	2,621	198	1,194	600	1,022	18,027	1,149	$44,200
Westhampton			18										17		8			17		313	37	$34,528
Wilbraham			154		175	608		26	122	28	190	10	159	781	741	85	340	105		4,829	376	$37,544
Williamsburg			97	54		86					30			153	15		69	22		584	82	$28,808
Worthington			13																	204	34	$28,236
Pioneer Valley Region	**471**	**1,181**	**9,869**	**21,637**	**7,494**	**29,767**	**8,350**	**3,734**	**9,589**	**2,804**	**7,498**	**2,525**	**9,469**	**32,083**	**57,283**	**3,241**	**20,859**	**8,165**	**8,299**	**258,874**	**20,615**	**$41,890**

Source: Massachusetts Division of Career Services and Division of Unemployment Assistance, 2009

Note: Blanks indicate that the data is suppressed to preserve confidentiality.

Figure 5-29 – Pioneer Valley Region Labor Force, Employment, and Unemployment

2. Median Household Income

The recession negatively affected wages also; median household incomes decreased between 2000 and 2010 by an average of 12.9% throughout the Pioneer Valley region. Hampden County suffered a more significant drop than Hampshire County, a trend that appears to be slowing between 2010 and 2013.

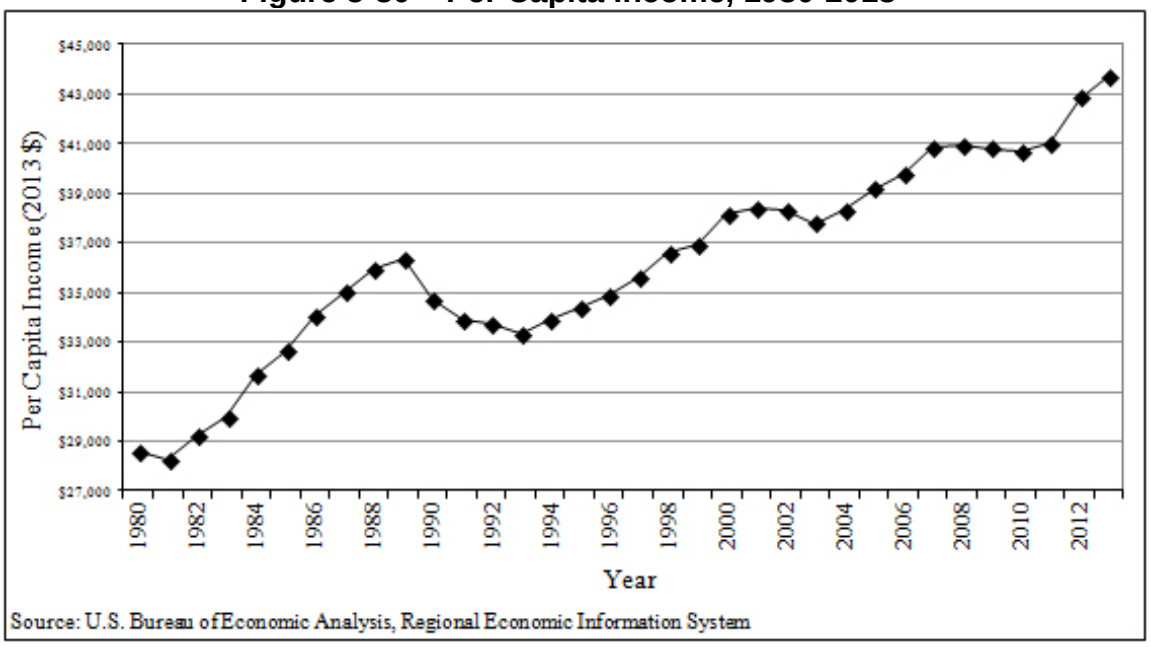
Though median household income has declined, per capita income (see Figure 5-30) in the Pioneer Valley region, except for slight losses between 1989 and 1993, had been increasing steadily since 1980. Despite two recessions in the 2000s, per capita wages continue to increase. Overall, declining household income coupled with rising average wages and per capita income is likely indicating that there are fewer wage earners per household now than in the past. This conclusion is also supported by our finding of shrinking average household sizes.

Table 5-39 – Median Household Income

	Median Household Income (2013 dollars)					Percent Change			
	1980	1990	2000	2010	2013	1980 to 1990	1990 to 2000	2000 to 2010	2010 to 2013
Hampden County	$59,256	$63,273	$58,122	$49,460	$49,094	6.8%	(8.1%)	(14.9%)	(0.7%)
Hampshire County	$61,122	$69,486	$67,459	$62,240	$61,227	13.7%	(2.9%)	(7.7%)	(1.6%)
Pioneer Valley Region*	**$59,665**	**$64,687**	**$60,380**	**$52,601**	**$52,108**	**8.4%**	**(6.7%)**	**(12.9%)**	**(0.9%)**

Source: U.S. Census Bureau Note: 2013 value is the 2009-2013 American Community Survey estimate.
* Median household income for the region is a weighted average based on the number of households.

Figure 5-30 – Per Capita Income, 1980-2013



L. VEHICLE REGISTRATION AND OWNERSHIP

Based on information available from 2012, a total of 532,188 vehicles were registered in the Pioneer Valley region. This translates into approximately 0.85 vehicles per person and is a decrease of 1.6 percent from 2008. Most of this decrease can be attributed to significantly fewer registered automobiles. Between 2008 and 2012, automobile registrations dropped by over 15 percent. Light truck and SUV registrations also decreased, but by far less (.04 percent). Automobile registrations appear to have peaked in 2008, at 304,425. Despite record-high gasoline prices between 2008-2012, light trucks and SUVs continue to comprise almost one-third of registered vehicles.

This decrease in automobile ownership is notable. The decrease in car ownership may be a result of the reduced workforce, and families not needing a second car. Alternatively, car owners may opt to use public transit to reduce transportation expenses, and avoid car maintenance costs altogether.

The City of Springfield has the most registered vehicles with 103,621 recorded in 2012. This translates to 24.5 percent of registered vehicles in the region. Outlying communities—including Belchertown, Brimfield, Chesterfield, Goshen, Holland, Plainfield, Tolland and Westhampton—had the largest increase in registered vehicles between 1996 and 2012 (an increase of more than 50 percent in each case). However, in the light truck and SUV category, the region's wealthiest town, Longmeadow, had the largest increase in registrations at 183.4 percent (going well beyond doubling the number of light trucks and SUVs registered in Longmeadow at a time when the population increased by only 1.6 percent). Tables 5-40 and 5-41 summarize the number of registered motor vehicles in the Pioneer Valley by community and type of vehicle for 1996 and 2012. Table 5-42 highlights the percent change in registrations between 1996 and 2012 by type of vehicle and community.

Table 5-40 – Registered Motor Vehicles in the Pioneer Valley – 1996

	Automobiles	Trailers	Light Trucks (& SUVs)	Heavy Trucks	Motorcycles	Other	Total
Agawam	16,476	1,060	4,609	488	227	310	23,170
Amherst	12,018	409	2,256	133	137	274	15,227
Belchertown	6,067	666	2,621	170	139	192	9,855
Blandford	614	84	399	17	21	13	1,148
Brimfield	1,581	185	755	80	48	87	2,736
Chester	615	89	452	27	23	17	1,223
Chesterfield	481	57	348	16	9	21	932
Chicopee	29,027	1,723	7,357	880	401	680	40,068
Cummington	458	57	284	12	17	24	852
East Longmeadow	8,405	582	2,232	207	94	203	11,723
Easthampton	8,735	482	2,726	116	169	219	12,447
Goshen	396	43	267	24	15	12	757
Granby	3,186	403	1,467	109	64	99	5,328
Granville	789	108	436	44	22	28	1,427
Hadley	2,610	263	1,012	110	29	82	4,106
Hampden	2,723	343	1,105	83	52	78	4,384
Hatfield	1,962	359	883	275	36	74	3,589
Holland	1,097	102	544	26	39	26	1,834
Holyoke	17,775	537	3,547	204	195	297	22,555
Huntington	954	117	597	24	27	43	1,762
Longmeadow	10,036	282	1,594	43	64	97	12,116
Ludlow	10,658	765	3,321	316	161	206	15,427
Middlefield	221	21	173	9	13	10	447
Monson	3,986	446	1,938	156	124	140	6,790
Montgomery	386	59	237	15	12	10	719
Northampton	15,174	725	3,943	309	203	293	20,647
Palmer	6,578	575	2,479	224	164	195	10,215
Pelham	814	66	259	14	10	27	1,190
Plainfield	270	31	178	7	5	13	504
Russell	776	153	424	19	16	17	1,405
South Hadley	8,918	639	2,623	208	110	191	12,689
Southampton	2,677	377	1,266	89	48	124	4,581
Southwick	4,511	526	2,077	164	115	146	7,539
Springfield	68,264	2,875	13,165	1,474	761	1,734	88,273
Tolland	190	23	114	12	10	7	356
Wales	857	86	442	24	33	32	1,474
Ware	4,675	384	1,901	123	122	101	7,306
West Springfield	15,968	1,037	3,926	525	211	383	22,050
Westfield	19,163	1,563	6,204	534	300	467	28,231
Westhampton	700	86	410	25	16	26	1,263
Wilbraham	7,933	657	2,026	206	111	201	11,134
Williamsburg	1,375	113	679	62	20	48	2,297
Worthington	597	71	356	22	17	44	1,107
Pioneer Valley Region	**300,696**	**19,229**	**83,632**	**7,625**	**4,410**	**7,291**	**422,883**

Source: Massachusetts Registry of Motor Vehicles

Table 5-41 – Registered Motor Vehicles in the Pioneer Valley – 2012

	Automobiles	Trailers	Light Trucks (& SUVs)	Heavy Trucks	Motorcycles	Other	Total
Agawam	13,864	1,764	9,316	806	658	2,586	28,994
Amherst	9,574	546	4,049	175	183	1,823	16,350
Belchertown	6,592	1,226	5,601	298	500	1,304	15,521
Blandford	483	138	628	37	63	93	1,442
Brimfield	1,636	417	1,620	124	162	330	4,289
Chester	483	140	637	39	73	94	1,466
Chesterfield	488	158	603	32	53	99	1,433
Chicopee	24,701	2,188	15,494	865	1,010	3,787	48,045
Cummington	435	76	375	34	51	87	1,058
East Longmeadow	7,483	940	5,322	344	312	1,740	16,141
Easthampton	7,872	793	5,203	171	396	1,167	15,602
Goshen	404	122	481	59	50	96	1,212
Granby	2,796	715	2,664	178	228	485	7,066
Granville	705	210	760	72	93	138	1,978
Hadley	2,665	464	1,835	158	99	546	5,767
Hampden	2,314	516	2,140	191	189	544	5,894
Hatfield	1,732	421	1,362	305	102	382	4,304
Holland	1,157	265	1,034	38	107	204	2,805
Holyoke	14,455	746	8,561	303	425	2,244	26,734
Huntington	838	223	1,065	52	79	169	2,426
Longmeadow	7,688	461	4,517	167	168	2,502	15,503
Ludlow	9,283	1,418	7,094	671	509	1,893	20,868
Middlefield	188	54	271	15	19	40	587
Monson	3,662	952	3,682	359	360	670	9,685
Montgomery	347	130	422	30	43	79	1,051
Northampton	13,414	897	6,621	379	427	2,297	24,035
Palmer	5,912	998	4,687	407	440	936	13,380
Pelham	726	102	418	28	33	177	1,484
Plainfield	327	53	310	15	21	50	776
Russell	630	153	773	37	73	133	1,799
South Hadley	7,618	959	4,997	325	301	1,441	15,641
Southampton	2,782	678	2,581	174	226	537	6,978
Southwick	4,340	925	3,954	325	345	989	10,878
Springfield	55,603	2,623	31,967	1,624	1,551	10,253	103,621
Tolland	212	84	243	19	21	41	620
Wales	844	182	802	39	93	149	2,109
Ware	4,050	644	3,779	169	315	686	9,643
West Springfield	13,151	1,201	8,279	730	462	2,413	26,236
Westfield	16,516	2,339	12,984	866	845	3,309	36,859
Westhampton	698	187	794	57	67	142	1,945
Wilbraham	7,027	922	5,035	310	323	1,865	15,482
Williamsburg	1,324	200	1,077	82	85	238	3,006
Worthington	568	140	572	28	62	105	1,475
Pioneer Valley Region	257,587	28,370	174,609	11,137	11,622	48,863	532,188

Source: Massachusetts Registry of Motor Vehicles

Table 5-42 – Percent Change in Registered Motor Vehicles, 1996-2012

	Automobiles	Trailers	Light Trucks (& SUVs)	Heavy Trucks	Motorcycles	Other	Total
Agawam	(15.9%)	66.4%	102.1%	65.2%	189.9%	734.2%	25.1%
Amherst	(20.3%)	33.5%	79.5%	31.6%	33.6%	565.3%	7.4%
Belchertown	8.7%	84.1%	113.7%	75.3%	259.7%	579.2%	57.5%
Blandford	(21.3%)	64.3%	57.4%	117.6%	200.0%	615.4%	25.6%
Brimfield	3.5%	125.4%	114.6%	55.0%	237.5%	279.3%	56.8%
Chester	(21.5%)	57.3%	40.9%	44.4%	217.4%	452.9%	19.9%
Chesterfield	1.5%	177.2%	73.3%	100.0%	488.9%	371.4%	53.8%
Chicopee	(14.9%)	27.0%	110.6%	(1.7%)	151.9%	456.9%	19.9%
Cummington	(5.0%)	33.3%	32.0%	183.3%	200.0%	262.5%	24.2%
East Longmeadow	(11.0%)	61.5%	138.4%	66.2%	231.9%	757.1%	37.7%
Easthampton	(9.9%)	64.5%	90.9%	47.4%	134.3%	432.9%	25.3%
Goshen	2.0%	183.7%	80.1%	145.8%	233.3%	700.0%	60.1%
Granby	(12.2%)	77.4%	81.6%	63.3%	256.3%	389.9%	32.6%
Granville	(10.6%)	94.4%	74.3%	63.6%	322.7%	392.9%	38.6%
Hadley	2.1%	76.4%	81.3%	43.6%	241.4%	565.9%	40.5%
Hampden	(15.0%)	50.4%	93.7%	130.1%	263.5%	597.4%	34.4%
Hatfield	(11.7%)	17.3%	54.2%	10.9%	183.3%	416.2%	19.9%
Holland	5.5%	159.8%	90.1%	46.2%	174.4%	684.6%	52.9%
Holyoke	(18.7%)	38.9%	141.4%	48.5%	117.9%	655.6%	18.5%
Huntington	(12.2%)	90.6%	78.4%	116.7%	192.6%	293.0%	37.7%
Longmeadow	(23.4%)	63.5%	183.4%	288.4%	162.5%	2479.4%	28.0%
Ludlow	(12.9%)	85.4%	113.6%	112.3%	216.1%	818.9%	35.3%
Middlefield	(14.9%)	157.1%	56.6%	66.7%	46.2%	300.0%	31.3%
Monson	(8.1%)	113.5%	90.0%	130.1%	190.3%	378.6%	42.6%
Montgomery	(10.1%)	120.3%	78.1%	100.0%	258.3%	690.0%	46.2%
Northampton	(11.6%)	23.7%	67.9%	22.7%	110.3%	684.0%	16.4%
Palmer	(10.1%)	73.6%	89.1%	81.7%	168.3%	380.0%	31.0%
Pelham	(10.8%)	54.5%	61.4%	100.0%	230.0%	555.6%	24.7%
Plainfield	21.1%	71.0%	74.2%	114.3%	320.0%	284.6%	54.0%
Russell	(18.8%)	0.0%	82.3%	94.7%	356.3%	682.4%	28.0%
South Hadley	(14.6%)	50.1%	90.5%	56.3%	173.6%	654.5%	23.3%
Southampton	3.9%	79.8%	103.9%	95.5%	370.8%	333.1%	52.3%
Southwick	(3.8%)	75.9%	90.4%	98.2%	200.0%	577.4%	44.3%
Springfield	(18.5%)	(8.8%)	142.8%	10.2%	103.8%	491.3%	17.4%
Tolland	11.6%	265.2%	113.2%	58.3%	110.0%	485.7%	74.2%
Wales	(1.5%)	111.6%	81.4%	62.5%	181.8%	365.6%	43.1%
Ware	(13.4%)	67.7%	98.8%	37.4%	158.2%	579.2%	32.0%
West Springfield	(17.6%)	15.8%	110.9%	39.0%	119.0%	530.0%	19.0%
Westfield	(13.8%)	49.6%	109.3%	62.2%	181.7%	608.6%	30.6%
Westhampton	(0.3%)	117.4%	93.7%	128.0%	318.8%	446.2%	54.0%
Wilbraham	(11.4%)	40.3%	148.5%	50.5%	191.0%	827.9%	39.1%
Williamsburg	(3.7%)	77.0%	58.6%	32.3%	325.0%	395.8%	30.9%
Worthington	(4.9%)	97.2%	60.7%	27.3%	264.7%	138.6%	33.2%
Pioneer Valley Region	**(14.3%)**	**47.5%**	**108.8%**	**46.1%**	**163.5%**	**570.2%**	**25.8%**

Source: Massachusetts Registry of Motor Vehicles

CHAPTER 6

SAFETY

The Pioneer Valley Planning Commission (PVPC) works according to the principles and guidelines adopted by Massachusetts Department of Transportation's (MassDOT) Traffic and Safety Engineering Division to ensure the attainment of a safe and dependable transportation system in the region. MassDOT's Highway Safety Division has established a set of several long and short term traffic safety related goals based on performance measure related strategies. PVPC works in cooperation with MassDOT as well as all the member communities to adopt these strategies at the regional level.

The overarching goal set by MassDOT is to: "Actively manage the nation's safest transportation system to minimize injuries whenever, wherever and to whomever possible."

The Highway Safety planning process in Massachusetts is undertaken through several plans, activities and policies broadly classified under four main categories:

- Roadway Safety Audits
- Strategic Highway Safety Plan
- Highway Safety Improvement Program
- Traffic Safety Toolbox

A. STRATEGIC HIGHWAY SAFETY PLAN

Under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy For Users ACT 2005 (SAFETEA-LU) each state was required to prepare a Strategic Highway Safety Plan (SHSP). This continues under MAP-21.

The purpose of a SHSP is to identify the State's key safety needs and guide investment decisions to achieve significant reductions in highway fatalities and serious injuries on all public roads. The SHSP brings together all highway safety partners in the State and draws on their strengths to align and leverage resources to collectively address the State's safety challenges. The most important benefit of an SHSP is that statewide goals and safety programs are coordinated to most effectively reduce highway fatalities and serious injuries on all public roads.

1. 2013 Update to the Strategic Highway Safety Plan

In the years since the first Massachusetts SHSP was prepared in 2006, Massachusetts experienced a steady decline in the number of traffic-related crashes throughout the Commonwealth. Comparing the five-year averages from the implementation of the SHSP in 2006 (2002-2006) to current data (2007-2011), fatalities dropped by 19 percent and serious injuries (hospital stays for nonfatal traffic injuries) also declined by 19 percent. Massachusetts completed a revised SHSP in September 2013 and is now actively implementing the various strategies.

To simplify the SHSP organization and direction, safety stakeholders grouped the emphasis areas into three tiers to focus attention on the traffic safety problems exhibited by each area. These three tiers are labeled: Strategic, Proactive, and Emerging.

A Strategic emphasis area is one that represents at least 10 percent of annual fatalities or severe injuries on Massachusetts roadways. The nine emphasis areas in this Tier are:

- Impaired Driving
- Intersections
- Lane Departures
- Occupant Protection
- Speeding/Aggressive Driving
- Young Drivers
- Older Drivers
- Pedestrians
- Motorcycles.

A Proactive emphasis area is one that represents less than 10 percent of annual fatalities or severe injuries. . In these areas, the focus is to further reduce the already low number of fatalities and incapacitating injuries. The four areas are:

- Bicycles
- Truck/Bus-Involved Crashes
- At-Grade Crossings
- Safety of Persons Working on Roadways

Emerging emphasis areas focus on continuously improving the data systems used to analyze traffic safety patterns and generate data on safety topics where the data currently are inconclusive. These areas include:

- Data Systems
- Driver Inattention.

The updated Massachusetts SHSP is consistent with requirements outlined in the most recent Federal transportation legislation, Moving Ahead for Progress

in the 21st Century (MAP-21). One requirement is to establish goals and performance measures. Goals in the Massachusetts SHSP include:

- Reduce motor vehicle fatalities and hospitalizations by 20 percent in the five-year period following adoption of the SHSP (Short-Term Goal)
- Halve the number of fatalities and serious injuries by 2030 (Interim Goal); and
- Move Toward Zero Deaths and eliminate fatalities and serious injuries on the roadways (Long-Term Goal)

a) Process of Updating

The update of the plan began with the identification of stakeholders to participate in the SHSP update process and enhance collaboration across public and private organizations. An important step in the update process was to engage stakeholders from across Massachusetts. Volunteers who participated in the 2006 SHSP development process along with new stakeholders identified by safety leaders in the State participated in the update process by offering their views on the strategies and future action steps in the plan along with recommendations on short-term and interim goals.

Recruit stakeholders to participate in Executive Leadership Committee, Steering Committee, and Emphasis Area Teams. A series of interviews were held with members of the Executive Leadership Committee (ELC), made up of traffic safety leaders from a wide cross section of agencies to determine safety needs in the State and to confirm their participation. The ELC's role is to provide oversight and review progress on implementing the updated plan. Each ELC agency/organization also identified staff to serve on the SHSP Steering Committee, which has primary responsibility for the day-to-day implementation of the plan. Members of the Steering Committee, other staff from participating agencies, and stakeholder volunteers also serve as members of the various emphasis area teams, which are responsible for implementing the plan's strategies and achieving emphasis area goals.

Conduct stakeholder meetings. Joint Executive Leadership Committee/Steering Committee meetings were held in July 2012 and April 2013 to review SHSP drafts based on an examination of the 2006 SHSP, a careful review of the data, and input from ELC interviews and meetings. Stakeholders provided feedback in October 2012 and May 2013 and will take active roles in developing action plans for each emphasis area. The Emphasis Area teams met during August 2013 and early September 2013 to review and update the strategies and actions, ensure each is supported by at least one agency or organization, develop performance measures, and finalize the emphasis area plans.

Complete evaluations of transportation safety, crash data, and emphasis area strategies. As the plan moves forward, each emphasis area will track performance measures in addition to the fatality and serious injury objectives to determine overall success. Because data are a critical part of the implementation process, a subcommittee of the Traffic Records Coordinating Committee (TRCC) will work with the ELC and Steering Committee to ensure data are available for SHSP reporting and evaluation. The TRCC is a multiagency committee that regularly meets to plan and implement safety data improvements.

b) Implementation

The SHSP implementation is based upon on-going communication and coordination among all stake holders. The Action Plan of SHSP details the strategies in each of the emphasis areas through which a majority of the implementation will be undertakes as well as monitored. Each emphasis area is monitored by a lead agency that volunteered to take on the important task of developing an action plan supplemented by performance measures to track effectiveness.

The Executive Leadership Committee (ELC) meets periodically to provide leadership and oversight of the SHSP implementation process. The Steering Committee meets more frequently than the ELC to review progress in each of the emphasis areas; provide assistance to overcome barriers or solve problems; receive regular updates on SHSP-related campaigns, training, or other programs; provide guidance on future programs, activities, etc.; make recommendations to the ELC; and determine the need and design of future SHSP updates.

The lead agency for an emphasis area coordinates with key stakeholders to track the progress of strategies, celebrate successes, and identify barriers. Activities for an emphasis area include developing action plans; discussing action step implementation progress; coordinating next steps; identifying problems or barriers; reporting to the Steering Committee; determining whether changes are needed in strategies and action steps as the plan moves forward; and tracking and reporting progress. SHSP is a dynamic document that stakeholders will update, review, and improve.

B. ROADWAY SAFETY AUDIT

A Roadway Safety Audit (RSA) is undertaken at a location to identify potential safety issues and possible opportunities for safety improvements considering all roadway users. The Federal Highway Administration defines a Road Safety Audit (RSA) as the formal safety examination of an existing or future road or intersection by an independent, multidisciplinary team.

RSA program in Massachusetts commenced in 2007 and since then has proven to be an effective low cost tool to make significant safety improvements at any number of stages ranging from project development and planning through existing operation. MassDOT has developed a thorough process and a set of guidelines to be followed for each RSA to make the process formal, uniform, and effective.

PVPC participates in RSAs around the region and provides comments and recommendations to make effective traffic safety related improvements. PVPC also works in cooperation with MassDOT and local Police departments at some of the locations to help provide most recent crash data and other relevant traffic volume and congestion data for the RSA team to study and review.

Road Safety Audits have also become an integral part of the Highway Safety Improvement Program (HSIP). In fact the HSIP guidelines specifically state, "All HSIP candidate locations will require an accompanying Road Safety Audit (RSA) report, or an engineering or planning report to determine eligibility." Additionally, if all or a portion of a project area is considered HSIP-eligible, a road safety audit shall be conducted prior to submitting the 25% design plans. Therefore, the RSA program greatly expanded to cover additional locations that have been identified as high crash locations. Table 6-1 enlists some of the latest Roadway Safety Audits that have been conducted in the region.

Table 6-1 – Roadway Safety Audits Completed in the Pioneer Valley Region

No.	Community	Location
1	Agawam	Feeding Hills Intersection
2	Agawam	Route 57
3	Agawam	Route 159 & CT Line to Route 75 & South River
4	Chicopee	Broadway Street and Memorial Drive (four locations)
5	Chicopee	Mass Pike Interchange 6, I-291 and Burnett Road
6	Granby	Chicopee Street & Carver Street
7	Granby	Route 202
8	Hadley	Route 9 and 47
9	Hadley	Russell Street (Route 9) at North and South Maple Streets
10	Holyoke	Cherry Street
11	Holyoke	Dwight Street at Maple Street and Dwight Street at High Street
12	Ludlow	Center Street (Route 21) at Mass Pike Interchange 7/Harding Avenue
13	Northampton	Conz St & Pleasant St
14	Northampton	Damon Road
15	Northampton	King Street and Damon Road
16	Southwick	College Highway
17	Springfield	Summer Ave- Abbot Street
18	Springfield	I-91 Viaduct
19	Springfield	Route 20
20	West Springfield	I-91
21	West Springfield	Route 20 & Boulevard St
22	Granville	Route 57

Source: MassDOT

C. HIGHWAY SAFETY IMPROVEMENT PROGRAM

Congress established the Highway Safety Improvement Program under SAFETEA-LU and continued it under MAP-21 to achieve a significant reduction in traffic fatalities and serious injuries on all public roads, including non-State-owned public roads and roads on tribal lands. The HSIP requires a data-driven, strategic approach to improving highway safety on all public roads that focuses on performance.

A Massachusetts HSIP Task Force was established to develop guidelines for HSIP-eligible projects and programs. The Task Force consists of FHWA, MassDOT Highway, MassDOT Planning and MARPA (Massachusetts Association of Regional Planning Agencies).

An HSIP eligible cluster is one in which the total number of "equivalent property damage only" crashes in the cluster is within the top 5% of all clusters in that region. "Equivalent property damage only" is a method of combining the number of crashes with the severity of crashes based on a

weighted scale where a fatal crash is worth 10, an injury crash is worth 5 and a property damage only crash is worth 1.

A highway safety improvement project is any strategy, activity or project on a public road that is consistent with the data-driven State Strategic Highway Safety Plan (SHSP) and corrects or improves a hazardous road location or feature or addresses a highway safety problem. To obligate HSIP funds, a State must develop, implement and update a SHSP, produce a program of projects or strategies to reduce identified safety problems, and evaluate the SHSP on a regular basis. Workforce development, training, and education activities are also an eligible use of HSIP funds.

PVPC works in cooperation with MassDOT and local communities in identifying and advancing potential projects that can be eligible for HSIP funding through its Transportation Improvement Program (TIP). Table 6-2 enlists HSIP projects that have been advertized in last five years.

Table 6-2 – HSIP Projects Advertised since 2011

Community	Project Description
Springfield	Signal & intersection improvements @ Summer Ave., Allen St., Abbott St., & Harkness Ave.
Agawam	Agawam, Rte 57 cable rail system
Regionwide	I-91 cable rail system
Holyoke	Holyoke Cherry Street Signal Installation
Northampton	Northampton - Signal and intersection improvements on Rte. 9, Bridge Road and Look
West Springfield	West Springfield- Guide sign replacement
Holyoke / West Springfield	Improvements & related work on I-91 / Route 5 / I-90 Connector Road
Agawam	Reconstruction of Rt. 159 (Main St.) from Connecticut S.L. to Rt. 75, including Br. Rehab
Holyole	Improvements & related work on I-91 / Route 5 / I-90 Connector Road
Holyoke	Cherry Street Signal Installation
Longmeadow/West Springfield	Traffic signs replacement on I-91
Southwick	Reconstruction Route 10 and Route 202
South Hadley	Resurfacing related work on Route 202 from Doouglas Street to Route 33
West Springfield	Westfield Street Route 20 reconstruction

Source: MassDOT

D. TRAFFIC SAFETY TOOLBOX

Traffic Safety Toolbox consists of a series of fact sheets regarding several traffic safety related topics. MassDOT publishes the Traffic Safety Toolbox to provide a resource of information for municipal practitioners. Specifically, the provide guidance and information regarding selected traffic safety and engineering topics.

These fact sheets also provide information about some potentially valuable resources, including web links to several other related information sources. All these fact sheets are available online on MassDOT website.

Topics addressed in the Traffic Safety Toolbox:

- New MUTCD Sign Retro Reflectivity Requirements
- General Traffic Safety Information
- Advanced Warning Signs
- Crosswalks
- Low Cost Intersection Safety Fixes
- Low Cost Non Intersection Safety Fixes
- Pavement Markings – Center lines and Edge Lines
- Pavement Markings - Others
- Roadway Safety Audits
- Retro Reflectivity
- Sight Distance
- Speed Limits and Speed Limit Setting
- Stop Sign Installation
- Work Zones

E. EXISTING CONDITIONS

1. Crash History

MassDOT maintains a database of crashes by collecting the records from the Registry of Motor Vehicles. PVPC utilizes this information as well as crash information collected locally from the police departments to analyze and evaluate the existing problems at different intersections in the region that have safety related problems.

A summary of the total number of crashes reported by each community to the Massachusetts Registry of Motor Vehicles over the last ten years is provided in Table 6-1. This information consists of crashes that either resulted in a personal injury or fatality, or resulted in greater than $1000.00 worth of property damage.

The City of Holyoke experienced the greatest number of crashes (16,956) over the ten year period and the highest number of crashes per roadway mile. The City of Springfield was under reporting their crash data until recently and therefore the number of crashes reported for the city showed notable increase within last couple of years. In the year 2012, Springfield alone accounted for a maximum number of crashes with a total of 4,501, followed by Holyoke (1,636), and Chicopee (1,390).

MassDOT also publishes and updates a report which summarizes the top 200 high crash locations in the state. The most recent report uses the crash data

from the calendar years of 2010 - 2012 Table 6-3 lists the top high crash locations in the Pioneer Valley which are ranked amongst the top 200 high crash locations in the State.

PVPC published the list of the top regional high crash intersections and roadway segments utilizing the crash data for years 2007-2009. The top high crash locations are ranked on the basis of Equivalent Property Damage Only (EPDO) index, which is based on the number of crashes weighted by the severity of each crash (fatal crashes are weighted by 10, injury crashes are weighted by 5, and property damage only or non-reported is weighted by 1). Due to the age of this data, some of these locations may have realized improvements to safety as a result of transportation improvement projects. Traditionally, rotaries with a history of crash problems such as the Route 5/20 rotary in West Springfield do not appear on the MassDOT list because the crash data is summarized by the individual intersections that comprise the rotaries rather than the rotary itself.

A total of 24 locations from Hampshire and Hampden counties were included in Top 200 high crash locations of the state. Springfield and Holyoke were leading with 9 and 7 locations each. The crash cluster in the vicinity of the Holyoke Mall in the City of Holyoke likely incorrectly attributes too many crashes to the main entrance. Figure 6-1 depicts the locations of these top 24 clusters in the region on a map.

Table 6-3 – Ten Year Community Crash History

Town	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total Crashes	Average Crashes/ Year	Average Crashes/ Roadway Mile
AGAWAM	759	687	704	541	603	586	521	569	545	494	6,009	600.9	4.00
AMHERST	162	132	238	222	218	182	96	449	450	390	2,539	253.9	1.87
BELCHERTOWN	239	256	289	223	215	221	261	232	229	230	2,395	239.5	1.54
BLANDFORD	72	67	62	55	72	72	60	78	76	77	691	69.1	0.77
BRIMFIELD	75	67	75	67	68	85	45	57	75	77	691	69.1	0.87
CHESTER	20	19	14	13	17	16	9	18	13	12	151	15.1	0.23
CHESTERFIELD	5	7	11	9	11	9	9	3	11	19	94	9.4	0.16
CHICOPEE	963	1,626	1,670	1,519	1,624	1,471	1,462	1,448	1,510	1,390	14,683	1468.3	5.64
CUMMINGTON	14	10	10	14	9	9	4	3	0	4	77	7.7	0.12
EAST LONGMEADOW	529	491	485	449	452	452	447	393	446	384	4,528	452.8	4.82
EASTHAMPTON	121	151	212	168	135	124	80	287	276	303	1,857	185.7	2.10
GOSHEN	15	23	22	16	23	17	6	11	18	14	165	16.5	0.38
GRANBY	157	178	187	150	150	165	140	117	138	166	1,548	154.8	2.29
GRANVILLE	31	16	21	16	18	22	10	23	18	12	187	18.7	0.25
HADLEY	435	381	372	383	388	319	327	266	257	290	3,418	341.8	4.11
HAMPDEN	57	65	62	57	55	63	40	55	47	37	538	53.8	1.00
HATFIELD	50	51	48	42	50	32	19	36	37	29	394	39.4	0.67
HOLLAND	15	12	12	12	5	7	10	12	6	9	100	10.0	0.27
HOLYOKE	1,832	1,609	1,749	1,627	1,342	1,654	1,716	1,724	2,067	1,636	16,956	1695.6	9.77
HUNTINGTON	25	17	15	8	13	19	21	23	19	21	181	18.1	0.33
LONGMEADOW	257	265	314	239	284	238	246	185	213	216	2,457	245.7	2.49
LUDLOW	233	433	462	417	479	449	462	438	459	448	4,280	428.0	3.31
MIDDLEFIELD	6	1	5	2	7	5	0	2	1	3	32	3.2	0.08
MONSON	108	108	137	108	117	110	87	51	67	50	943	94.3	0.83
MONTGOMERY	28	21	21	7	9	8	15	18	16	17	160	16.0	0.52
NORTHAMPTON	786	725	811	671	706	670	613	627	635	565	6,809	680.9	3.77
PALMER	477	503	498	441	429	379	294	425	436	347	4,229	422.9	3.70
PELHAM	14	16	28	21	20	11	13	8	8	17	156	15.6	0.34
PLAINFIELD	8	3	4	4	9	7	9	4	7	10	65	6.5	0.13
RUSSELL	58	54	59	35	36	45	30	40	46	50	453	45.3	1.25
SOUTH HADLEY	289	270	308	253	289	276	247	288	258	261	2,739	273.9	2.64
SOUTHAMPTON	49	69	69	57	62	50	53	46	51	44	550	55.0	0.74
SOUTHWICK	226	232	221	190	194	202	194	102	236	179	1,976	197.6	2.58
SPRINGFIELD	836	675	1,032	1,070	911	805	573	489	4,656	4,501	15,548	1554.8	3.12
TOLLAND	6	8	2	4	3	1	2	2	4	5	37	3.7	0.09
WALES	13	10	12	13	6	12	8	8	7	5	94	9.4	0.33
WARE	151	176	149	177	181	162	194	213	233	196	1,832	183.2	1.57
WEST SPRINGFIELD	213	174	194	194	150	145	531	618	860	823	3,902	390.2	2.72
WESTFIELD	906	969	944	878	850	755	732	820	815	778	8,447	844.7	3.42
WESTHAMPTON	20	27	21	16	17	20	17	14	18	20	190	19.0	0.40
WILBRAHAM	313	330	391	358	334	308	295	359	363	317	3,368	336.8	3.02
WILLIAMSBURG	46	34	29	57	65	67	61	39	64	54	516	51.6	1.03
WORTHINGTON	10	12	8	10	9	14	6	1	5	4	79	7.9	0.12
TOTAL	**10,629**	**10,980**	**11,977**	**10,813**	**10,635**	**10,264**	**9,965**	**10,601**	**15,696**	**14,504**	**116,064**	**11606.4**	**2.68**

Source: MassDOT

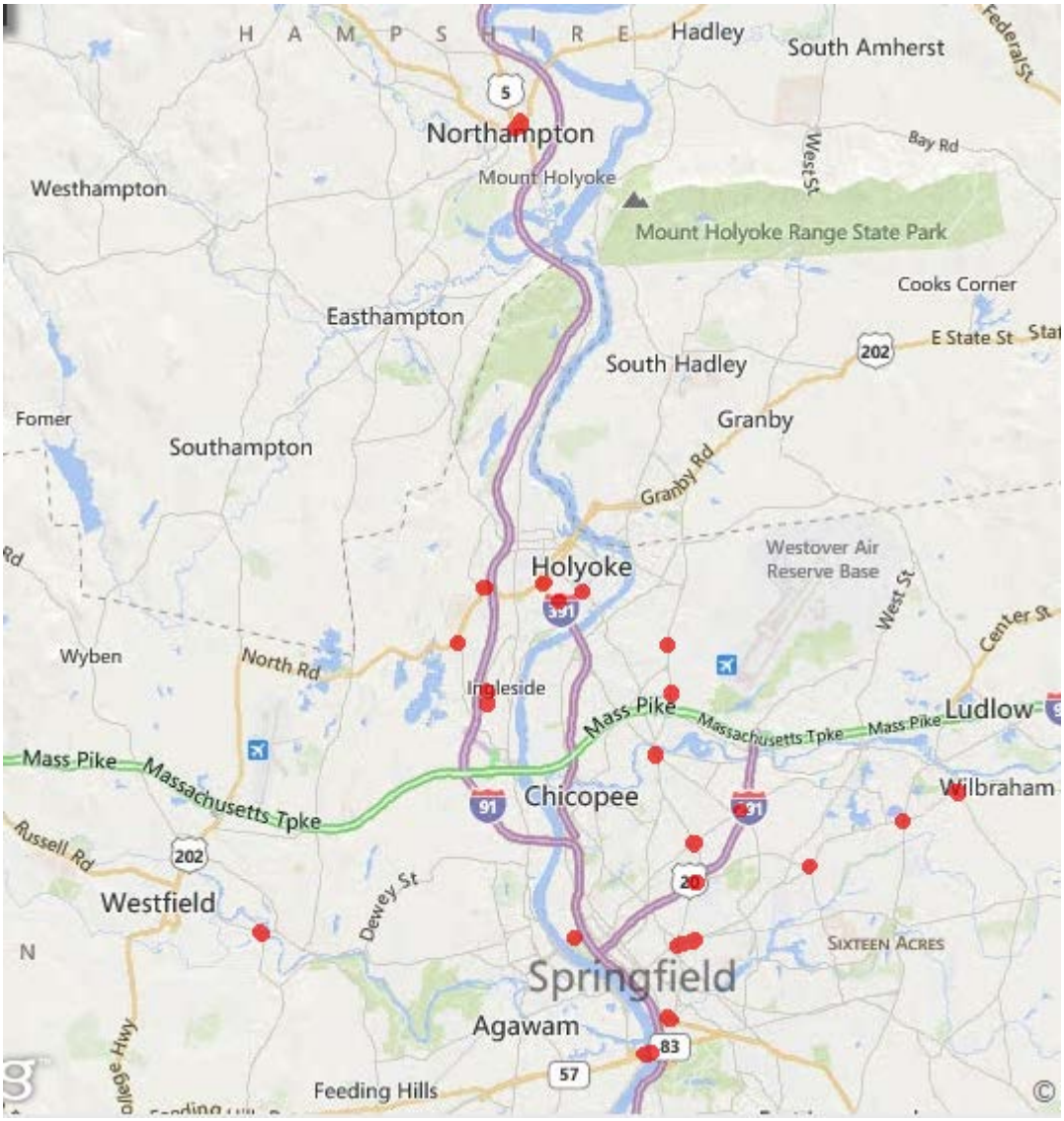
Table 6-4 – High Crash Locations in the Pioneer Valley on the Top 200 Locations in Massachusetts List

No.	Rank	Community	Location/Intersection	Total Crashes (2010-2012)	EPDO*	Fatal Crashes	Injury Crashes	Property Damage Only
1	1	Holyoke	Holyoke Street and Holyoke Mall	235	367	0	33	202
2	24	Chicopee	Broadway and East Main Street (Route 141)	78	166	0	22	56
3	30	Agawam	South End Bridge (Route 5)	69	153	0	21	48
4	38	Westfield	East Main Street (Route 20) and Little River Road (Route 187)	52	144	0	23	29
5	45	Chicopee	Memorial Drive (Route 33) and Pendleton Avenue	52	136	0	21	31
6	59	Wilbrham	Boston Road (Route 20) and Stony Hill Road	78	130	0	13	65
7	59	Springfield	State Street and Saint James Avenue	38	130	0	23	15
8	92	Northampton	Main Street (Route 9) and Strong Avenue	64	112	0	12	52
9	100	Holyoke	Beech Street (Route 202) and West Franklin Street	52	108	0	14	38
10	100	Springfield	Mill Street and Locust Street	40	108	0	17	23
11	100	Springfield	Saint James Boulevard and Saint James Avenue	40	108	0	17	23
12	113	Holyoke	Main Street (Route 116) and Cabot Street	53	105	0	13	40
13	126	Holyoke	Jackson Street and Commercial Street	43	103	0	15	28
14	126	Norhampton	Main Street (Route 9) and King Street (Route 5)	50	103	1	11	38
15	131	Springfield	Plainfield Street (Route 20) and West Street (Route 20)	34	102	0	17	17
16	137	Springfield	State Street and Thopmson Street	33	101	0	17	16
17	145	Holyoke	Lower Westfield Road and Whiting Farms Road	51	99	0	12	39
18	145	Springfield	State Street and Orleans Street	3	99	0	17	14
19	145	Springfield	Boston Road (Route 20) and Parker Street (Route 21)	39	99	0	15	24
20	153	Holyoke	Cherry Street (Route 202) and Soldier's Home Road	46	98	0	13	33
21	153	Springfield	Roosevelt Avenue and Page Boulevard (Route 20A)	30	98	0	17	13
22	159	Holyoke	Westfield Road (Route 202) and Homestead Avenue	53	97	0	11	42
23	159	Chicopee	Memorial Drive (Route 33) and Chicopee Market Place	41	97	0	14	27
24	173	Springfield	Saint James Avenue and Tapley Street	39	95	0	14	25

*EPDO – Equivalent Property Damage Only

Source: MassDOT

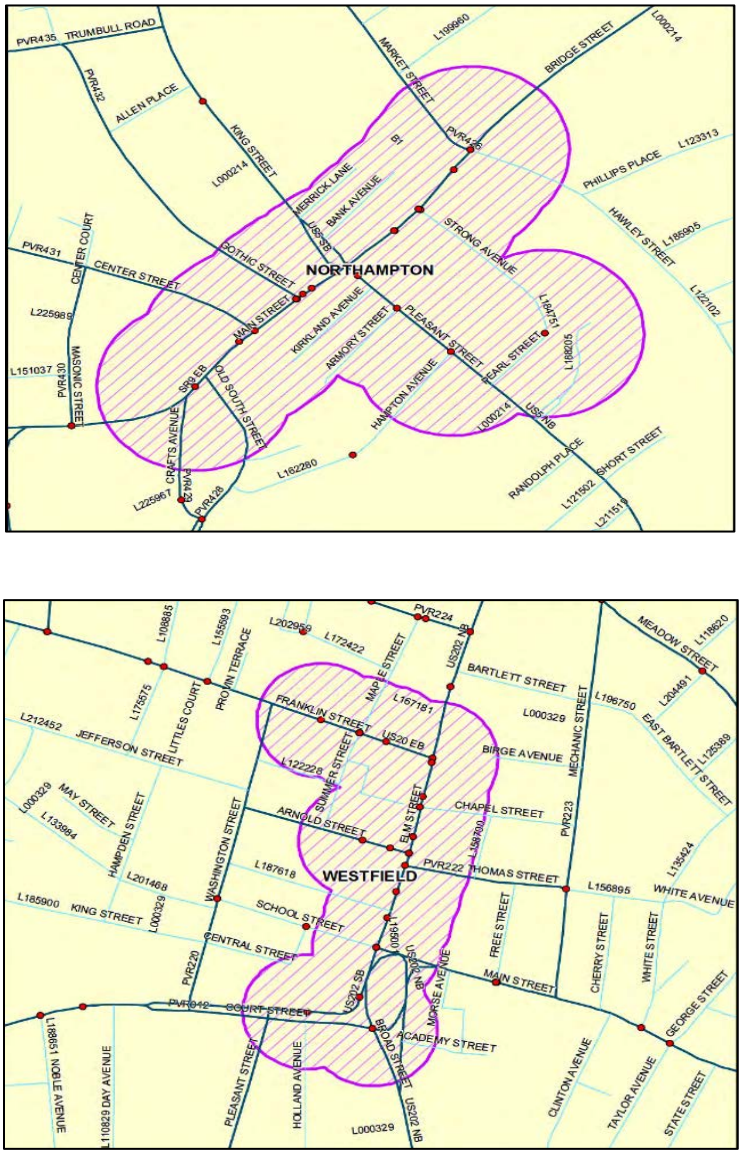
Figure 6-1 – High Crash Locations in the Pioneer Valley on the Top 200 Locations in Massachusetts List



Bicycle / Pedestrian Crash Clusters: The top 200 high crash locations report also includes the top 10 pedestrian and top 10 bicycle crash clusters in the State. The clustering analysis used for the top bike and pedestrian crash locations utilized crash data from the eleven year period of 2002-2012 because of the relatively small number of reported crashes per year.

A cluster of 28 bicycle crashes along Main Street and its intersecting streets in Northampton is ranked 5th and a cluster of 27 bicycle crashes along Elm Street and its intersecting streets in Westfield is ranked 6th amongst the top 10 bicycle crash clusters in the State. Figure 6-2 depicts the above mentioned bicycle crash clusters.

Figure 6-2 – Top Bicycle Crash Clusters in the Region



Source: MassDOT

2. Crash Data Trends

The Commonwealth of Massachusetts Highway Safety Performance Plan 2012 report summarizes crash data trends in the State which enlists the total number of fatalities and other crash related statistics.

The State of Massachusetts experienced a declining trend in the number of traffic-related crashes throughout the Commonwealth since the implementation of the Massachusetts Strategic Highway Safety Plan in the year 2006. As per SHSP update, comparing the five-year averages from (2002-2006) to current (2007-2011), crash fatalities in the state dropped by 19 percent and serious injuries (hospital stays for non-fatal traffic injuries) also declined by 19 percent. That also is the same time period Massachusetts was implementing a comprehensive, multidisciplinary approach to improving safety on our roadways.

Since 2006, there has been a consistent decreasing trend in the number of speeding related fatalities. Increased awareness and vigilant enforcement can reduce these numbers even further.

The updated Strategic Highway Safety Plan for the Commonwealth of Massachusetts adopts both a short-term (five years, 2013-2017) goal to reduce fatalities and hospitalizations by 20 percent by 2017 and an interim goal of reducing the number of fatalities[2] and serious injuries by one-half over two decades. The short-term goal is to reduce the five-year average fatalities from 367 to 294 and five-year average hospitalizations from 4,834 to 3,867 by 2017.

One area of concern is the number of motor cycle crash related fatalities which has not decreased over the last ten years. This may require special safety improvement initiatives. Many of the MassDOT reported crashes have an injury status listed as ‘Unknown’ or ‘Unreported’. Further action is required to improve this data collection process to be able to have more accurate information regarding the severity of each crash.

[2] The numbers of fatalities is different from the number of fatal crashes as some of the fatal crashes are responsible for more than one fatality.

Table 6-5 – Crash Data Trends in Massachusetts

Crash Data Trends	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Fatalities (Actual)	477	459	462	476	441	429	434	364	340	314
Number of Serious Injuries	N.A.*	5279	5370	5033	5052	4579	4182	3983	3384	3048
Number of Speeding-Related Fatalities	144	176	156	158	145	148	143	97	69	62
Fatality Rate / (100 million VMT#)	0.9	0.86	0.86	0.87	0.8	0.78	0.79	0.67	0.61	N.A.*
Fatalities involving driver with BAC@ $\geq$ 0.8	181	178	156	169	148	144	155	124	108	N.A.*
Number of Motorcyclist Fatalities	53	58	35	60	56	50	62	42	52	54
Number of Pedestrian Fatalities	79	58	86	81	76	61	66	75	46	51
Percent observed belt use for front seat outboard	56%	51%	62%	63%	65%	67%	69%	67%	74%	74%
Unrestrained Passenger Vehicle Occupant Fatalities	195	189	177	165	171	158	148	120	79	94

*Not Available
#Vehicle Miles Travelled
@Blood Alcohol Content

Source: Commonwealth of Massachusetts Highway Safety Performance Plan, 2012

3. Crash Rates

Crash Rate comparison method is devised to evaluate the safety conditions of an intersection or a roadway segment in relation to conditions elsewhere in the region. The combination of crash frequency (crashes per year) and vehicle exposure (traffic volume or miles traveled) results in the development of a crash rate. Crash rates are expressed as 'crashes per Million Entering Vehicles' (MEV) for intersection locations and as 'crashes per Million Vehicle Miles Traveled' (MVMT) for roadway segments. By calculating the crash rate it can be determined how conditions along a roadway or at an intersection compare to the average condition of other similar locations. The MassDOT website provides the crash rates for intersections and segments based upon roadway classification for all Massachusetts Highway Districts.

The latest intersection crash rates on the MassDOT website are based on the averages derived from 2010 crash data which was queried on January 23rd, 2013. The roadway segment crash rates are based on 2012 crash data which was queried on August 13th, 2014. Table 6-6 summarizes these crash rates for MassDOT Highway Districts and Table 6-7 summarizes crash rates along roadway segments.

Table 6-6 – Intersection Crash Rates by MassDOT District

Location	Signalized Intersections	Unsignalized Intersections
Statewide	0.8	0.6
District 1*	0.92*	0.43*
District 2	0.82	0.68
District 3	0.89	0.66
District 4	0.77	0.58
District 5	0.77	0.58
District 6	0.76	0.58

* District 1 should use Statewide Rates due to low sample total

Table 6-7 – Roadway Segment Crash Rates by Functional Classification

Roadway Functional Classification	Rural	Urban
Statewide	0.97	2.08
Interstate	0.59	0.54
Principal arterial - other freeways and expressways	0.83	0.65
Principal arterial - other	0.69	3.35
Minor arterial	0.9	3.74
Major collector	1.61	3.62*
Minor collector	1.94	-
Local	1.03	1.9

* This rate is for all Urban Collector Roads, including both Urban Major Collector and Urban Minor Collector roadways.
If a crash occurred at an intersection or along two different functional classifications, the crash was assigned to the higher order roadway

Source: MassDOT

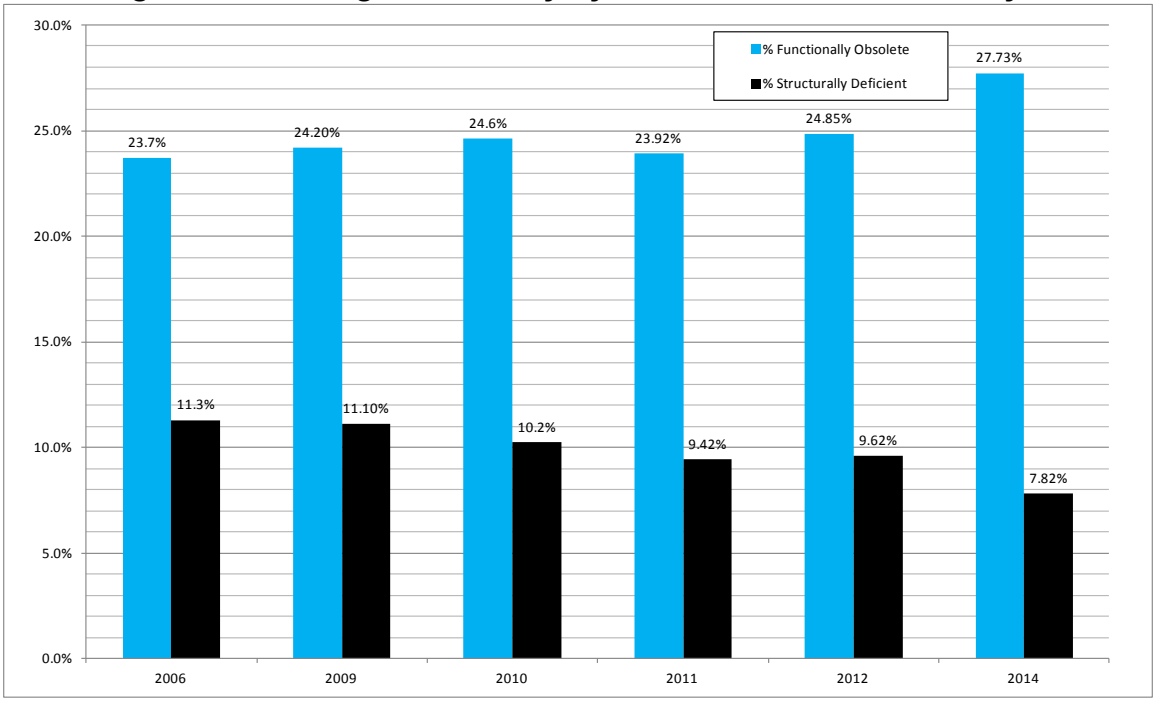
4. Bridges

All of the bridges throughout the state undergo routine structural inspection. Using a generally accepted rating system developed by the American Association of State Highway and Transportation Officials (AASHTO), MassDOT surveys and rates the state bridges. This process identifies bridges that are structurally sufficient, functionally obsolete and structurally deficient. Figure 6-3 summarizes the status of bridge conditions within the Pioneer Valley Region.

A bridge is classified as functionally obsolete when deck geometry, local capacity, clearance or alignment of the approach roadway no longer meets the usual criteria for the highway it serves. A bridge is classified as structurally deficient when the structural scores are below the acceptable sufficiency rating. Sufficiency rating is a function of the structural adequacy and safety, functional obsolescence, and serviceability of a bridge. The

percentage of structurally deficient bridges decreased by nearly two percent from 2012 to 2014, however there is an upward trend in the percentage of functionally obsolete bridges. A summary of deficient bridges by community is presented in Table 6-8.

Figure 6-3 – Bridge Deficiency by Year for the Pioneer Valley



5. At-grade Railroad Crossings

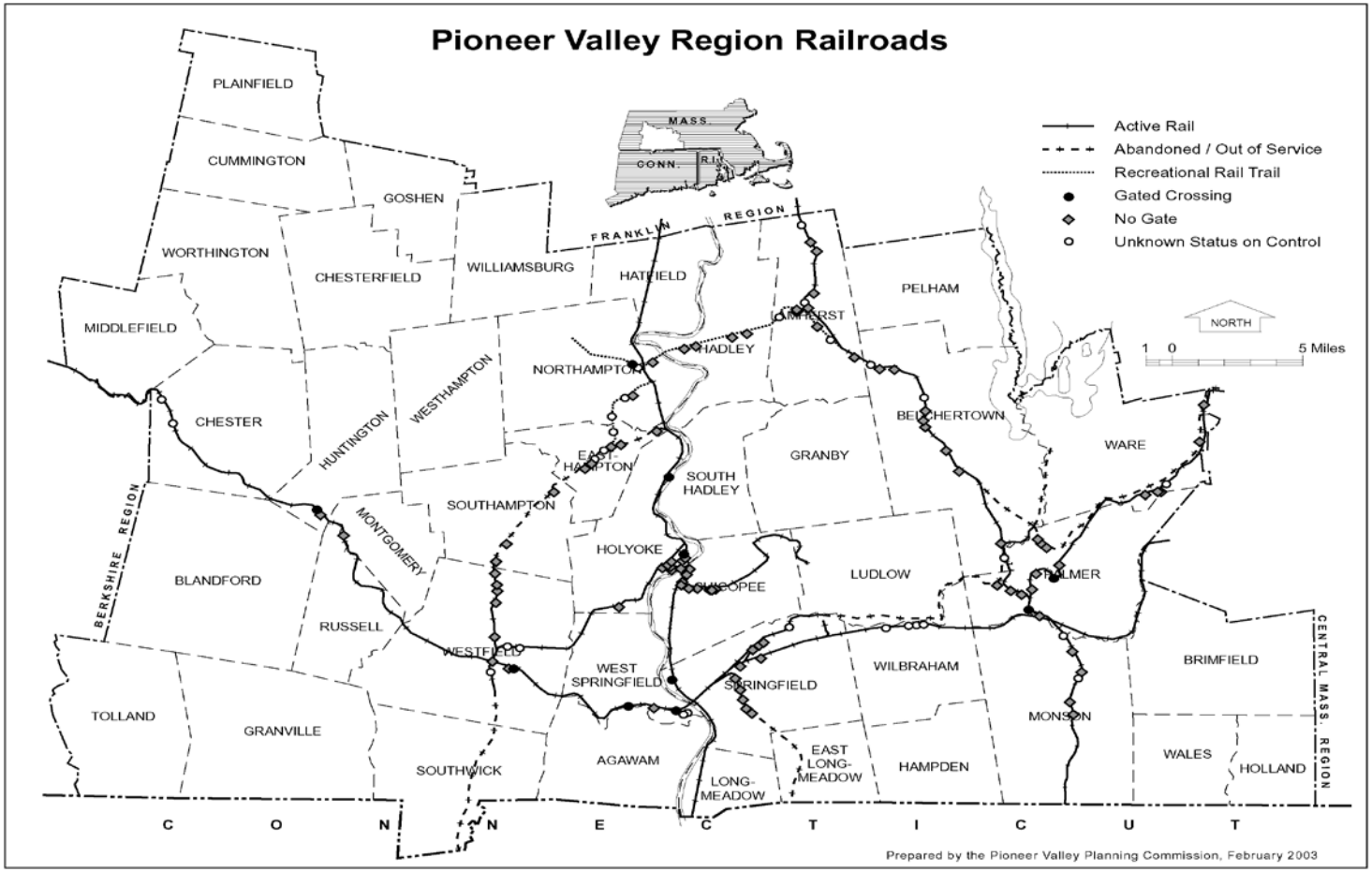
Information on the location of all at-grade rail crossings in the Pioneer Valley Region is shown on Figure 6-4. There are currently 136 railroad crossings in the Pioneer Valley Region. A total of 95 of these crossings are located on active rail lines. However, less than 10 percent of all active rail crossings in the region are controlled by automatic gates to stop vehicle traffic. Many of the at-grade railroad crossings in the PVPC region do not have safety gates to separate motor vehicle traffic from railroad traffic. In addition, supplemental warning devices such as flashing lights, warning signs, and pavement markings require routine maintenance in order to provide maximum effectiveness. It is important to maintain an inventory of these at-grade crossings in order to determine when increases in traffic and surrounding developments require the installation of safety gates and other appropriate devices.

Table 6-8 – Deficient Bridges in the PVPC Region

Community	Functionally Obsolete	Structurally Deficient	Total Deficient Bridges	Total Bridges	% Deficient	% Functionally Obsolete	% Structurally Deficient
Agawam	4	1	5	18	27.8%	22.2%	5.6%
Amherst	1	2	3	15	20.0%	6.7%	13.3%
Belchertown	5	1	6	12	50.0%	41.7%	8.3%
Blandford	1	0	1	12	8.3%	8.3%	0.0%
Brimfield	6	0	6	26	23.1%	23.1%	0.0%
Chester	4	2	6	25	24.0%	16.0%	8.0%
Chesterfield	1	2	3	9	33.3%	11.1%	22.2%
Chicopee	11	2	13	50	26.0%	22.0%	4.0%
Cummington	1	2	3	13	23.1%	7.7%	15.4%
Easthampton	6	0	6	19	31.6%	31.6%	0.0%
East Longmeadow	0	0	0	0	0.0%	0.0%	0.0%
Goshen	0	0	0	4	0.0%	0.0%	0.0%
Granby	2	0	2	8	25.0%	25.0%	0.0%
Granville	1	1	2	8	25.0%	12.5%	12.5%
Hadley	2	2	4	10	40.0%	20.0%	20.0%
Hampden	1	1	2	8	25.0%	12.5%	12.5%
Hatfield	7	1	8	15	53.3%	46.7%	6.7%
Holland	0	0	0	1	0.0%	0.0%	0.0%
Holyoke	7	3	10	49	20.4%	14.3%	6.1%
Huntington	5	1	6	8	75.0%	62.5%	12.5%
Longmeadow	0	0	0	4	0.0%	0.0%	0.0%
Ludlow	7	1	8	22	36.4%	31.8%	4.5%
Middlefield	2	1	3	9	33.3%	22.2%	11.1%
Monson	6	4	10	23	43.5%	26.1%	17.4%
Montgomery	4	0	4	5	80.0%	80.0%	0.0%
Northampton	16	5	21	43	48.8%	37.2%	11.6%
Palmer	10	2	12	30	40.0%	33.3%	6.7%
Pelham	1	2	3	3	100.0%	33.3%	66.7%
Plainfield	2	0	2	2	100.0%	100.0%	0.0%
Russell	3	0	3	15	20.0%	20.0%	0.0%
South Hadley	1	0	1	11	9.1%	9.1%	0.0%
Southampton	3	0	3	10	30.0%	30.0%	0.0%
Southwick	1	0	1	3	33.3%	33.3%	0.0%
Springfield	27	5	32	60	53.3%	45.0%	8.3%
Tolland	0	0	0	0	0.0%	0.0%	0.0%
Wales	0	1	1	1	100.0%	0.0%	100.0%
Ware	3	2	5	16	31.3%	18.8%	12.5%
West Springfield	12	3	15	26	57.7%	46.2%	11.5%
Westfield	13	3	16	36	44.4%	36.1%	8.3%
Westhampton	4	2	6	14	42.9%	28.6%	14.3%
Wilbraham	1	0	1	4	25.0%	25.0%	0.0%
Williamsburg	7	1	8	17	47.1%	41.2%	5.9%
Worthington	0	0	0	14	0.0%	0.0%	0.0%
2014	188	53	241	678	35.5%	27.7%	7.8%

Source: MassDOT

Figure 6-4 – Rail Crossings Map



6. Dams in the Pioneer Valley Region

There are approximately 268 dams in the PVPC region that are regulated by the Office of Dam Safety. To be regulated, these dams are in excess of 6 feet in height (regardless of storage capacity) and have more than 15-acre feet of storage capacity (regardless of height). There are also many dams in the region that because they fall below these parameters are known as non-jurisdictional dams. Of the regulated dams in the region:

- 43 have a hazard index rating of high,
- 134 are rated significant hazard, and
- 91 are rated low hazard[3]

Hazard index rating is a level of risk determined by the likelihood that a dam failure (an uncontrolled release of impounded water) would result in loss of life or substantial property damage.[4]

Dam safety regulations enacted in 2005 transferred significant responsibilities for dams from the State of Massachusetts to dam owners. The financial burden associated with these responsibilities can vary greatly, depending on the number of dams for which an owner is responsible, and the dam's condition and hazard index rating. A dam in poor or unsafe condition can involve very costly repairs, and a hazard index rating also brings with it different requirements related to frequency of inspections by engineers and the need for development of emergency action plans.

More recently enacted regulations seek to promote greater dam safety by extending the requirement of emergency action plans to significant hazard dams (in addition to high hazard dams), strengthening the authority of the Office of Dam Safety by increasing fines for non compliance, and establishing the Dam and Sea Wall Repair and Removal Fund, an annual grant and loan program available to dam owners.

Problems remain however. Within the region there are 18 high and significant hazard dams in poor or unsafe condition. There are an additional 14 low hazard dams in poor or unsafe condition. It is important to note that most of these dams are located upstream of important roadway infrastructure. See Table 6-9 for a listing of specific dams.

[3] These numbers are estimates based on periodic and partial updates to PVPC's dams data base from the Massachusetts Office of Dam Safety.

[4] Dams that are "likely" to cause such damage are classified as "high hazard"; dams that "may" cause such damage are classified as "significant" hazard; dams that "may cause minimal property damage to others" where "loss of life is not expected" are classified as "low" hazard. Dams that fall into these classifications are regulated by the Office of Dam Safety.

Table 6-9 – Dams in the Pioneer Valley in Poor or Unsafe Condition

Dam Name	Location	Hazard index	Condition	Notes
Upper Highland Lake Dam	Goshen	H	Poor	
Lower Highland Lake Dam	Goshen	H	Poor	
Roberts Meadow Upper Reservoir Dam	Northampton	H	Poor	Slated for removal 2015
Van Horn Park Lower Dam	Springfield	H	Poor	
Bondsville Upper Dam	Belchertown	S	Poor	
Knights Pond Dam	Belchertown	S	Poor	
Aldrich Lake Dam	Granby	S	Unsafe	
Lake Warner Dam	Hadley	S	Poor	
D.F. Riley Grist Mill Dam/Advocate Dam	Hatfield	S	Poor	
Springfield Sportsman's Club Dam	Monson	S	Unsafe	
Pulpit Rock Pond Main Dam	Monson	S	Poor	
Pulpit Rock Pond West Dam	Monson	S	Poor	
Forest Park Upper Pond Dam	Springfield	S	Poor	
Monsanto Chemical Co. Upper Dam	Springfield	S	Poor	
Van Horn Park Lower Dam	Springfield	S	Poor	
Wards Pond Dam	Tolland	S	Unsafe	
Beaver Lake Dam	Ware	S	Unsafe	
Strathmore Paper Dam	West Springfield	S	Poor	
Nine Lot Dam	Agawam	L	Poor	
Quenneville Dam	Granby	L	Unsafe	Impoundment has been drained
Bahre Pond Dam	Granville	L	Poor	
Clear Pond Dam	Holyoke	L	Poor	
Virginia Lake Shore Dam	Middlefield	L	Poor	
Shepard Upper Pond Dam	Monson	L	Poor	
Rocky Hill Pond Dam	Northampton	L	Poor	
Lithia Springs Reservoir Dam	South Hadley	L	Poor	
Putnam's Puddle Dam	Springfield	L	Poor	
Van Horn Park Upper Dam	Springfield	L	Poor	
Camp Kinderland Dam	Tolland	L	Poor	
Vinica Pond Dam	Wales	L	Poor	
Norcross Pond Dam #2	Wales	L	Poor	
Lyman Pond Dam	Westhampton	L	Unsafe	

Source: Massachusetts Office of Dam Safety.

In Table 6-9, Dams labeled as "POOR" are dams with major structural, operational, maintenance and flood routing capability deficiencies. This category also includes

unsafe-nonemergency dams. An “UNSAFE” dam indicates a dam whose condition, as determined by the Commissioner, is such that a high risk of failure exists. Among the deficiencies which would result in this determination are: excessive seepage or piping, significant erosion problems, inadequate spillway capacity and/or condition of outlet(s), and serious structural deficiencies, including movement of the structure or major cracking.

With the more frequent larger storm events in the northeastern United States, these and other dams will be tested and dam failure may increase in likelihood.[5] The extreme storm flows produced by Tropical Storm Irene in 2011, for example, led to the failure of at least two dams in the Pioneer Valley Region. An unnamed private dam in Blandford failed, sending a surge of water downstream to inundate and damage nearby roads. At the Granville Reservoir Dam owned by the City of Westfield, the spillway failed when waters overwhelmed and then undermined the structure. Since then, the City of Westfield has had to spend $3 million in repairs and improvements to the dam and spillway.

These storm events raise questions about dams and their current capacity to pass more frequent extreme flows. Poor condition dams in the region—as may have been the case in Blandford—will certainly be tested, but so will other dams—such as the Granville Reservoir Dam, which was reportedly in fair condition at the time of the storm.

Where a dam is no longer providing a specific beneficial function, such as water supply or power generation, it makes sense to focus resources on removal to avoid what could be the larger costs of damages in the wake of a failure. Throughout the state, there have been some 38 dam removal projects in the past 8 years, with permitting and costs decreasing as professionals, local boards, and state agencies gain more experience with design, permitting, and construction. Within the Pioneer Valley, there is a good recent example of a dam removal in Pelham along Amethyst Brook that can help inform other local projects going forward. The project in Pelham involved removing the 20-foot high/170-foot wide significant hazard Bartlett Rod Shop Co. Dam. Located upstream of West Pelham Road and Route 9, the dam was in poor repair and estimated costs to bring it to good condition were $300,000. Removal, funded through a combination of grants, cost a total of $193,000, and involved a coalition that included the Massachusetts Department of Fish & Game, and the Pelham and Amherst conservation commissions.

[5] A study examining climate records, found that New England has experienced the greatest change, with intense rainstorms and snowstorms now happening 85 percent more often than in 1948. This study also found that the biggest rainstorms and snowstorms are getting bigger. Extreme downpours are more frequent *and* more intense. See: *When it Rains, It Pours: Global Warming and the Increase in Extreme Participation from 1948 to 2011*, Environment America Research & Policy Center, Summer 2012.

F. FATAL CRASHES

A summary of fatal crashes in the State from 2002 to 2012 is presented in Figure 6-3. Fatal crashes in the state have reduced by more than 16% in last decade. There are some yearly fluctuations and some increases from year to year basis, however long term averages have reduced. Once again the rate of reduction has increased since the implementation of the Strategic Highway Safety Plan.

The average of five-year total of fatal crashes in the Pioneer Valley dropped by almost 20% from (2002-2006) to (2007-2011). However there was a slight increase in the number of fatal crashes in the year 2012. A vast majority of the crashes occurred in the Hampden County, which has higher population and larger urban centers. In the year 2012, the City of Springfield alone accounted for 9 fatal crashes followed by Chicopee and Westfield with 5 fatal crashes each.

Figure 6-5 – Fatal Crashes in Massachusetts

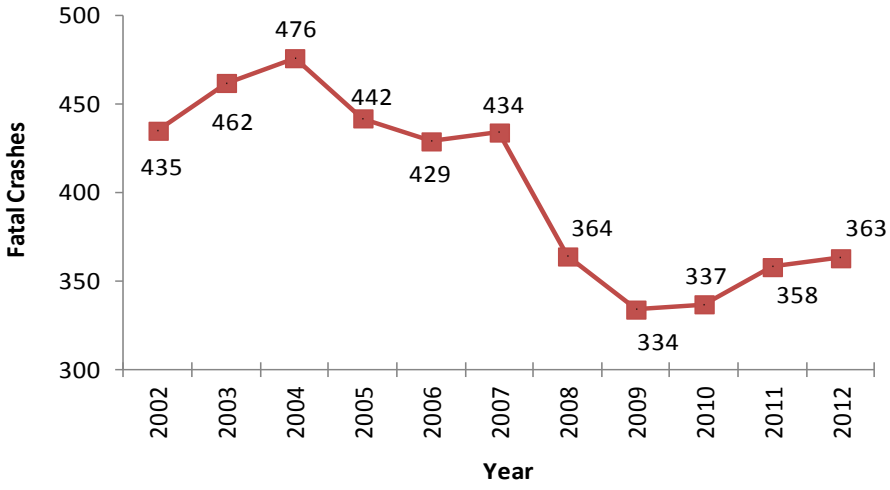
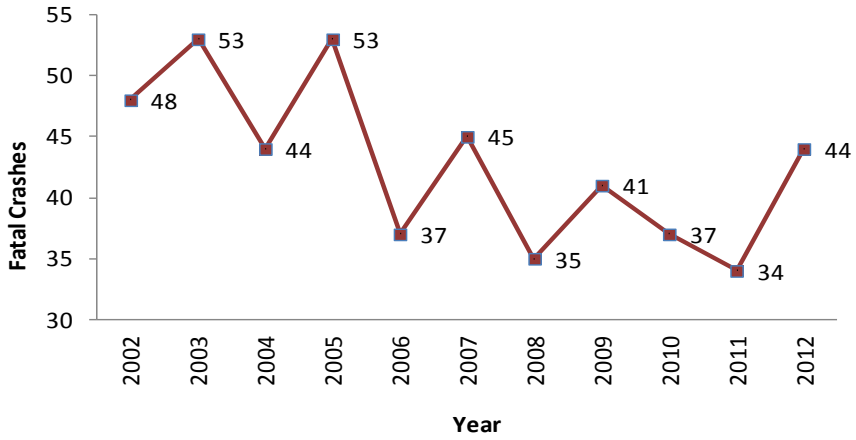
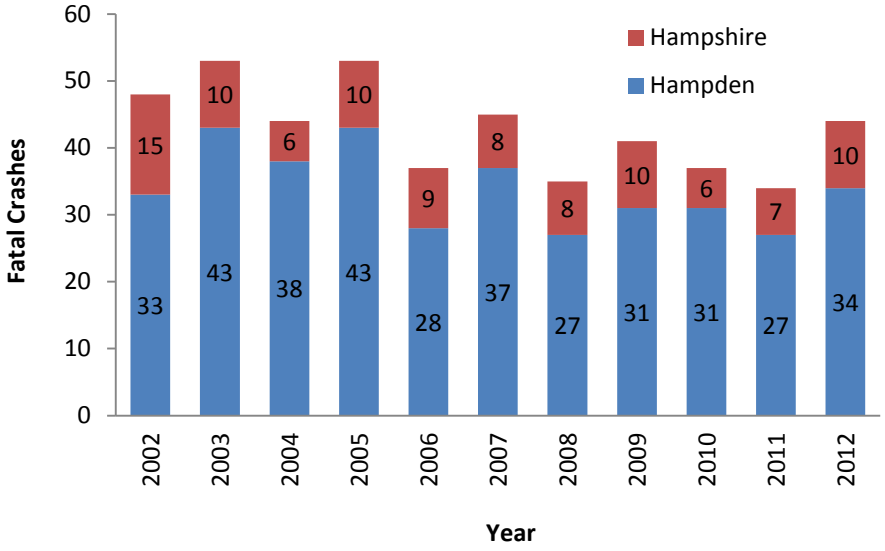


Figure 6-6 – Fatal Crashes in the Pioneer Valley



Source: MassDOT

Figure 6-7 – Fatal Crashes in Hampshire and Hampden Counties

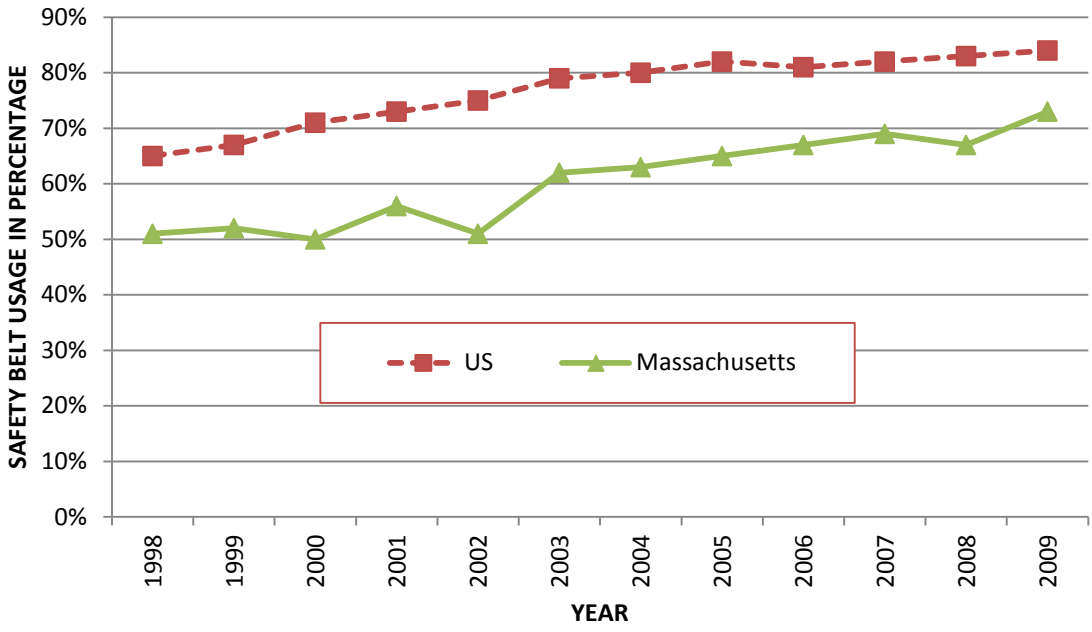


Source: MassDOT

G. SAFETY BELT USAGE

Personal injuries and fatalities resulting from motor vehicle crashes can be linked to safety belt usage. Although the use of safety belts in the Commonwealth of Massachusetts has increased over time, it still falls short of the national average. This information is shown on Figure 6-8.

Figure 6-8 – Safety Belt Use in Massachusetts compared to U.S.



Source: UMassSafe, National Occupant Protection Use Survey (NOPUS) National Highway Traffic Safety Administration

Information from the 2009 Massachusetts Safety Belt Usage Observation Study report indicates that observed safety belt usage in communities in the Pioneer Valley was on average 75%. This is higher than the statewide average of 74% from the same study, but still falls well below the national average of 84%. Table 6-10 summarizes the subsample data of observed safety belt usage at 6 locations in the Pioneer Valley between the time period of June 1 and June 30, 2009.

Table 6-10 – Safety Belt Usage in Pioneer Valley Communities

Community	Observation Location	Safety Belt Usage in Percentage
Chicopee	Center Street	74.35%
Holyoke	Beech Street	72.10%
Ludlow	Center Street	65.67%
Monson	Main Street	75.92%
Palmer	Palmer Ramp Route 32 to Route 90	82.75%
Springfield	West Columbus Avenue Exit	76.47%

Source: 2009 Massachusetts Safety Belt Usage Observation Study, UMassSafe

H. SAFETY STUDIES

As a part of PVPC's Unified Planning Work Program (UPWP), prime locations in the region which have a history of safety related issues are identified every year as proposed traffic study locations and short and long term recommendations are made to improve the conditions at such locations. As discussed earlier, the guidelines set by the Massachusetts Department of Transportation in Strategic Highway Safety Plan and Traffic Safety Tool Box are utilized for analysis to ensure the safe operations of all the transportation components in the region. Crash Data information obtained from MassDOT's crash database and local police departments is used in this analysis. In the past such study reports published by PVPC have been helpful to the towns and communities in providing them with preliminary guidelines for future safety measures as well as for obtaining appropriate funding to implement the recommended safety measures. Some of the Safety Studies that have been conducted in past include:

- *Route 9 at North and South Maple Street Safety Study*
- *Massachusetts Turnpike Exit 6 at I-291 Safety Study*
- Route 5 at Conz Street Safety Study
- Feeding Hills Center Safety Study – Agawam
- Florence Road at Burts Pit Road Safety Study – Northampton
- *Boston and Maine Railroad Bridge Safety Study – Northampton*
- West Street at Pantry Road Safety Study – Hatfield
- *Main Street at Jackson Street Safety Study – Holyoke*
- Route 141 Safety Study – Easthampton and Holyoke

- I-291 Exit 6 off ramp at Shawinigan Drive Safety Study – Chicopee
- Route 141 Safety Study Updates – Easthampton and Holyoke
- *Feeding Hills Center Transportation and Safety Study Final Report*
- Adams Road Safety Study – Williamsburg
- Feeding Hills Center Crash Data Review – Agawam
- *Granby Road at McKinstry Avenue and Montgomery Street Safety Study – Chicopee*
- Maple Street at Resnic Boulevard Safety Study – Holyoke
- Dwight Street at Worthington Street Safety Study – Springfield
- *North Main Street at Wilbraham Street, Sykes Street, and Shearer Street Safety Study – Palmer*
- Williamsburg Pedestrian Safety Study
- Brimfield Safety Study
- *Route 116 at Route 33 and Lyman Street Safety Study – South Hadley*
- *East Street at Winsor Street and Hampden Street Study – Ludlow*
- *West Avenue at Fuller Street Study – Ludlow*
- Greenleaf Community Center Safety Study
- Springfield Crash Data Analysis
- Cottage Street at Robbins Road Safety Study – Springfield, MA
- Route 9 (Locust Street) at Hatfield Street Safety Study – Northampton, MA
- *Route 9 (Federal Street) at Bay Road Safety Study – Belchertown, MA*
- *Cottage Street, Robbins Road and Industry Avenue Intersection: Springfield Safety Study*

CHAPTER 7

SECURITY

The security of the regional transportation system is an ever increasing priority. It is critical to ensure that the highest levels of security are provided for the users of our regional transportation system and that appropriate measures are taken to restrict access to our critical transportation infrastructure.

A. EXISTING CONDITIONS

Over the past few years, the region has concentrated on improving the security of the transportation system. This includes participation with the Massachusetts Executive Office of Public Safety (EOPS) and the Massachusetts Emergency Management Agency (MEMA). In cooperation with both agencies a number of changes have been made to increase both existing security measures and public awareness of potential threats to security. The following sections provide additional information on the topic of security for the Pioneer Valley Metropolitan Planning Organization.

1. Homeland Security

The Pioneer Valley Metropolitan Planning organization is part of the Western Massachusetts Homeland Security Region. The Western Region Homeland Security Advisory Council provides planning, financial and technical resources to all 101 communities within Hampden, Hampshire, Franklin, and Berkshire counties of Massachusetts.

The focus of this organization is to support the following activities:

- Identification of Threats and Vulnerabilities within the Region
- Plan Regionally to Protect Critical Infrastructure and Key Assets
- Training First Responders and Local Officials
- Improve Interoperability
- Multi-jurisdiction Exercises
- Intelligence Gathering & Information Sharing

One of the products of the Western Region Homeland Security Advisory Council (WRHSAC) was the development of a website to increase public awareness and provide the general public with information on the role of the council. This website is located at www.westernmassprepares.org. The Pioneer Valley MPO has also assisted in improving Homeland Security by providing planning assistance in the following areas:

- Assisting in the development of Mutual Aid Agreements between the state and local communities.
- Updating maps for critical infrastructure such as bridges and Tier II Haz-Mat locations.
- Providing technical assistance as needed for use in local and regional evacuation planning efforts.

Western Mass Ready (http://www.westernmassready.org/) was created by the WRHSAC and provides resources for individuals in the Pioneer Valley to prepare for emergency events. A marketing campaign for Western Mass Ready was conducted in conjunction with the Pioneer Valley Transit Authority (PVTA). Western Mass Ready ads were placed on the exterior of the buses as well as brochures being placed near the schedule racks on the interior of the buses. Translated brochures were provided by the Individuals Requiring Additional Assistance Preparedness Project. Billboard and movie theater advertising was also utilized to provide public outreach.

a) Western Region Homeland Security Plan

This plan seeks to enhance the region's capabilities to support homeland security-related public safety efforts, and is guided by the principles established by the Commonwealth in the Massachusetts State Homeland Security Strategy. The Plan identifies and prioritizes key vulnerabilities that exist in the region and develops steps to mitigate these potential threats.

Regional solutions were developed in order to strengthen core functions and provide all public safety agencies the tools required to effectively prevent, provided early response, and recover from terrorist events or other high profile events that threaten security. The Plan also defines funding levels to address the identified priorities and improve interoperable communications and overall emergency preparedness through focused training exercises and upgraded equipment.

PVPC has conducted evacuation planning studies using the regional transportation model and dynamic traffic assignment. The TransCAD modeling software was used to analyze the evacuation scenarios at the macro level. The network used in this study excludes local roads; only major arterials and highways are considered. Dynamic Traffic assignment was utilized because it is more responsive to operational factors, route changes, and produces more realistic results for modeling unexpected results than traditional travel demand models. PVPC has conducted analysis on the following four evacuation scenarios using this methodology.

- Hurricane evacuation for Hampden, Hampshire, Franklin and Berkshire- Under this scenario, a hurricane forces a full evacuation of all four of the Western Massachusetts counties. The hurricane splits the region in two, sending people to the east and west.

- UMass Campus Evacuation - A severe snowstorm occurs, necessitating the evacuation of the University of Massachusetts Amherst campus. A phased evacuation is modeled using current university vehicle and housing data.
- Flooding Scenarios - 3 flooding scenarios were created for the City of Springfield which established the identification of site specific challenges and sensitive receptors. Changes in traffic flow were estimated for each scenario based on the identification of roadways that would not be accessible due to flooding. The effectiveness of existing detour routes was analyzed and recommendations were made on additional resources that may be required during an actual evacuation.
- I-91 Chemical Spill - A chemical spill occurring in the afternoon peak hours on Interstate 91 in the vicinity of Exit 12 results in the closure of the highway in both directions. This scenario identifies the impact of the unanticipated closure of I-91 on downtown Springfield and the regional roadway network.

2. Transit Security

The Pioneer Valley Transit Authority (PVTA) has undertaken extensive efforts in order to increase the security of the regional transit system. This includes the development of an emergency operations plan for the agency and the placement of security cameras on their entire fleet of buses. PVTA has also installed security cameras and audio alert equipment in passenger terminals, vehicle storage and maintenance facilities. Most importantly, the PVTA has committed transit vehicles for use in situations that may require the evacuation of residents.

The PVTA has participated in ongoing regional emergency drills and has also provided extensive emergency training for their staff. To make this training more widely available to first responders PVTA requested the PVPC to create 3 videos documenting response protocol. The three videos involved: a simulation of a bus rollover, a simulation of a hostage situation on a bus, and a technical walkthrough of PVTA's newest Gillig buses, offering tips to first responder teams on how to access the bus and how to deal with systems during an emergency response. PVPC is currently developing a new video to provide emergency responders information related to PVTA's articulated buses.

3. Rail Security

Similar to rail service itself, rail security is usually defined by both passenger and freight rail services, separated into two parts: passenger rail and freight rail. Unlike air travel, neither passenger or freight rail transportation services lend themselves to the increased security measures utilized at airports. While each type of rail service has its own security concerns, they must not be separated because they often share the same track. Passenger rail stations are often located in densely populated areas, and freight rail transports nearly half of the nation's hazardous waste materials. As a result, the Pioneer Valley Metropolitan Planning Organization has continually integrated both passenger and freight rail security concerns into its

regional planning efforts. Representatives from the region's rail providers are invited to participate in monthly Joint Transportation Committee meetings. In addition, all planning studies approved by the MPO include a rail component when appropriate.

a) Pedestrian Rail Access

Trespassing by local residents within the rail yard, across railroad bridges and along railroad tracks is not only a safety problem but also is frequently a security problem that involves theft and vandalism. Because of the hazardous materials, dangerous equipment, and unsafe settings found within the rail yard, this unhindered trespass is significant and needs to be addressed.

As part of the Merrick and Memorial Neighborhood Study in West Springfield, PVPC proposed a series of safety and security improvements to address hazardous materials procedures, existing vulnerabilities, and overall security at the CSX Rail Yard. It is important that security planning be implemented in advance of an incident, rather than in response to an incident as mitigation. CSX implemented a series of security improvements as part of a recent upgrade to their rail yard. These improvements include:

- Physical barriers;
- Secure access gates at portals;
- Closed circuit television system;
- Conspicuously located signage;
- Surveillance patrols utilizing two-way radio communications; and,
- Sensors, alarms and detectors with audible/visual alerts.

New security fencing was added along the Knowledge Corridor rail line prior to the return of passenger rail service at the end of 2014. Many pedestrians and bicyclists cross this rail line between King Street and Woodmont Road to access the Norwottuck Rail Trail and businesses along King Street. This section also is missing a connection to a bike path to the village of Florence and a bike path through the downtown area. A pedestrian underpass, proposed to be constructed in the summer of 2015, could eliminate the need for pedestrians to illegally cross this rail line.

B. WESTERN MASSACHUSETTS EVACUATION PLAN

Completed in January of 2013, the Western Massachusetts Evacuation Plan provides emergency responders on the local, state, and federal levels with the resources necessary for conducting a regional evacuation in as efficient and effective a manner as possible. The plan provides maps and lists of evacuation routes, population centers, infrastructure, and other critical assets. Contact information for municipal and state officials, as well as major employers, schools, and hospitals is also provided.

This plan pertains to the counties of Berkshire County, Franklin County, Hampshire County, and Hampden County. Contact information for municipalities in Worcester County that border Franklin County, Hampshire County, and Hampden County is also provided, as these towns and cities would potentially be active in any evacuation from western Massachusetts. Information for state resources applicable to the region is also provided. The plan was completed in conjunction with other emergency plans that have been developed for western Massachusetts, including a regional sheltering plan and regional communications plan. Data and recommendations from these plans have been integrated into the evacuation plan to the extent possible.

Evacuation routes were developed based on an analysis of the transportation network, considering factors such as capacity, congestion, and road destinations to develop a hierarchy of primary, secondary, and tertiary routes. Definitions of these routes are as follows:

- Primary – state designated highways that carry the largest capacity and provide the most direct route out of the region.
- Secondary – main arterial roads through towns that carry traffic where primary routes do not exist or provide an alternate route to the primary route.
- Tertiary – local main roads, used to channel traffic towards secondary and primary evacuation routes.

Evacuation routes with regional water hazards are shown by county in Figures 7-1 and 7-2. Complete copies of the Western Massachusetts Evacuation Plan are available upon request.

Figure 7-1 – Evacuation Routes and Water Hazards in Hampden County

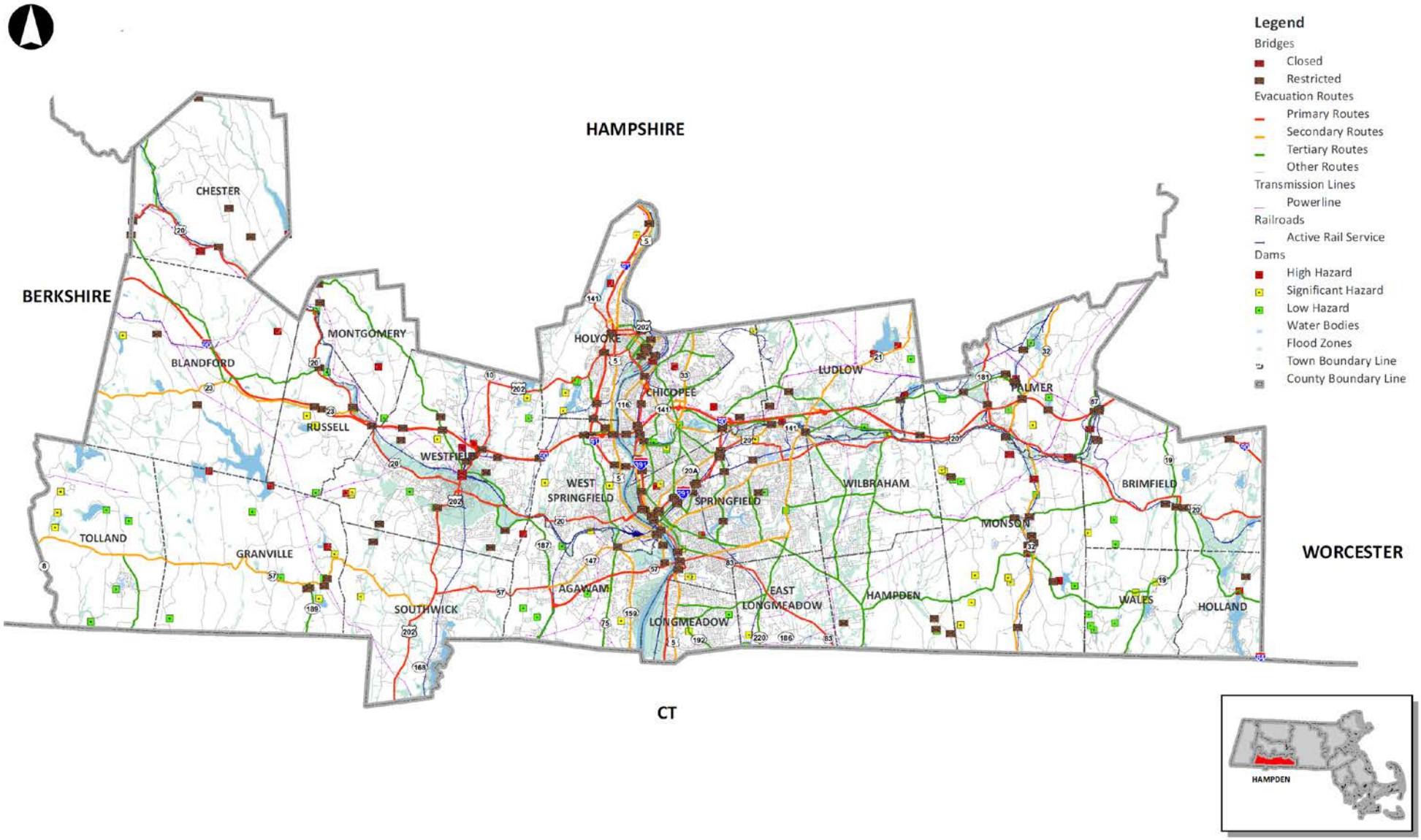
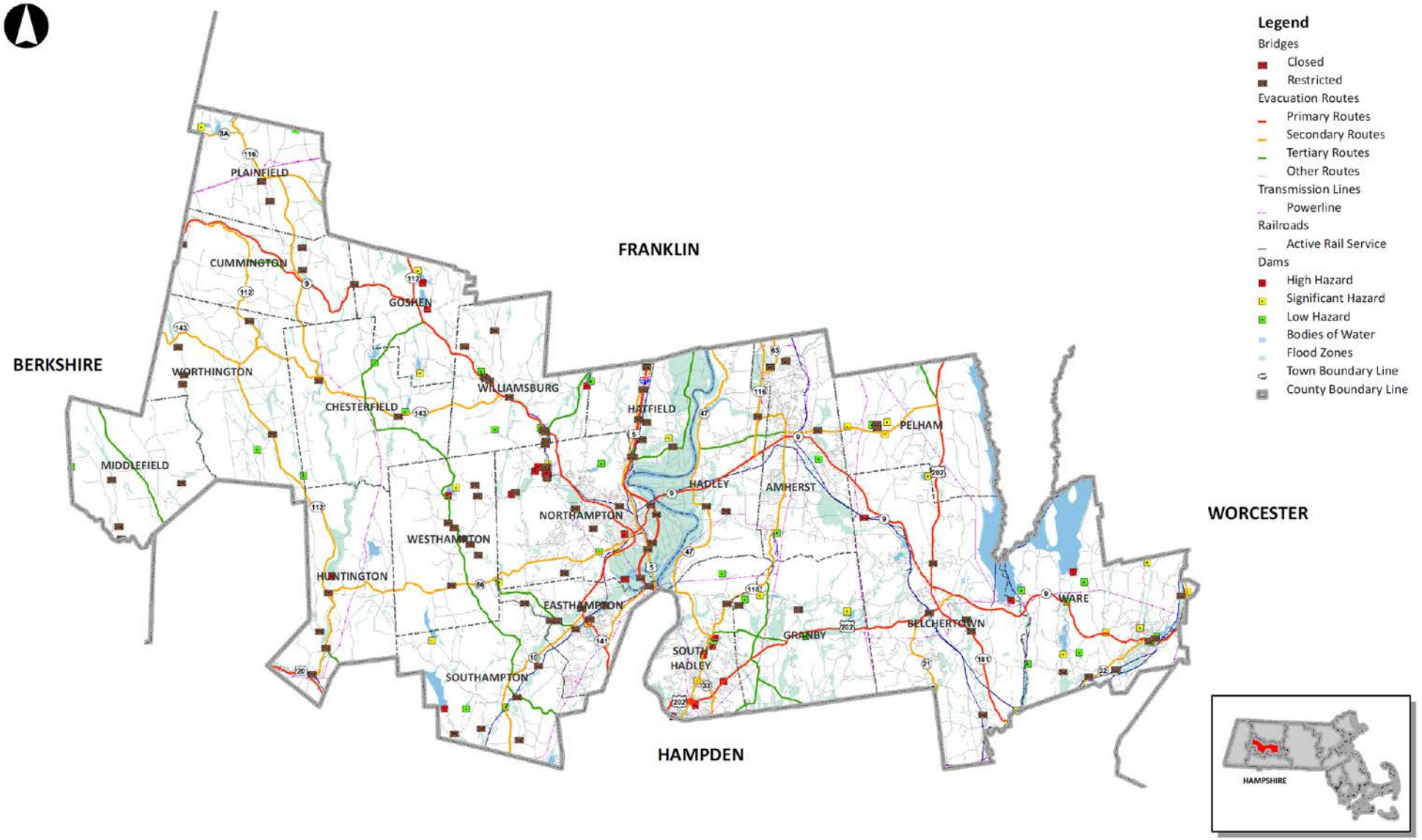


Figure 7-2 – Evacuation Routes and Water Hazards in Hampshire County



C. MASSACHUSETTS COMPREHENSIVE EMERGENCY MANAGEMENT PLAN

The Massachusetts Comprehensive Emergency Management Plan (CEMP) outlines the system that will be used to prevent, prepare for, respond to, and recover from emergencies and disasters. The Transportation Chapter of the CEMP specifically outlines the responsibilities of state agencies and the protocol to be followed in supporting the transportation activities related to an event, emergency, or disaster. Last updated in May of 2013, the CEMP is maintained by the Massachusetts Emergency Management Agency (MEMA).

1. eCEMP

The eCEMP, or the Electronic Comprehensive Emergency Management Plan is an online web application designed to provide community emergency management officials with the ability to directly view and update their respective CEMP information. It is a login/password protected website that allows the end user to navigate through menus to add, update or edit information and GIS data, as well as to generate copies of the CEMP, GIS maps and inventory reports.

D. IMPROVING REGIONAL SECURITY

Although the region has made great strides in identifying and addressing potential threats to transportation security, additional deficiencies remain that must be addressed. The following sections summarize the regional needs and strategies that should be considered by the Pioneer Valley MPO to increase transportation security in the region.

A key component of homeland security is the ability to work with federal, regional, local, and private partners to identify the critical infrastructure that is at the greatest risk and take the necessary steps to mitigate these risks. This begins through the identification of our critical links in the transportation infrastructure and the agencies responsible for the maintenance and security of these areas. This is an ongoing process that is defined in the State Homeland Security Strategy (SHSS) for the Commonwealth of Massachusetts. The following needs have been identified as part of the SHSS.

- Continue to establish a prioritized list of potential targets and potential methodologies of attack.
- Share target lists with key officials.
- Identify conditions that may facilitate the ability of a terrorist to carry out an attack.
- Disseminate important information to key entities and support the development and implementation of risk mitigation efforts.
- Develop and track defined performance metrics that will allow for performance based management of risk mitigation efforts.

CHAPTER 8

CONGESTION

A. INTRODUCTION

No one likes to be stuck in traffic. Roadway congestion is frustrating because its causes are usually out of the driver's control. Further, what seems like a "major traffic jam" to one person might be "just a little delay" to another. In either case, the consequences of excessive traffic congestion are real: aggressive driving, decreased personal safety, and, eventually, stifled community development. The environment also suffers. Stop-and-go traffic needlessly increases greenhouse gas emissions from vehicles and wastes fuel. Congestion also wastes people's personal and professional time.

Understanding where and why traffic congestion is happening is an important step toward reducing it. The Pioneer Valley Congestion Management Process (CMP) identifies the major traffic congestion spots in the 43 cities and towns of our region. This information is essential in advancing future transportation improvements that will reduce traffic congestion and improve the overall safety and efficiency of our transportation network.

The CMP is an integrated planning activity. It supports the Metropolitan Planning Organization (MPO) planning process for regional transportation infrastructure, maintenance, and operating investments. In addition, CMP activities and information are valuable to planning at the municipal level for non-federal transportation investments, as well as for decision-making about land use, environmental protection, housing and community development.

CMP activities are iterative. They are intended to identify existing deficiencies in the regional transportation system through ongoing monitoring and analysis of key performance measures. These performance measures themselves may evolve as a region's transportation capacities, needs, and shortcomings change.

CMP activities are comprehensive. They involve multiple agencies at all levels of government and stakeholders in communities large and small.

PVPC developed a vision to provide a framework for the development of the CMP.

VISION

The Pioneer Valley Congestion Management Process identifies, evaluates, monitors, and implements transportation performance measures that enhance the safety and efficiency of the movement of people, goods, and information.

1. Regulatory Context

The current transportation reauthorization bill Moving Ahead for Progress in the 21st Century (MAP-21) retains the CMP requirement of the Safe Accountable Flexible Efficient Transportation Equity Act – a Legacy for Users (SAFETEA-LU) of 2005. In addition, MAP-21 features a new federal emphasis on performance measurement.

CMP activities are a continuation of the predecessor Congestion Management System (CMS) process established by the 1991 federal Intermodal Surface Transportation Efficiency Act (ISTEA). PVPC has continuously engaged in congestion monitoring and analysis consistent with federal guidance in support of the MPO process.

The CMP builds on the seven original steps of the original CMS guidance and adds an eighth step identified in bold below.

- Develop congestion management objectives;
- Identify areas of application;
- Define system or network of interest;
- Develop performance measures;
- Institute system performance monitoring plan;
- Identify and evaluate strategies;
- Implement selected strategies and manage transportation system;
- Monitor strategy effectiveness.

2. CMP Development Process

The CMP builds on previous versions completed for the Pioneer Valley Metropolitan Planning Organization. Consistent with Federal Highway Administration (FHWA) guidance, the CMP process for the Pioneer Valley has been broadened to better incorporate assessment of the congestion impacts and benefits experienced by transit, cyclists, and pedestrians. This necessitated a significant review and expansion of performance measures. PVPC therefore took this opportunity to engage in a public and agency review of CMP performance measures. Steps included:

- Generate draft performance measures for all transportation modes;
- Engage agency participants and stakeholders in review of draft measures;
- Identify performance measures and timeframe for availability;
- Develop implementation measures and timeframe for action;

- Data collection and analysis;
- Public review of preliminary findings.

3. Performance and Implementation Measures

The goal of the CMP is to identify, evaluate, and implement transportation performance and implementation measures that enhance the safety and efficiency of the movement of people, goods, and information throughout the Pioneer Valley. In order to achieve this goal PVPC identified the performance measures necessary to obtain the data needed to fulfill this goal. Performance measures included in the CMP are summarized in Table 8-1. The status of each performance measure is based on the availability of existing data. Ongoing performance measures have data which is currently collected by the PVPC or available from partner agencies. Immediate performance measure data is not currently available but is anticipated to be available in the near future. Future performance measure data is also not available but is highly desirable for use in future CMP activities.

Table 8-1 – CMP Performance Measures

Performance Measure	Status
Monitor on-time performance, ridership, and customer satisfaction for all transit and paratransit services of the Pioneer Valley Region	Ongoing
Develop regional route Congestion Ratio, Delay per Mile, and Congestion Index through collection of travel time data.	Ongoing
Inventory and monitor pavement conditions for all federally aid eligible roadways.	Ongoing
Increase awareness and availability of park-and-ride lots in the Pioneer Valley region.	Ongoing
Monitor and update the inventory of bicycle lanes and trails in the region.	Ongoing
Increase the percentage of bicycle rack utilization on buses.	Ongoing
Increase customer satisfaction levels of the bus terminal and shelters.	Ongoing
Increase and inventory the number of municipal bicycle racks in the region.	Ongoing
Identify regional auto/transit mode split.	Future
Identify systemwide transportation alternatives and monitor, update, and increase the number of intermodal transfer points.	Future
Decrease the number of structurally deficient and functionally obsolete bridges.	Ongoing
Identify safe alternate heavy vehicle routes in the region.	Ongoing
Map travel time contours to show distance traveled in 15 minute intervals.	Ongoing
Identify off-ramps that are operating at above capacity.	Immediate
Increase efficiency of rail systemwide.	Immediate
Improve LOS on major intermodal connector routes to the National Highway System.	Future
Monitor and update the percentage of areas without broadband access.	Ongoing
Increase the number of ITS based cameras, variable message boards, and detection units in the PVPC	Ongoing
Continue to utilize car based GPS travel time data collection.	Ongoing
Identify and monitor the number of closed-loop traffic signal systems in the Pioneer Valley.	Immediate
Improve access to advance information on ongoing construction activity.	Immediate
Develop an inventory of traffic signals with video detection capability.	Immediate
Data sharing with regional public and private partners.	Ongoing
Provide more advance information for transit riders on anticipated vehicle arrival time.	Ongoing
Monitor the average incident response time	Future
Monitor Peak hour loading vs. vehicle rated capacities (load factors).	Ongoing
Monitor transit vehicle crash rate and identify high crash locations	Ongoing
Monitor PVTA customer satisfaction related to safety throughout the PVTA system.	Ongoing
Monitor the EPDO ranking at intersections in the region	Ongoing
Monitor the percent of the Federal Aid Eligible Roadway Network rated in “Poor” condition.	Ongoing
Identify communities in the Pioneer Valley with a Safe Route to School Program.	Ongoing
Annual totals of fatalities and injuries caused by motor vehicle crashes.	Ongoing
Develop Transit Severity Ranking based on the information available from the PVTA AVL	Immediately

4. Recurring and Non-Recurring Congestion

There are two types of congestion: recurring and non-recurring. Recurring congestion can be expected to occur at the same time every weekday as a result of high volumes of commuter traffic traveling on roadways that are at or near their carrying capacity. Non-recurring congestion occurs as a result of an unexpected or non-typical event. Some causes of non-recurring congestion include: vehicular crashes, vehicle breakdowns, roadway construction, inclimate weather, and additional traffic resulting from special events.

Previous versions of the Pioneer Valley CMP only included the impacts of recurring congestion. In the past, travel time data that was thought to have been influenced by unexpected events such as roadway improvement projects or vehicle breakdowns was not used. The CMP now incorporates all regional travel time data regardless of the cause of congestion or its perceived severity. A number of new performance measures have also been developed to include the impacts of non-recurring congestion in the CMP.

5. CMP Corridors

The CMP corridors are the basis for all data collection and analysis. When developing the corridors, PVPC staff utilized data and results from previous CMP reports, past congestion relief studies, and general knowledge of the region. This information was used to develop the CMP corridor map of 76 unique corridors that are presented in Figure 8-1.

It is difficult to ensure that every congested roadway in the region is being monitored. While CMP activities are both interactive and comprehensive, the availability of resources and data guides the assessment of congestion in the region. As technology continues to advance, data will become more readily available allowing more corridors to be analyzed in the CMP. PVPC will consider adding corridors at the request of a communities' chief elected official. If requested to do so, PVPC will perform 3 days of travel time data collection. If the data verifies congestion, PVPC will consider adding the corridor. Likewise, PVPC can discontinue a corridor if the corridor is not congested.

a) Travel Time Data Collection

Travel time data collection on the 73 CMP corridors is facilitated by a four-year data collection cycle. A data collection year is scheduled to correspond with an average academic school year beginning in early September and ending in late May. Data collection is restricted by factors to include but not limited to inclement weather, federally observed holidays, and school vacations. The data is collected for each corridor on multiple days and in

both directions during the AM and PM peak hours (7:00 AM - 9:00 AM and 4:00 PM - 6:00 PM). Drivers are instructed to travel with the flow of traffic but not exceed the posted speed limit for each 2 hour data collection period.

B. REGIONAL ROADWAY CONGESTION SEVERITY

The PVPC reviewed each of the ongoing performance measures with respect to their impacts on congestion severity. In previous versions of the CMP, congestion severity was defined solely by the total delay and congestion ratio calculated for each CMP corridor. As new performance measures are integrated into the CMP it becomes more difficult to quantify congestion as each corridor has a number of different factors that contribute to congestion.

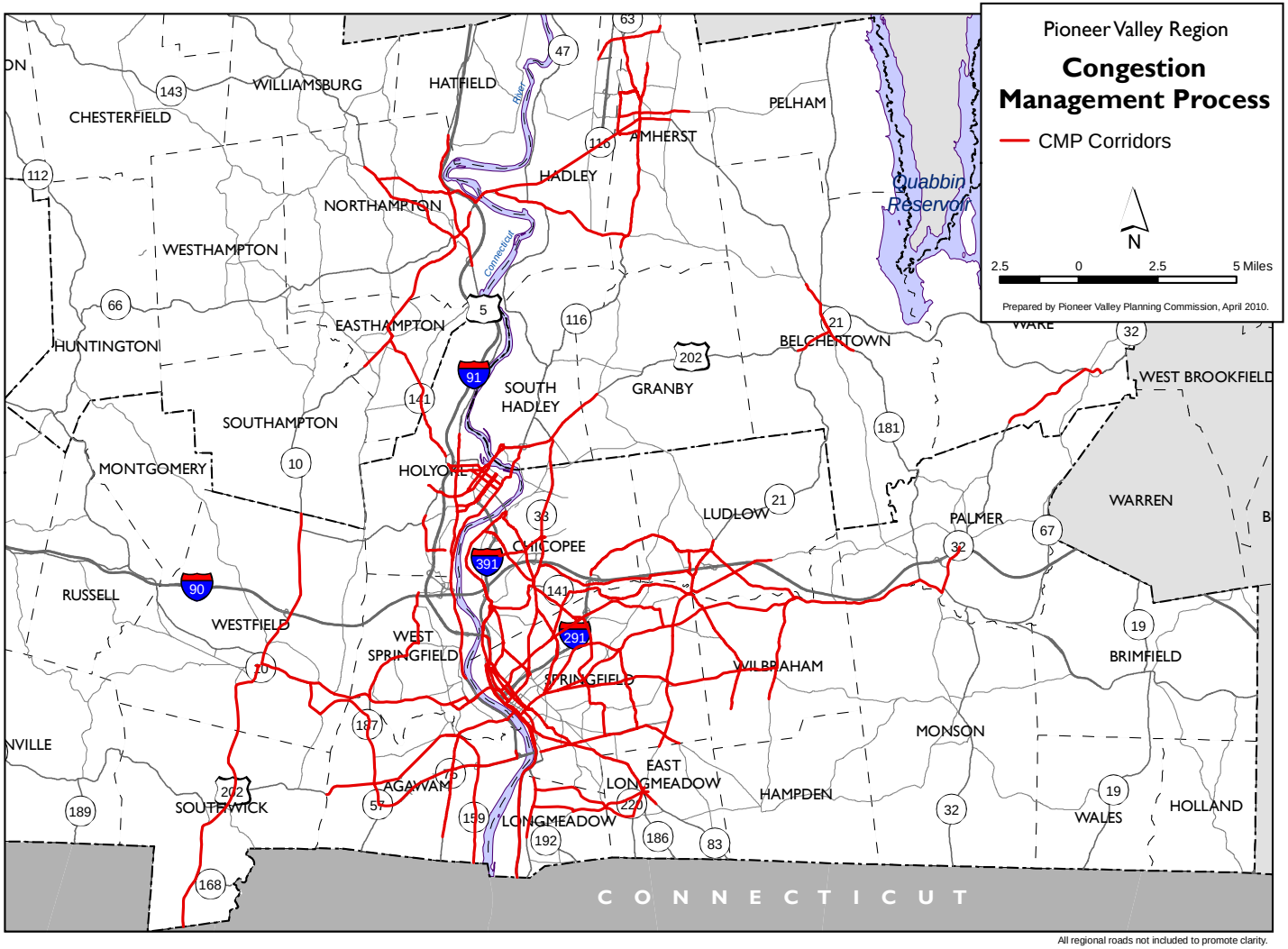
A Regional Congestion Severity formula was developed to assist in our goal of developing an objective driven, performance based congestion management process that incorporates both recurring and non-recurring congestion. This formula is intended to be a dynamic metric that can be modified to incorporate Immediate and Future performance measures as data becomes available. A number of variations of this formula were tested. Each variation attempted to incorporate a variety of performance measures that considered the impacts of a variety of transportation modes on regional congestion. The current version of the formula includes data from six performance measures and integrates the impacts of non-recurring congestion, roadway geometry, and bridge conditions in addition to travel time data.

$$\text{Regional Congestion Severity} = \text{AVG}\left(\text{Inverse Ranking of: } \text{Travel Time Index} + \text{Travel Time Delay} + \text{Congestion Ratio}\right) + 5 \times \left(\frac{\#\text{ High Crash Locations}}{\text{Length of Corridor}}\right) + \left(3 \times \text{Structurally Deficient Bridge Total}\right) + \left(2 \times \text{Functionally Obsolete Bridge Total}\right)$$

1. Methodology

Currently, there are a total of 73 CMP corridors with available travel time data. Travel time data for each CMP corridor was ranked based on the inverse value of each of the travel time performance measures. The ranking scheme ranges from 1 to 73 with a value of 73 indicating the highest level of congestion and 1 indicating the lowest level of congestion. A weighted average was performed of the inverse rankings of each performance measures and the average values were again inversely ranked. Priority on corridors that had the same rank was given to the corridor with the higher Travel Time Index. This total was added to the number of high crash locations, structurally deficient bridges and functionally obsolete bridges along each of the CMP corridors. Additional information on the six performance measures currently used in the Regional Congestion Severity formula is provided below.

Figure 8-1 – CMP Corridors



- Travel Time Index is the ratio of the average peak travel time to a free-flow travel time. Index values can be described as an indicator of the length of extra travel time spent during a trip. A travel time index of 1.0 represents free-flow travel conditions in which there are no delays. Any congestion increases the travel time index.
- Travel Time Delay is defined as the difference between the second worst and second best travel time in seconds per mile.
- Travel Time Congestion Ratio is defined as the second worst travel time divided by the second best travel time.
- High Crash Locations as defined in the Top 100 High Crash Intersections in the Pioneer Valley Region report were plotted along each of the CMP corridors. The number of high crash locations was divided by the distance of the corridor in miles, thus placing a greater emphasis on the concentration of crashes rather than total experience. This figure was then multiplied by a factor of 5 to increase its weight in the regional congestion severity formula.
- Structurally deficient and functionally obsolete bridges occasionally require vehicles to travel alternate routes, create bottlenecks due to lane elimination or lack of exclusive turning lanes, and influence driver confidence resulting in deceleration. Each structurally deficient bridge and functionally obsolete bridge located within a corridor was multiplied by the value of 3 and 2 respectively.

2. Congestion Severity Descriptions

The values produced for each corridor by the Regional Congestion Severity formula are ranked to create a congestion severity table ranging from the most to the least congestion. For analytical and evaluative purposes, four descriptive levels of congestion were created. The corridors were grouped into 21 severely congested corridors, 17 seriously congested corridors, 23 moderately congested corridors, and 12 minimally congested corridors based on their calculated severity value. Each Level is explained below.

a) Severe Congestion

Severe congestion is characterized by a condition of heavy traffic congestion resulting in significantly slower traveling speeds, longer trip times, significant queuing and high side-street delay. Contributing factors include vehicle volume, pedestrian volumes, multi-purpose lane utilization, multi-modal utilization and availability, functionally obsolete and structurally deficient bridges, vehicle crashes and uncoordinated signalized intersections. These corridors will greatly benefit from further study to identify recommendations useful in relieving congestion. These corridors are operating above capacity and driving conditions are highly unstable.

b) Serious Congestion

Serious congestion is characterized by a condition of medium traffic congestion approaching unstable flow caused by slower travel speeds, queuing and increased levels of delay. Contributing factors include vehicle volumes, pedestrian volumes and the number of signalized and unsignalized intersections along the corridor. These corridors operate at or near capacity.

c) Moderate Congestion

Moderate congestion is characterized by a condition of stable traffic congestion and flow, non-sporadic travel speeds and reasonable trip times. Contributing factors include reasonable traffic volume and opportunities for non-recurring congestion. These corridors may have small pockets of congestion, but generally operate at posted speed limits.

d) Minimal Congestion

Minimal congestion is characterized by a condition of ideal traffic congestion operating at desired travel speeds, with reasonable trip times and little to no queuing or delay. These corridors are ideal for commuting purposes and operate at free-flow travel speeds.

3. Findings

The results of the Regional Congestion Severity formula are summarized in Tables 8-2 – 8-5 and Figure 8-2. Based on the new rankings, 21 of the 73 corridors are classified as severe, 17 as serious, 23 corridors as moderate, and 12 corridors as minimal. The regional congestion severity rank has been color coded for map readability. The rankings have been defined as follows; Severe Congestion is color coded red, Serious Congestion is color coded orange, Moderate Congestion is color coded yellow, and Minimal Congestion is color coded green. The column tilted Previous Rank is the Rank for each corridor based on the 2010 CMP update.

Of the 15 corridors ranked as Severe Congestion in 2010, 8 of the corridors are still listed as severe, but 3 of the 15 are now ranked as serious congestion and 4 are ranked as moderate Congestion. This is likely a result of now having updated travel time data for all 73 corridors (6 previously un-scored corridors are now classified as having severe congestion) and completed transportation improvement projects.

Table 8-2 – Corridors with Severe Congestion

Severity Rank	Previous Rank	Corridor	Community	Route Name	Congestion Severity Total
1	12	84	Springfield/Chicopee	St, James St from State St to Broadway (Chicopee)	77.78
2	NA	78	Springfield Chicopee	Beginning Main St at Center St (Chicopee City Line) travel southbound on Main St ending at State St	74.02
3	13	25	Springfield	Sumner Ave - Longhill Road to East Longmeadow TL	73.43
4	1	69	Holyoke	AM Run Hampden St. from Route 202 Rotary to I-91, PM Run Dwight Street from I-91 to Route 202 Rotary	73.21
5	NA	58	Ware	Beginning at the intersection of Route 32 (Palmer Road) and Bacon Road traveling northbound to Route 9 (Main St), continuing eastbound ending at the intersection of Route 9 and Knox Ave	72.67
6	2	75	Chicopee	Chicopee St from Florence St to Front St, Front St to Cabot St, Cabot St to Exchange St, Exchange St to Center St, Center St to Front St Front to Grove St, Grove St to Main St, Main St to East Main St ending at Maple St.	71.06
7	NA	70	Holyoke	Beginning at the intersection of Dwight St and Linden St traveling southbound on Dwight St ending at the intersection of Dwight St and South Main St	70.67
8	11	79	Springfield	E. Columbus Ave - From Bruno Street to Liberty Street	65.88
9	6	74	Chicopee	McKinstry St. from Arcade St to Granby Rd, Granby Rd to Westover Rd ending at Bernice St	65.82
10	23	12	Springfield	Rt 21(Parker St) - N. Branch PKWY to East St.	63.22
11	26	31	Westfield	Rt. 20 - E. Mountain Rd. to Elm St.	62.01
12	NA	83	Springfield	Dickinson St, Maple St, and Chestnut St from the X to Dover St Dwight St, Maple St, and Dickinson St from Dover St ending at the X	60.83
13	NA	68	Holyoke South Hadley	Beginning at the intersection of Main Street (Holyoke) and Route 5 (Ingleside St) travel eastbound on Main St to Race St to Canal St northbound on Route 116 (Vietnam Veterans Memorial Bridge) to Bridge St (South Hadley) Lamb St. (Route 116) ending at the intersection of Lamb St and Gaylord St	59.47
14	15	77	Springfield	Liberty St - From West Columbus Ave to Amory St, Armory St north to Atwater Ter	57.67
15	NA	57	South Hadley Granby	Beginning at the exit to the Route 202 Rotary and Purple Heart Dr traveling eastbound on Route 202 (Granby Rd) into Granby ending at the Five Corners (Pleasant/Amherst St intersection)	57.01
16	18	80	Springfield	W. Columbus Ave - From Clinton Street to South Street	55.33
17	8	66	Agawam	Route 75 from Long Brook Estates to Colony Road	54.33
18	NA	61	Ludlow	Beginning at the intersection of Chapin St and Holyoke St traveling eastbound on Chapin St through Ludlow into Wilbraham on Cottage Street ending at the intersection of Cottage St and Boston Road (Wilbraham)	54.33
19	54	11	Longmeadow	Route 5 - Mill Rd. to I-91	53.67
20	47	41	Hadley/Northampton	Bay Rd. - From Atkins corner to Route 9	53.00
21	28	8	E. Longmeadow / Springfield	Rt. 83, Springfield st. - Sumner Ave.. to Quaryhill Rd.	51.61

Table 8-3 – Corridors with Serious Congestion

Severity Rank	Previous Rank	Corridor	Community	Route Name	Congestion Severity Total
22	5	42	Holyoke	Maple Street from Lyman to Route 5 via South Street	49.60
23	20	67	Amherst	Snell Street from Route 116 north to University Drive, East on Mass Ave, South on N Pleasant St., North on East Pleasant ending at Eastmen Lane.	49.00
24	19	52	Springfield	Bay St. from Boston Rd to State St.	48.88
25	NA	7	Chicopee	I-291, Burnett Rd - Exit 5 to Holyoke St (Ludlow) to Chapin to Fuller to West Ave.	48.33
26	4	71	Holyoke	Appleton Street from Dwight to North Canal Street	48.24
27	NA	65	Agawam	Beginning on Route 159 (Main Street) from Ct Stateline traveling northbound on Route 159 to Springfield Street ending at the intersection of Springfield St and Columbus St.	46.67
28	NA	63	Longmeadow East Longmeadow	Beginning at the intersection Converse St and Route 5 (Longmeadow St) traveling Eastbound to Dwight Street southbound on Dwight St to Chestnut St (East Longmeadow) travel eastbound on Chestnut St to Shaker Rd then northbound on Shaker Rd to Elm St ending at the intersection of Elm St and Taylor St.	46.33
29	34	23	Springfield	Rt. 20A - From East St to Page, Page to Paco to Boston Road, Start and end @ St. James and Carew	46.18
30	50	36	Wilbraham	Main St - Tinkham Rd/Main to Cottage/Boston Rd	46.00
31	39	15	Northampton	Rt. 9 - Florence St. to Day Ave	44.00
32	40	14	Hadley/Northampton	Bridge St at Route 9 to Damon Road -Damon Rd to Bridge/Main to Rt. 9 Aqua Vita	41.67
33	17	18	Springfield	Main St., Locust St., Belmont Ave. - State/Main to Belmont (The X)	41.67
34	14	22	Springfield	Roosevelt Av. - Sumner to East St.	41.44
35	29	21	Springfield/Chicopee	Liberty St - From I-291(Go thru rotary) to Broadway (Chicopee) to I-90 Exit 5	41.00
36	NA	55	Springfield	Beginning at the intersection of Parker St and the North Branch Parkway traveling southbound on Parker St to Cooley St continue southbound on Cooley St ending at the East Longmeadow T.L.	40.88
37	NA	62	Chicopee Ludlow	Beginning at the intersection of Fuller Rd and Route 33 Memorial Dr eastbound on Fuller Rd to Shawinigan Drive to West Ave ending at the intersection of West Ave and Center Street (Ludlow)	40.31
38	51	20	West Springfield/ Springfield/Chicopee	North Boulevard to South Boulevard to Rotary to Plainfield Street to Carew Street ending at East Main Street (Chicopee)	40.18

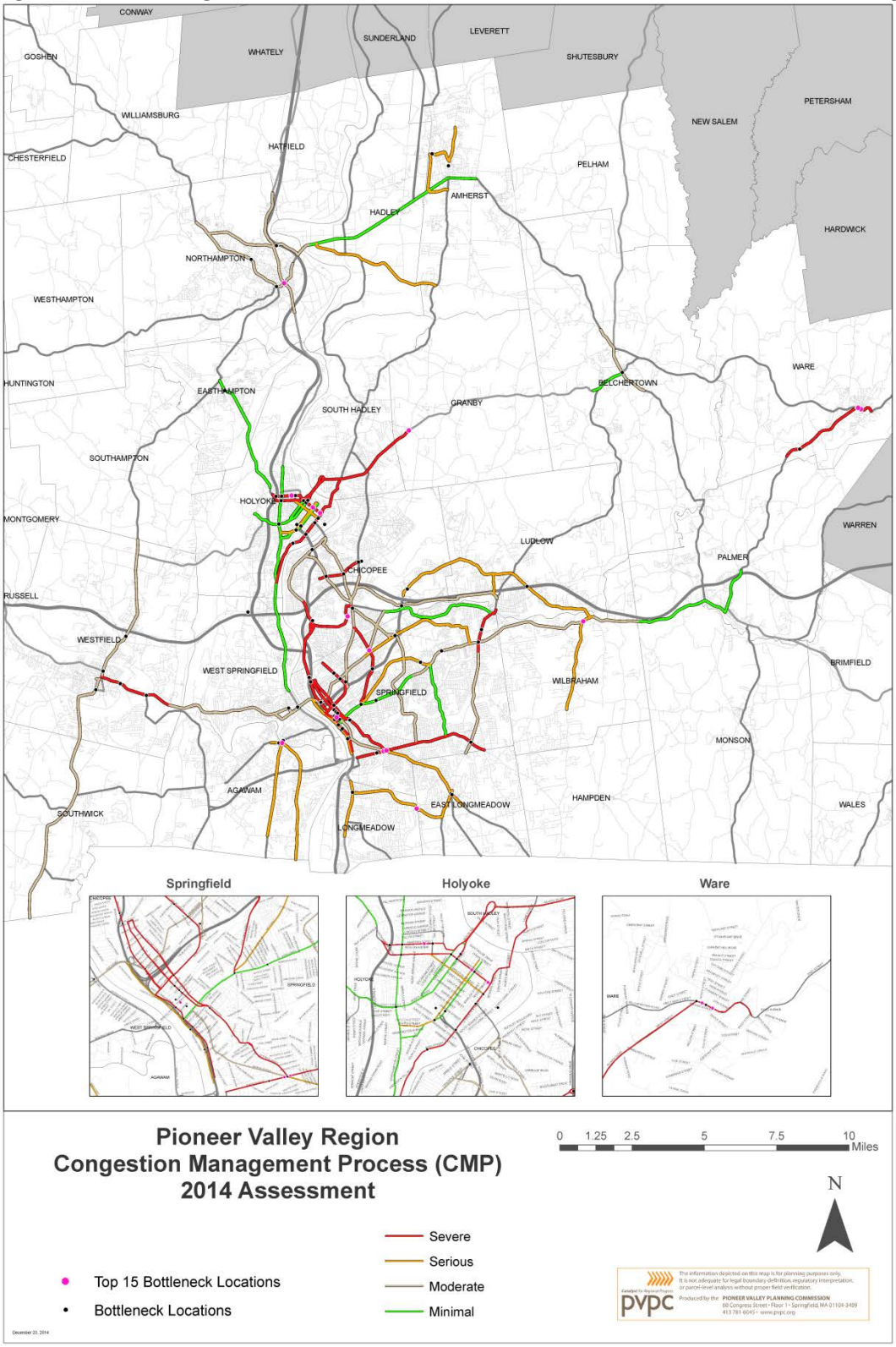
Table 8-4 – Corridors with Moderate Congestion

Severity Rank	Previous Rank	Corridor	Community	Route Name	Congestion Severity Total
39	16	51	Northampton	Route 5 Exit 18 to MassHighway District 2 Building	39.85
40	46	39	Belchertown	Route 9/181 Federal St from Bay to Route 181n at Jensen Road (Belchertown)	39.00
41	7	72	Chicopee	Chicopee St from Willamansett Bridge to Yelle St, Yelle St to Montgomery Street, Montgomery St to Memorial Dr (Route 33)	37.21
42	42	49	Springfield/Wilbraham	Rt. 20 / Boston Raod - All of Boston Road	36.88
43	36	33	Westfield/Southwick	Rt. 10/202 - CT Line to Washington St. (Law Offices)	36.00
44	3	30	Westfield	Rt 10/202/, N. Elm St. from Southampton T.L. to Main St.	34.68
45	21	73	Chicopee	Grattan St from Chicopee St (Route 116) to Memorial Dr (Route 33)	34.67
46	22	28	West Springfield	Rt. 20 - East Mountain Road to Elm Street to Park Street to North End Rotary.	33.04
47	33	86	Springfield/Chicopee	East Main St (Chicopee) to Worcester St (Springfield) to Main St (Indian Orchard) to River Rd ending at Weston St.	32.67
48	10	9	Holyoke	Laurel St to Brown St to South St to High Street ending at Lyman St.	32.09
49	27	85	Springfield	Bradley Rd from Sumner Ave to Boston Rd	31.85
50	41	50	Easthampton	Route 141 from Route 10 to I-91	31.67
51	NA	59	Belchertown	Beginning at the intersection of Route 202 (State St) and Underwood St traveling eastbound and then northbound on Route 202 (Maple St and Main St) ending at the intersection of Route 202 (North Main St) and Sargent St	30.33
52	9	44	Holyoke	Jarvis St/ Beech St. - from George Frost Dr to Rt 202 Rotary and back up Linden St to Georg Frost Dr	29.67
53	35	27	West Springfield / Holyoke	Rt. 5 - E. elm St to Providence Hospital	28.98
54	44	53	Palmer	Route 32 from High St. to Route 20 to Boston Rd.	27.67
55	32	24	Springfield	State St. - Columbust Ave. to Boston rd	26.84
56	24	37	Holyoke	Rt. 5 - River Terrace to Providence Hospital	26.77
57	49	56	Hadley	Route 9 from Aquavita Rd to Belchertown Road (Amherst)	26.67
58	30	82	Springfield	Springfield Street from Center at Chicopee to Chestnut to Main to Bernie end at West Street	24.00
59	25	2	Agawam	Springfield St - Mill Street (Agawam) to Memorial Ave (West Springfield) to Main St (Springfield)	23.57
60	57	48	West Springfield	Dewey, Pease, Morgan, Birnie - Dewey/Rt 20 to Birnie/Prospect	23.33
61	NA	54	Springfield	Beginning at the Intersection of Wilbraham Rd and State St traveling eastbound on Wilbraham Rd, Wilbraham Rd turns into Springfield St (Wilbraham) ending at the intersection of Springfield St and Main St	22.98

Table 8-5 – Corridors with Minimal Congestion

Severity Rank	Previous Rank	Corridor	Community	Route Name	Congestion Severity Total
62	NA	64	Longmeadow East Longmeadow	Beginning at the intersection of Bliss St and Route 5 (Longmeadow St) traveling eastbound on Bliss St to Williams St eastbound on Williams St to Maple St (East Longmeadow) eastbound on Maple St to Pleasant Street ending at the intersection of Pleasant St and Taylor St.	20.67
63	NA	19	Springfield Longmeadow	I-91 Exit 12 to CT Exit 49	19.67
64	38	40	Chicopee	Memorial Dr. Rt. 33 - From Rout 202 to I-90	19.67
65	31	35	Wilbraham	Stony Hill Rd. - Tinkham Rd to River Rd to Route 21	18.47
66	53	16	Northampton/Easthampton	Rt. 10 - Donais St. to Route 9	17.33
67	55	1	Agawam	Rt. 57 - Rt. 5 on Ramp to end of Rt 57, N on RT 187, West of old 57 to Southwick T.L.	15.31
68	45	13	Ludlow	Center St. and East St. - Rood Street to Owens Way	15.26
69	37	10	Holyoke	Lower Westfield Rd., Homestead Ave - Elbert Dr. to Holyfamily Rd.	13.22
70	52	5	Amherst	Meadow St., Pine St., Bridge St., and Market Hill - Market and South Hills to Meadow and Roosevelt	10.00
71	NA	60	Amherst	Beginning at the intersection of Main St and Poets Corner Rd traveling westbound on Main st St to Amity St ending at the intersection of Rocky Hill Rd and North Pleasant St in Hadley.	9.33
72	48	3	Agawam	Route 75 from Mill Street to Main Street	7.00
73	56	4	Agawam	Route 187 - From Route 20 (Westfield) to Springfield St (Agawam), Springfield St to Mill ST.	6.85

Figure 8-2 – Congested Corridors and Bottlenecks in the Pioneer Valley



C. REGIONAL TRANSIT CONGESTION SEVERITY

Congestion is perceived in different ways depending on the type of transportation mode being used. Single occupancy automobile drivers often see congestion as how often they are forced to travel at less than the posted speed limit, while users of public transportation may perceive congestion as how often do they arrive at their destination on late or whether there are any seats available on the bus. This section discusses the various measures PVPC in cooperation with PVTA have access to. Based on these measures PVPC will develop a transit congestion severity formula for measuring transit congestion on our CMP corridors.

PVTA has a fully integrated CAD/AVL system by Avail Technologies. This system allows for real-time system monitoring by PVTA. The Avail system provides a suite of ITS technologies which improve the ease of collecting major transit performance measures such as; ridership, on time performance, as well as revenue mileage.

1. Regional Transit System Ridership

FHWA guidance cites transit ridership as a key CMP performance measure. Bus ridership is typically reported on an annual and monthly basis for individual routes. Following are PVTA ridership highlights for FY2013:

- 11.1 million total rides
- 927,000 average monthly rides

PVTA full system ridership from 2003 through 2013 is displayed Figure 8-3. Significantly, PVTA cut service approximately 20% in FY2002 and subsequent years in response to reduced government support; total ridership fell as a result.

In 2014 Nelson Nygaard performed a Comprehensive Service Analysis (CSA) on behalf of PVTA. The objective of the CSA was to conduct a detailed review of existing transit services, identify strengths and weaknesses, and develop recommendations to improve service for existing riders and attract new riders. Specifically the goals of this study were to ensure that PVTA services:

- Continue to meet and support community needs
- Provide an attractive transportation option for as many people as possible
- Operate in a cost effective and efficient way

PVTA is currently in the process of phasing in the recommendations of the CSA. Once implemented it is anticipated that these service changes will increase ridership throughout the region. For more information regarding the CSA please go to http://pvta.com/csa.php .

Figure 8-3 – PVTA Ridership 2003-2013

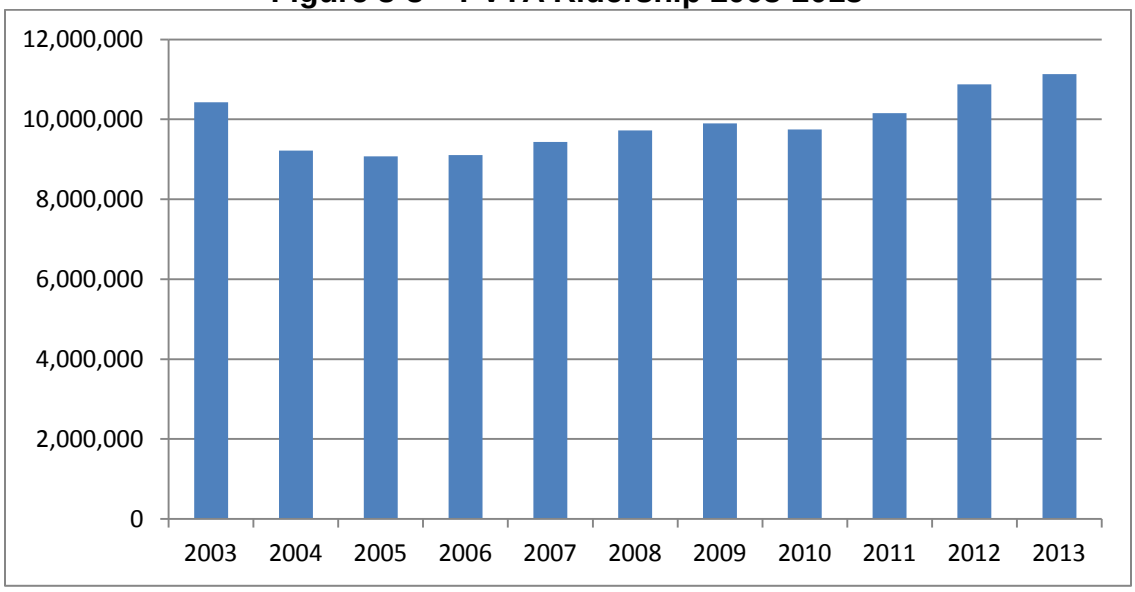
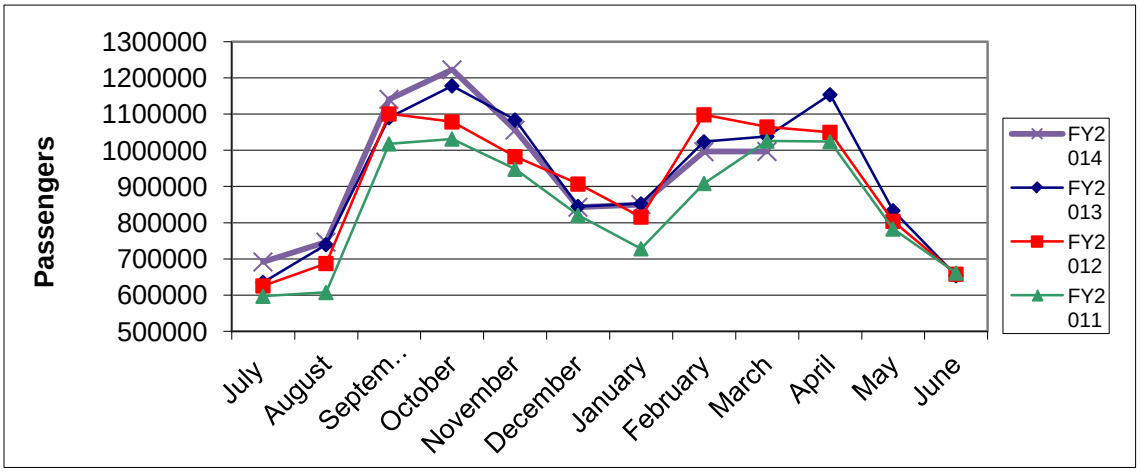
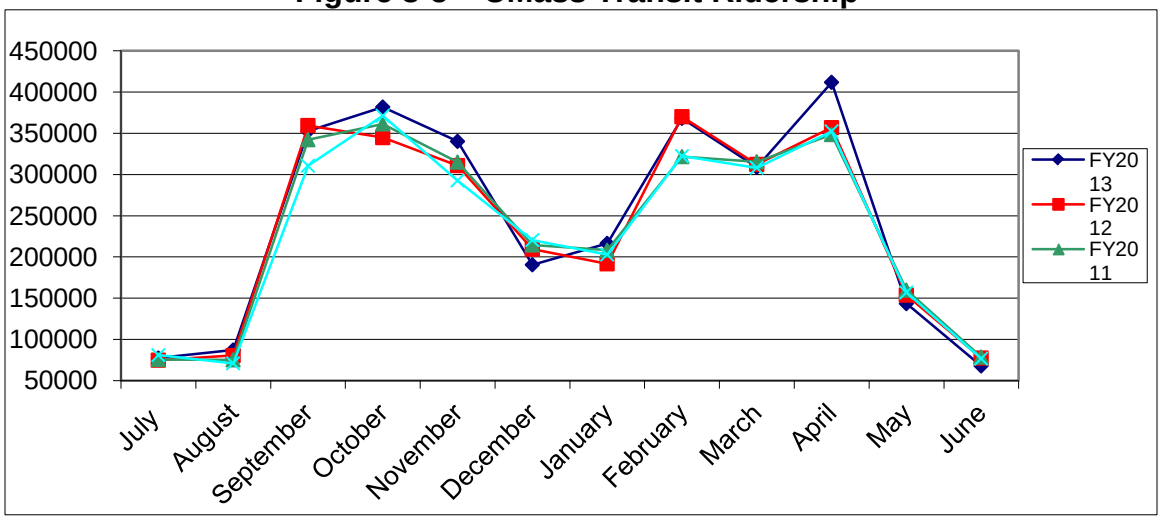


Figure 8-4 – SatCo and VatCo Combined Ridership



SatCo = Springfield Area Transit Company
VatCo = Valley Area Transit Company

Figure 8-5 – UMass Transit Ridership



1. Transit On-Time Performance

Transit on time performance information is cited by FHWA guidance as an important performance measure in CMP analysis. Industry research tends to show that transit passengers are willing to tolerate longer trips as long as they can be certain they will arrive on time.

Since PVTA implementation of the CAD/AVL system, on-time performance for each route became much more readily available. Therefore, transit on time performance information is now being incorporated as a performance measure.

Table 8-6 – Operational Statistics 2012 and 2013

2013 Operational Statistics

Provider	% On Time	% Late	% Early	Number of Departures
UMASS Transit	89.4	5.1	5.5	433060
VatCo	66.2	26.7	7.1	140380
SatCo	67.6	21.4	11	869833

2012 Operational Statistics

Provider	% On Time	% Late	% Early	Number of Departures
UMASS Transit	86.6	6	7.4	295516
VatCo	64.3	27	8.7	142724
SatCo	65.7	21.6	12.7	846225

SatCo = Springfield Area Transit Company
VatCo = Valley Area Transit Company

2. Transit Congestion Severity Ranking

PVPC is in the process of developing a transit congestion severity ranking. This measure will help quantify the number of transit users being impacted by delays on the PVPC CMP corridors.

In order to develop a Transit Severity Ranking PVPC will overlay PVTA's fixed routes on the CMP corridors in order to identify locations were bus occupancy and on time performance can be measured against the results of the regional roadway congestion severity analysis (see Figures 8-6 and 8-7). By doing this we can identify the number of transit users, number of buses, and the number of routes being influenced by congestion. This analysis may also help identify correlations between automobile delay and transit OTP. By including ridership we can then calculate the number of transit travelers being impacted by congestion.

For the RTP we will be including two routes for this analysis. The full system analysis will be completed at a later date as part of the CMP update. The routes being looked at are the Northampton portion of the Blue 43, this transit route corresponds to CMP corridor 15 (Route 9 in Northampton). The second route being looked at is the G1, this transit route corresponds with CMP corridor 78 (Main Street in Springfield). These two CMP corridors were selected based on their high congestion severity ranking. The two transit routes selected also experience high ridership.

Table 8-7 – Transit Severity Data

Transit Route	Average Ridership	Maximum Riders	Alights	Boardings	Number of buses	Number of Trips	Corridor 78 Main Street - Springfield	
G1 NB am	12	28	150	89	7	5	Severity Rank (Score)	2 (74.02)
G1 SB am	15	27	116	141		6	Delay	434.21
G1 NB pm	13	36	163	116	13	6	Ratio	7
G1 SB pm	19	38	105	188		13	Index	2.03
Average	**14.75**	**32.25**	**133.5**	**133.5**	**10**	**7.5**		
Transit Route	**Average Ridership**	**Maximum Riders**	**Alights**	**Boardings**	**Number of buses**	**Number of Trips**	**Corridor 15 Route 9 - Northampton**	
B43 EB am	8	22	6	90	4	6	Severity Rank (Score)	31(44)
B43 WB am	7	15	30	1		5	Delay	156.71
B43 EB pm	12	25	38	107	6	6	Ratio	1.97
B43 WB pm	11	24	57	0		5	Index	1.5
Average	**9.5**	**21.5**	**32.75**	**49.5**	**5**	**5.5**		

Table 8-7 shows the different types of data available to for analysis; for PVTA's fixed routes and how it can be matched up with our CMP data. The data is summarized by direction of travel and time period (AM = 7-9, PM = 4-6). The data can also be broken out by stop or stops to better correspond with the segmentation of our CMP corridors. More in-depth analysis will be done as part of our next CMP update.

Table 8-7 also shows the average ridership by direction for both AM and PM peak periods, as well as the maximum number of riders on the bus while the bus was traveling on the CMP corridor. A significant number of alightings and boardings were recorded on the G1 in Springfield; this was due to transfers at the Springfield Bus Terminal. The table also includes information on how many buses travel the route during the peak hours as well as how many trips were made.

By overlaying the transit data over our CMP data we are able to see that the portion of the G1 route experiences a severe congestion with a congestion severity ranking of 2. The B43 route also experience serious congestion with a congestion severity ranking of 31. As we advance this process we anticipate being able to identify points along our corridors where congestion directly impacts the transit experience.

D. PIONEER VALLEY REGION BOTTLENECKS

1. Introduction

The CMP "Bottlenecks" analysis further refines the existing CMP methodology and evaluates individual roadway segments along each corridor. Segments are determined on a corridor by corridor basis and vary in length and physical characteristics. As a result, the degree of congestion severity can vary significantly along a given corridor.

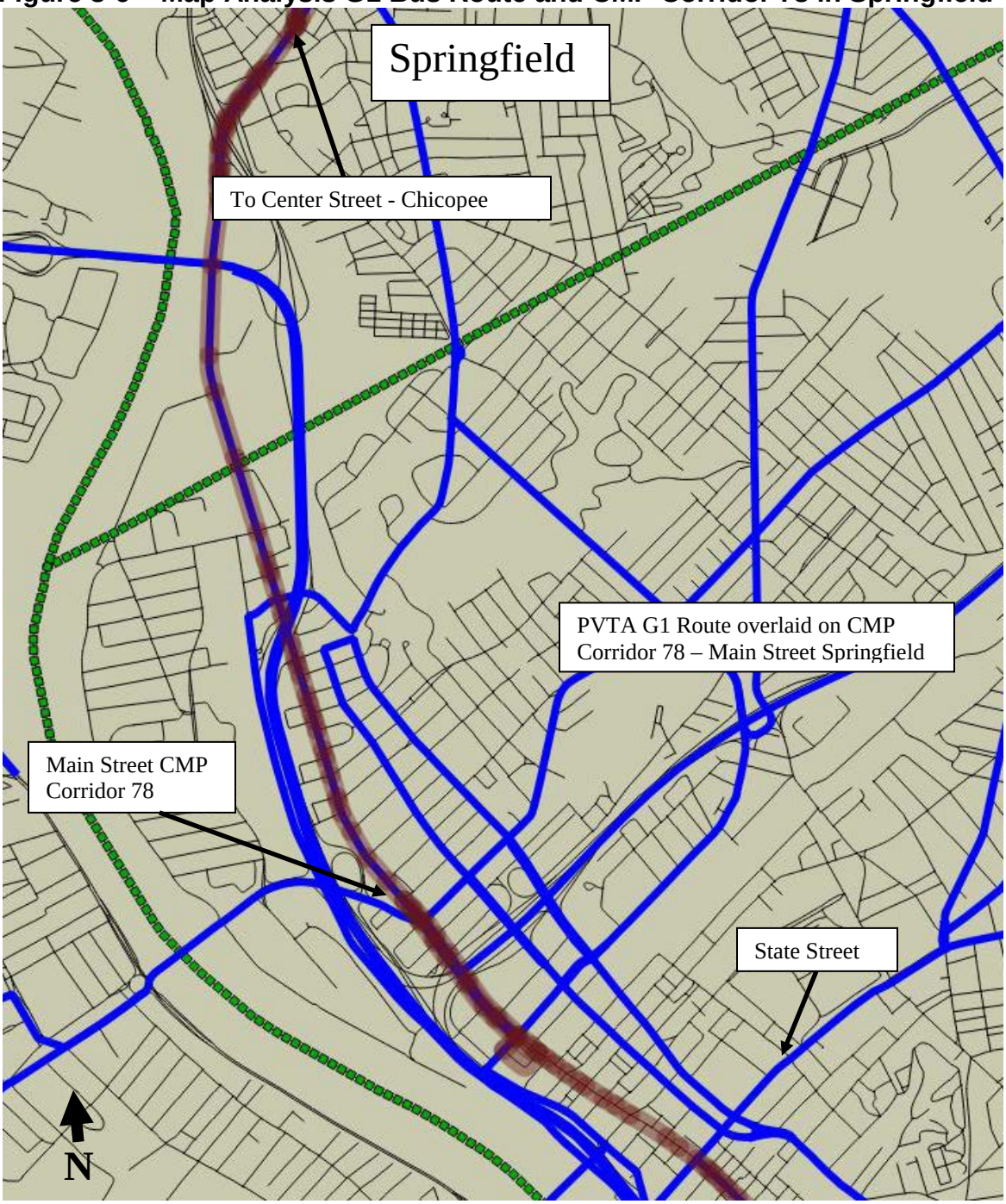
The Federal Highway Administration (FHWA) defines a congestion bottleneck as "A localized section of highway that experiences reduced speeds and inherent delays due to a recurring operational influence or a nonrecurring impacting event"[6]. If congestion occurs along an entire corridor, then the corridor is considered congested. Likewise, if the corridor is experiencing congestion only at a specific location, then the corridor is considered a congestion bottleneck.

2. Analysis

Each roadway segment was ranked based on the inverse value of each of the travel time performance measures. Currently, there are a total of 456 roadway segments with travel time data available. The ranking scheme ranges from 1 to 456 with a value of 4456 indicating the highest level of congestion and 1 indicating the lowest level of congestion. For segments that had the same rank, priority was given to the corridor with the higher Travel Time Index. PVPC used this process to identify the top 15 congested segments in the region to identify the top bottlenecks in the Pioneer Valley Region. The results of the analysis are presented in Table 8-8 and Figure 8-3.

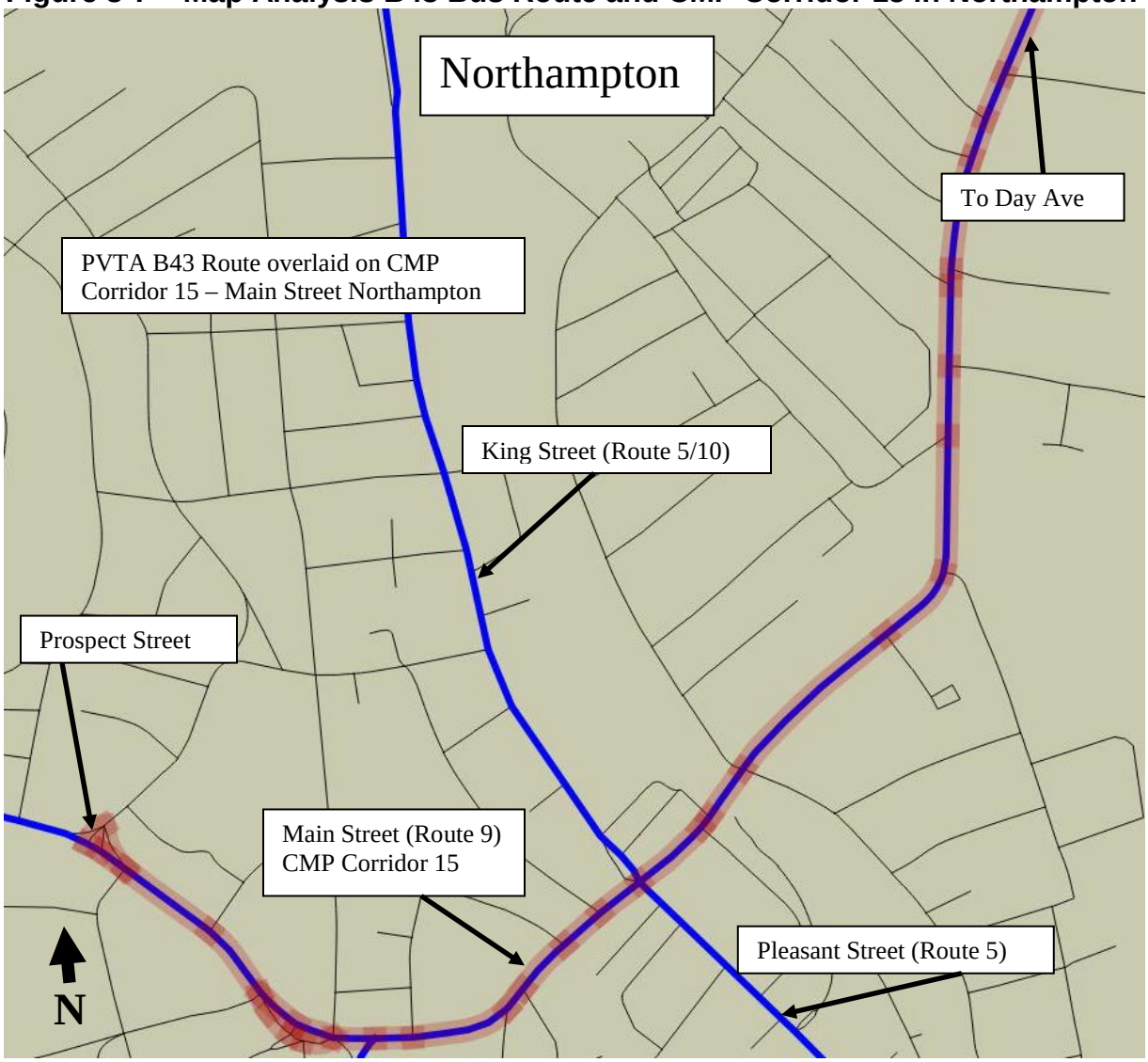
[6] http://www.ops.fhwa.dot.gov/bn/lbr.htm#g3

Figure 8-6 – Map Analysis G1 Bus Route and CMP Corridor 78 in Springfield



Map Key: Blue line indicates CMP corridor
Red highlight indicates transit route
Green Doted Line indicates municipal boundary
Black lines represent roads

Figure 8-7 – Map Analysis B43 Bus Route and CMP Corridor 15 in Northampton



Map Key: Blue line indicates CMP corridor
Red highlight indicates transit route
Green Doted Line indicates municipal boundary
Black lines represent roads

Table 8-8 – Congestion Bottlenecks in the Pioneer Valley Region

Rank	Municipality	Bottleneck Location	Score
1	Chicopee	Grove Ave/Front Street @ Grove Street - Chicopee	452
2	Springfield	Carew Street @ Saint James Avenue - Springfield	450
3	Holyoke	Dwight @ Race Street to Dwight at Maple Street- Holyoke	448
4	Ware	Main Street @ South Street/Church Street to Main Street @ North Street- Ware	447
5	Springfield	Main Street @ Boland Way/Harrison Ave - Springfield	444
6	Springfield	Sumner Ave @ The "X" - Springfield	444
7	Granby	West State Street @ Pleasant Street (5 Corners) - Granby	443
8	Agawam / West Springfield	Memorial Ave @ River Street to Suffield Street @ Main / Springfield Street including Walnut Street - Agawam / West Springfield	441
9	Longmeadow	Dwight @ Maple/Williams - Longmeadow	439
10	Wilbraham	Main Street @ Boston Road - Wilbraham	438
11	Holyoke	Hampden Street (141) @ Nonotuck Street - Holyoke	438
12	Northampton	Main Street (Route 9) @ Pleasant /King Street - Northampton	436
13	Hadley / Amherst (UMass)	Massachusetts @ Commonwealth Ave - UMass	432
14	Chicopee	I-291 @ Exit 6 - Chicopee	430
15	Chicopee	Westover Road @ Bernice Street - Chicopee	428

E. CONGESTION STUDIES

As part of the CMP process, PVPC is required to monitor and develop strategies to improve congestion in the region. Under this section we have identified several proposed locations PVPC can perform congestion studies in a future UPWP as well of a list of TIP projects that may improve congestion within the Pioneer Valley Region. Many locations identified as a regional bottleneck or a corridor of serious congestion do not appear Table 8-9 as a candidate for a future study as they were determined to have a planned transportation improvement project to reduce congestion, a planned congestion study, or have a recently completed study.

Table 8-9 – Potential Congestion Studies to be Advanced Through a Future UPWP

Location	Study
Region wide	Develop a congestion "Toolbox" which will contain various congestion management strategies which can be applied to locations identified as being congested. Strategies will be based on type and extent of congestion
Region wide	Update the Top 15 Bottlenecks report
PVTA Service Area	Advance the "Transit Congestion Severity" calculation based on the data discussed in the transit congestion severity section of this chapter
Interstate 391 Exits 3 and 4 northbound off ramps	Study existing congestion that causes traffic to queue back onto the highway, particularly during the afternoon peak hour.
Grove Street at Front Street - Chicopee	Ranked as the #1 Bottleneck location in the region.
Boston Road at Main Street - Wilbraham	Ranked as the #10 Bottleneck location in the region.
Route 33 at Granby Road and Westover Road - Chicopee	Ranked as the #15 Bottleneck location in the region.
Route 9 at University Drive and Snell Street	Ranked as a corridor of Serious congestion.

Table 8-10 – TIP Projects that May Improve Congestion

Proposed Funding Year	Municipality	SID	Project Desrictiopn	Estimated Cost
2015	Springfield	605222	NORTH END & BRIGHTWOOD INFRASTRUCTURE IMPROVEMENTS, FROM OSGOOD STREET TO THE CHICOPEE CITY LINE (NORTHERLY SEGMENT)	$4,233,000
2016	Westfield	604446	RECONSTRUCTION OF ROUTE 187 (LITTLE RIVER ROAD) AND SHAKER ROAD - 300 METERS SOUTH OF ROUTE 20 TO 460 METERS EAST OF SHAKER RD (.8 MILES)	$5,504,386
	Westfield	604445	RECONSTRUCTION ON ROUTE 187, INCLUDES REPLACEMENT OF W-25-002, SHERMAN'S MILL BRIDGE OVER GREAT BROOK AT PONTOOSIC ROAD	$6,926,210
2015	Northampton	605066	INTERSECTION IMPROVEMENTS AT ROUTE 5 (PLEASANT STREET) AND CONZ STREET	$1,592,248
2016	Ludlow	605011	RECONSTRUCTION OF CENTER STREET (ROUTE 21) - FROM 35' WEST OF BEACHSIDE DRIVE WESTERLY TO GAS LINE BESIDE MTA OVERPASS (3,500 FEET)	$4,728,895
2016	Northampton	180525	RECONSTRUCTION OF DAMON ROAD, FROM ROUTE 9 INTERSECTION TO ROUTE 5 INTERSECTION (1.1 MILES)	$5,000,000
2015	Hadley	604035	SIGNAL & INTERSECTION IMPROVEMENTS AT ROUTE 9 (RUSSELL STREET) & ROUTE 47 (MIDDLE STREET)	$3,038,060
2017	Hadley	605032	RECONSTRUCTION ON ROUTE 9 BETWEEN THE LOWE'S AND HOME DEPOT SITE DRIVES (0.6 MILES)	$4,428,122
2016	Southwick	603477	Intersection Improvements at Four Locations on Route 57 (Feeding Hills Road)	$3,617,872
2016	Northampton	606555	Roundabout Construction Route 5/10 (North King Street) @ Hatfield Street	$2,874,896
2017	Agawam	600513	RECONSTRUCTION OF ROUTE 187 FROM 425 FT. SOUTH OF S. WESTFIELD STREET TO ROUTE 57 (0.3 MILES - PHASE I)	$1,558,000
	Agawam	607316	RECONSTRUCTION OF ROUTE 187, FROM SOUTHWICK/SPRINGFIELD STREET TO ALLISON LANE (1.29 MILES - PHASE II)	$5,562,610
	Belchertown	604692	RECONSTRUCTION ON SOUTH MAIN STREET & NORTH WASHINGTON STREET FROM SOUTH MAIN ST TO THE INTERSECTION OF NORTH LIBERTY (2.08 MILES)	$3,740,430
2016	Springfield	605385	SIGNAL & INTERSECTION IMPROVEMENTS @ ROOSEVELT AVENUE & ISLAND POND ROAD, ROOSEVELT AVENUE & ALDEN STREET	$1,900,000
	West Springfield	604210	Rte 5 Reconstruction	$4,800,000
	West Springfield	604746	BRIDGE REPLACEMENT, W-21-006, CSX RAILROAD OVER UNION STREET	$12,403,054
	Agawam	603372	RECONSTRUCTION ON ROUTE 5 CONNECTOR TO ROUTE 57, INCLUDES A-05-013 & A-05-014	$11,670,939
	Westfield	603449	ROUTE 20 ACCESS IMPROVEMENTS ON COURT STREET & WESTERN AVENUE HPP $2,503,688	$3,360,000
	Westfield	607773	WESTFIELD- IMPROVEMENTS & RELATED WORK ON ROUTE 20, COURT STEET & WESTERN AVENUE, LLOYDS HILL ROAD TO HIGH STREET/MILL STREET INTERSECTION (PHASE II) Eastern Section	$2,383,981
2017	Agawam	604203	Route 187/57 Intersection Improvements	$1,500,000

Table 8-10 – TIP Projects that May Improve Congestion (cont.)

Proposed Funding Year	Municipality	SID	Project Desrictiopn	Estimated Cost
	Hadley	605881	RECONSTRUCTION ON ROUTE 9, FROM MIDDLE STREET (ROUTE 47) TO EAST OF MILL VALLEY ROAD (LOWE'S) (1.27 MILES)	$6,900,000
	Holyoke /West Springfield	604209	REHABILITATION OF ROUTE 5 (RIVERDALE ROAD), FROM I-91 (INTERCHANGE 13) TO MAIN STREET IN HOLYOKE & FROM ELM STREET TO NORTH ELM STREET IN WEST SPRINGFIELD (3.2 MILES)	$3,000,000
2018	Northampton	604597	I-91 INTERCHANGE 19 IMPROVEMENTS AT ROUTE 9 AND DAMON RD	$5,000,000
	Palmer	601504	RECONSTRUCTION OF ROUTE 32, FROM 765 FT. SOUTH OF STIMSON STREET TO 1/2 MILES SOUTH OF RIVER STREET (PHASE I) (1.63 MILES)	$6,134,080
2018	Northampton	607502	INTERSECTION IMPROVEMENTS AT KING STREET, NORTH STREET & SUMMER STREET AND AT KING STREET & FINN STREET	$1,633,150
	Chicopee	607736	CHICOPEE- SIGNAL & INTERSECTION IMPROVEMENTS AT 11 INTERSECTIONS ALONG ROUTE 33 (MEMORIAL DRIVE), FROM FULLER ROAD TO BRITTON STREET	$3,651,800
2018	Holyoke	606903	IMPROVEMENTS TO LOWER WESTFIELD ROAD ON I-91 (INTERCHANGE 15)	$1,031,250
	South Hadley	607735	SOUTH HADLEY- SIGNAL & INTERSECTION IMPROVEMENTS AT ROUTE 202 (GRANBY ROAD) & ROUTE 33 (LYMAN STREET)	$500,004
	Agawam	607317	Route 187 Reconstruction from Allison Ln to Westfield City Line, 1.69 miles(Phase III)	$7,589,668
	Granby	606895	Route 202 Intersection Improvements 2 Locations @ 5 Corners and @ School Street	$500,000
2016	Holyoke	606450	TRAFFIC SIGNAL UPGRADES AT 15 INTERSECTIONS ALONG HIGH & MAPLE STREETS	$1,564,867
	Northampton	607433	INTERSECTION IMPROVEMENTS @ PROSPECT STREET, JACKSON STREET & WOODLAWN AVENUE	$1,248,180
	Northampton	607501	INTERSECTION IMPROVEMENTS @ NORTH ELM STREET, ELM STREET & WOODLAWN AVENUE	$1,489,520
	Holyoke	606156	RECONSTRUCTION OF I-91 INTERCHANGE 17 & ROUTE 141	$2,600,000
	Hadley	606547	PEDESTRIAN SIGNAL INSTALLATION AT 2 LOCATIONS ALONG ROUTE 9 NEAR WEST ST	$134,600

CHAPTER 9

PAVEMENT

A. PAVEMENT MANAGEMENT SYSTEM

A Pavement Management System (PMS) is a systematic process that collects and analyzes roadway pavement information for use in selecting cost-effective strategies for providing and maintaining pavements in a serviceable condition. The role of PMS is to provide an opportunity to improve roadway conditions and make cost-effective decisions on maintenance priorities and schedules.

1. Regional Efforts and Process

The Pioneer Valley Planning Commission's (PVPC) regional PMS involves a comprehensive process for establishing the network inventory and project histories, collecting and storing the pavement distress data, analyzing the data, identifying the network maintenance activities and needs and integrating the PMS information in the metropolitan and statewide planning processes. The Pioneer Valley region covers approximately 1,200 square miles, roughly the same size as the state of Rhode Island. The roadway network covered by the regional PMS includes all urban and rural Federal-Aid highways of the 43 cities and towns in the region. The Pioneer Valley region consists of approximately 1,400 miles of Federal-Aid eligible roadways. In October 2009, the Federal Highway Administration (FHWA) mandated that the Regional Planning Agencies (RPA) undertake a study to establish the cost of maintaining the Federal-Aid roadways that make up their regions with the expectation that the results of these studies will be incorporated in every update of the Regional Transportation Plan (RTP) thereafter. The PVPC's regional PMS efforts have been ongoing since 1995 at which time the RPAs were complying with the requirements of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. In an effort to continue to be in federal compliance, the PVPC has continued the regional PMS efforts. Staff have collected and analyzed pavement distress data for all 43 cities and towns in the Pioneer Valley Region.

The PVPC utilizes the prepackaged Pavement Management software program "The PAVEMENT*View*" developed by Cartegraph Systems. The PAVEMENT*View* uses a Road Condition Index (RCI) as a measurement of roadway serviceability and as a method to establish performance criteria. Since the PVPC only collects pavement distress information, the Overall Condition Index (OCI) produced by PAVEMENT*View* was used for analysis purposes.

An OCI was generated for each inventoried roadway segment in the region using the pavement distress data collected by the PVPC staff. Deduct values assigned to

each type of distress based on severity and extent, were applied to generate an OCI for each roadway segment. OCI is measured from 0 to 100, with 100 being an excellent or perfect condition and zero being failure or impassable condition. The OCI values generated are grouped into OCI category ranges which are defined depending on the type and functional class of each segment. These OCI categories along with other factors, such as a Base Index, Average Curb Reveal, Functional Class and Pavement Type are used to assign a Repair Strategy for each of the defined segments.

The PVPC incorporates 6 default repair categories:

1. Reconstruction of Collectors and Arterial Streets
2. Reconstruction of Local Roads (not used in regional efforts)
3. Rehabilitation
4. Preventive Maintenance
5. Routine Maintenance
6. No Action

Reconstruction involves the complete removal and replacement of a failed pavement section which includes reclamation. For the most part, the cost per square yard differs for local roads as opposed to collectors and arterials. The rehabilitation of pavements includes the work necessary to restore the pavement to a condition that will allow it to perform satisfactorily for several years. Preventative maintenance activities are those which are performed at planned intervals to protect and seal the pavement. Routine maintenance activities are those which are taken to correct a specific pavement failure or area distress.

The following summarizes the findings of the region's surveyed federal-aid eligible roadways and recommends appropriate maintenance activities. A documented guideline of project priority, cost and recommended maintenance activity may be produced in a systematic and coordinated manner for the entire region. Project level analysis is conducted and highway maintenance projects are developed, the results of which are an integral part of the RTP and Transportation Improvement Program (TIP).

2. Existing Conditions

The PVPC staff surveyed approximately 1,280 miles of federal-aid eligible roadways in the Pioneer Valley region which was divided into 2,473 roadway segments. Pavement distress data was collected for the entire Surface Transportation Program (STP) roadway network and select National Highway System (NHS) roadways. The average OCI for the surveyed roadways in the region is rated at 64, which indicates

that majority of the roadways are in a moderately good condition. The average OCI information by community is depicted in Table 9-1.

Table 9-1 – Average OCI by Community

Community	Arterial Miles	Collector Miles	Fed Aid Miles	Average OCI 2015	Average OCI 2011
Agawam	24.47	26.18	50.65	67	66
Amherst	16.32	34.15	50.47	58	70
Belchertown	26.22	21.27	47.49	74	80
Blandford	8.56	8.41	16.97	68	68
Brimfield	11.58	13.26	24.84	57	83
Chester	8.058	0	8.058	73	84
Chesterfield	7.713	9.96	17.673	79	81
Chicopee	17.84	42.94	60.78	74	81
Cummington	12.95	8.05	21	71	71
East Longmeadow	8.43	23.304	31.734	73	73
Easthampton	4.25	25.723	29.973	68	68
Goshen	5.401	3.7058	9.1068	71	71
Granby	7.7155	14.117	21.8325	67	85
Granville	8.803	6.452	15.255	76	76
Hadley	17.996	21.439	39.435	85	85
Hampden	0	12.65	12.65	84	84
Hatfield	0	14.687	14.687	83	83
Holland	0	7.279	7.279	35	77
Holyoke	16.25	46.97	63.22	54	82
Huntington	11.227	4.846	16.073	72	72
Longmeadow	3.26	15.79	19.05	74	61
Ludlow	24.46	9.689	34.149	68	83
Monson	8.64	25.484	34.124	54	83
Montgomery	0	5.197	5.197	74	83
Northampton	50.81	15.7	66.51	68	73
Palmer	16.603	30.572	47.175	56	87
Pelham	5.795	10.155	15.95	49	71
Plainfield	0	11.893	11.893	39	74
Russell	9.45	5.084	14.534	60	78
South Hadley	15.39	13.84	29.23	65	74
Southampton	0	17.17	17.17	58	88
Southwick	14.14	20.34	34.48	77	77
Springfield	42.7	117.42	160.12	62	78
Tolland	5.66	0	5.66	77	77
Wales	0	9.66	9.66	44	73
Ware	13.36	19.77	33.13	66	85
West Springfield	7.51	28.64	36.15	60	72
Westfield	19.14	48.72	67.86	62	78
Westhampton	0	21.08	21.08	71	71
Wilbraham	5.79	28.22	34.01	71	85
Williamsburg	7.87	11.2	19.07	74	74
Worthington	11.07	6.76	17.83	52	84
			Average OCI	**71.1**	**77.6**

The OCI generated by PAVEMENT*View* was used to establish pavement condition categories of “Excellent”, “Good”, “Fair”, “Poor”, and “Failed” with OCI ranges provided in Table 9-2.

Table 9-2 – Pavement Condition Range by Functional Class

-	Excellent	Good	Fair	Poor	Failed
Arterial	>89.5	>69.5 and <=89.5	>48.5 and <=69.5	>25.5 and <=48.5	<=26.5
Collector	>88.5	>68.5 and <=88.5	>47.5 and <=68.5	>23.5 and <=47.5	<=24.5

The results indicate that most of the region’s surveyed federal-aid eligible roadways are in good condition. Figures 9-1 and 9-2 depict the region’s pavement condition graphically by functional class. As shown, the region’s arterial and collector roadways follow a similar pattern with regards to pavement condition. The region’s surveyed federal-aid roadways consist of 459 miles of arterial and 820 miles of collector roadways. The percentages are 36% and 64% respectively.

Figure 9-1 – Pavement Condition of the Region’s Arterial Roadways

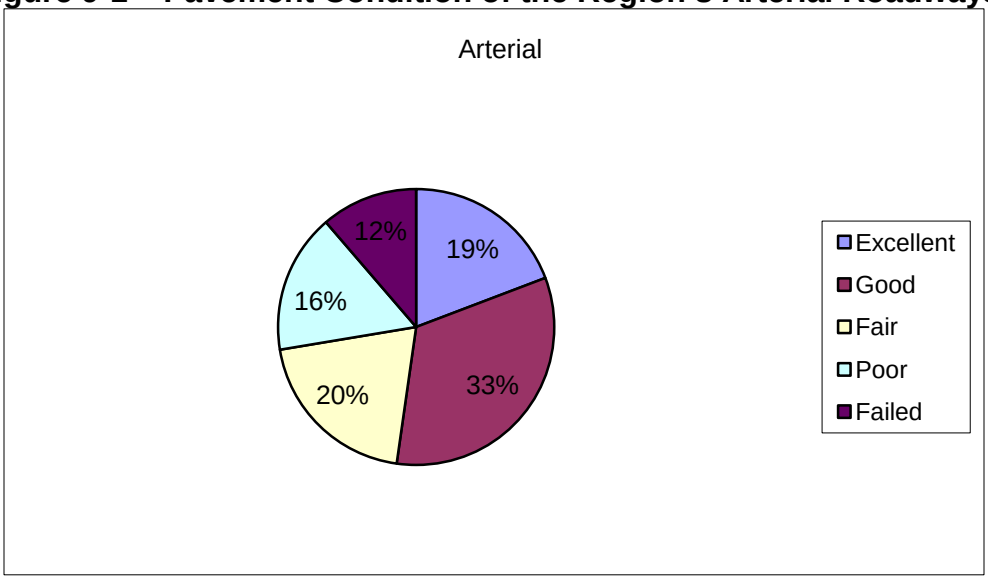
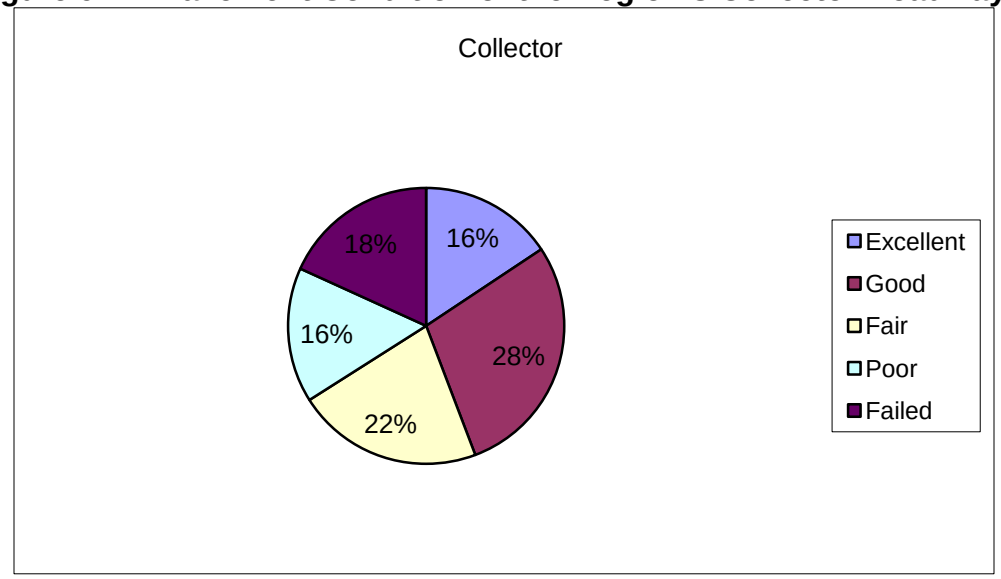


Figure 9-2 – Pavement Condition of the Region's Collector Roadways



Figures 9-3 and 9-4 show a comparison of the number of miles of existing surveyed roadways by pavement condition to the last time the RTP was updated for the arterial and collector roadways respectively. Figure 9-3 is indicative of pavement repair action taken on the arterial roadway segments which require major rehabilitation and whose condition cannot deteriorate much further. The trend is reversed as far as the region's collector roadways are concerned. Figure 9-4 is indicative of application of improvement funds to be directed towards the cost effective repairs that improve and/or maintain the segments which are salvageable.

Figure 9-3 – Arterial Road Condition Comparisons by Miles

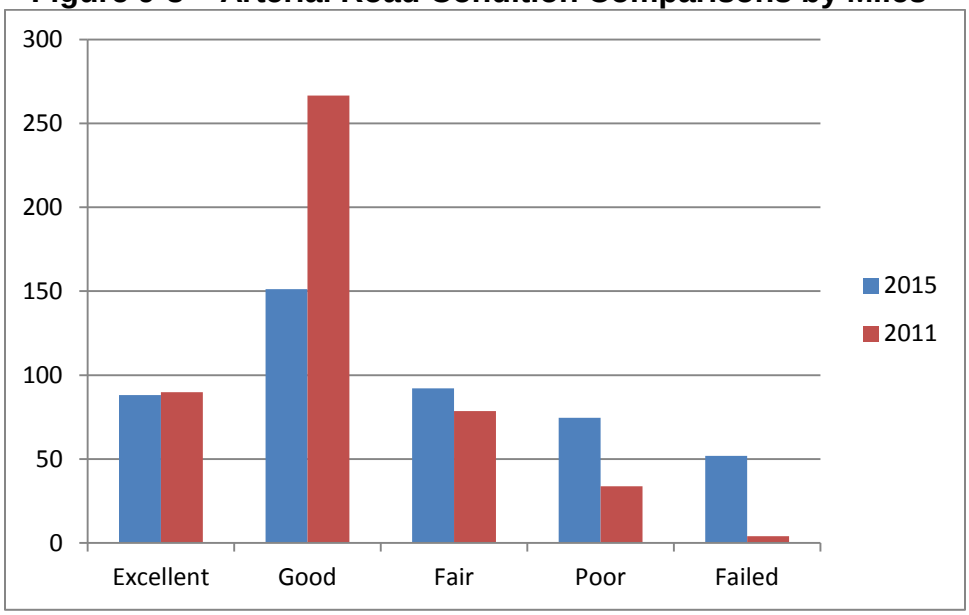
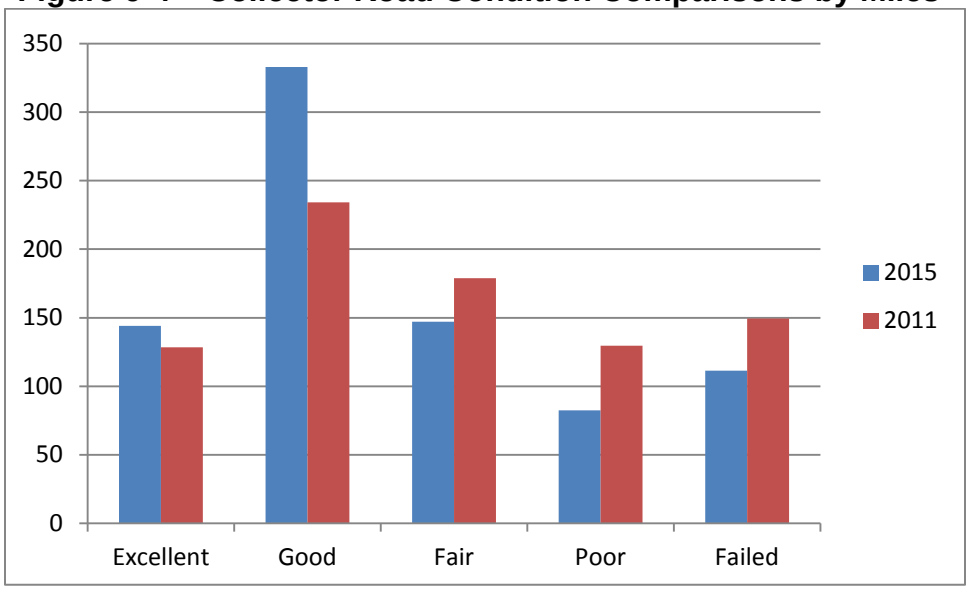


Figure 9-4 – Collector Road Condition Comparisons by Miles



3. Regional Roadway Improvement Needs

The budgeting process of the PAVEMENT*View* can be used to calculate the backlog of repair work for the region by assigning 100% of roadway segments within the best OCI range. The backlog is defined as the cost of bringing all roads up to a near perfect condition within one year.

The backlog represents how far behind the roadway network is in terms of its present physical condition and measures the cost of performing all desirable repairs to achieve the best OCI range. At the end of the year 2015 the backlog repair work for the Pioneer Valley Region was $491,410,099. This cost estimate is useful in identifying the pavement condition of the system at the end of the year 2015 and in comparing to future and/or past year's backlogs.

After the backlog of improvement needs have been determined, the recommended maintenance actions for roadway segments may be ranked by priority. The priority of segment improvement is determined based on its calculated Network Priority Ranking (NPR). NPR is a function of vehicle volume, roadway length, estimated life of repair, improvement cost, and OCI, and it is a measurement of the benefit/cost ratio for each segment improvement recommendation. NPR is used to rank roadway projects based on a priority scale. The projects with a higher NPR are assigned a higher priority and projects with a lower NPR are assigned a lower priority. The higher the NPR, the higher the project priority. The roadway segments with the same NPR are assigned the same priority ranking and segments with no NPR are not assigned a priority ranking.

Table 9-3 summarizes the region's backlog of Federal-Aid eligible roadway repair work by community. The table also provides information on how far behind each community is as far as backlogs of reconstruction and resurfacing work are concerned. It is important to note that the region’s total reconstruction cost is almost double of the resurfacing needs.

Table 9-3 – Backlog of Repair Work by Community

Community	Backlog	Reconstruction	Resurfacing
Agawam	$16,224,260.00	$10,678,599.00	$3,318,244.00
Amherst	$16,465,268.00	$9,564,698.00	$5,013,537.00
Belchertown	$12,471,340.00	$9,278,184.00	$2,195,919.00
Blandford	$2,202,833.00	$1,522,460.00	$115,664.00
Brimfield	$6,803,075.00	$0.00	$5,339,046.00
Chester	$1,096,330.00	$0.00	$0.00
Chesterfield	$495,630.00	$0.00	$0.00
Chicopee	$19,413,757.00	$9,261,579.00	$5,006,645.00
Cummington	$1,685,082.00	$0.00	$940,469.00
East Longmeadow	$4,157,136.00	$154,539.00	$2,055,656.00
Easthampton	$5,133,550.00	$1,000,955.00	$2,357,653.00
Goshen	$824,652.00	$0.00	$0.00
Granby	$2,790,316.00	$551,413.00	$1,330,244.00
Granville	$408,334.00	$0.00	$0.00
Hadley	$1,044,712.00	$0.00	$0.00
Hampden	$157,351.00	$0.00	$0.00
Hatfield	$734,532.00	$0.00	$34,532.00
Holland	$5,537,211.00	$5,534,553.00	$0.00
Holyoke	$45,506,335.00	$36,489,463.00	$5,958,641.00
Huntington	$927,743.00	$0.00	$671,051.00
Longmeadow	$4,386,832.00	$1,820,405.00	$1,946,578.00
Ludlow	$13,933,099.00	$8,967,153.00	$2,449,756.00
Monson	$12,260,843.00	$8,892,545.00	$2,263,021.00
Montgomery	$267,677.00	$0.00	$0.00
Northampton	$29,748,336.00	$18,615,035.00	$7,555,272.00
Palmer	$19,530,349.00	$9,810,988.00	$7,130,820.00
Pelham	$4,688,337.00	$4,578,590.00	$25,973.00
Plainfield	$7,455,723.00	$7,216,279.00	$206,891.00
Russell	$3,023,725.00	$0.00	$2,513,856.00
South Hadley	$8,896,811.00	$4,165,058.00	$3,680,120.00
Southampton	$5,113,496.00	$593,736.00	$4,051,855.00
Southwick	$3,413,098.00	$0.00	$2,413,172.00
Springfield	$82,325,101.00	$55,735,779.00	$19,380,323.00
Tolland	$349,425.00	$0.00	$0.00
Wales	$3,011,218.00	$2,174,126.00	$0.00
Ware	$6,106,834.00	$1,284,186.00	$2,079,357.00
West Springfield	$23,752,869.00	$16,926,189.00	$5,245,773.00
Westfield	$28,809,173.00	$15,578,118.00	$9,504,696.00
Westhampton	$15,368,747.00	$15,368,747.00	$0.00
Wilbraham	$6,593,550.00	$1,761,417.00	$2,480,844.00
Williamsburg	$12,881,174.00	$12,881,174.00	$0.00
Worthington	$3,609,078.00	$0.00	$2,073,076.00
Total	$439,604,942.00	$270,405,968.00	$109,338,684.00

CHAPTER 10

SUSTAINABILITY

The Pioneer Valley Planning Commission (PVPC) affirms the United Nations Bruntland Commission's definition of sustainable development as development that meets the needs of the present generation without jeopardizing the ability of future generations to meet their own needs. Applied to transportation this means keeping people and goods moving safely and efficiently throughout the Pioneer Valley by planning, designing, building and maintaining a balanced interconnected transportation system that includes sidewalks, on and off road bike ways, rail, airports, and miles of paved and unpaved roadways, while minimizing negative impacts on the region's air, land, water and people.

A. MASSDOT / GREENDOT

The function of the Regional Transportation Plan (RTP) is to define an overarching vision of the future of the region, establish principles and policies that will lead to the achievement of that vision, and allocate projected revenue to transportation programs and projects that reflect those principles and policies.

In order for our transportation system to be more sustainable, MassDOT has articulated the following 10 themes to guide transportation work:

- Improve transportation system reliability
- Focus more attention on maintaining our transportation system
- Design transportation systems better
- Encourage shared use of infrastructure
- Increase capacity by expanding existing facilities and services
- Create a more user-friendly transportation system
- Broaden the transportation system to serve more people
- Provide adequate transportation funding and collect revenue equitably
- Minimize environmental impacts
- Improve access to our transportation system

In addition, MassDOT has elaborated a Green DOT Vision:

"The Massachusetts Department of Transportation will be a national leader in promoting sustainability in the transportation sector. Through the full range of our activities, from strategic planning to construction and system operations, 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. This will enable MassDOT to use resources in a manner that serves its existing customers while preserving our resources for future generations."

The following three mutually-reinforcing goals form the foundation of GreenDOT:

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

The Global Warming Solutions Act requires Massachusetts to reduce economy-wide GHG emissions: 10% -25% below 1990 levels by 2020 and an 80% reduction below 1990 levels by 2050. The transportation sector is largest GHG emitter, producing 31% of 1990 emissions and projected to produce 38% of 2020 emissions. Figure 10-1 presents GHG emissions for the past 21 years and projected GHG emissions in the state of Massachusetts.

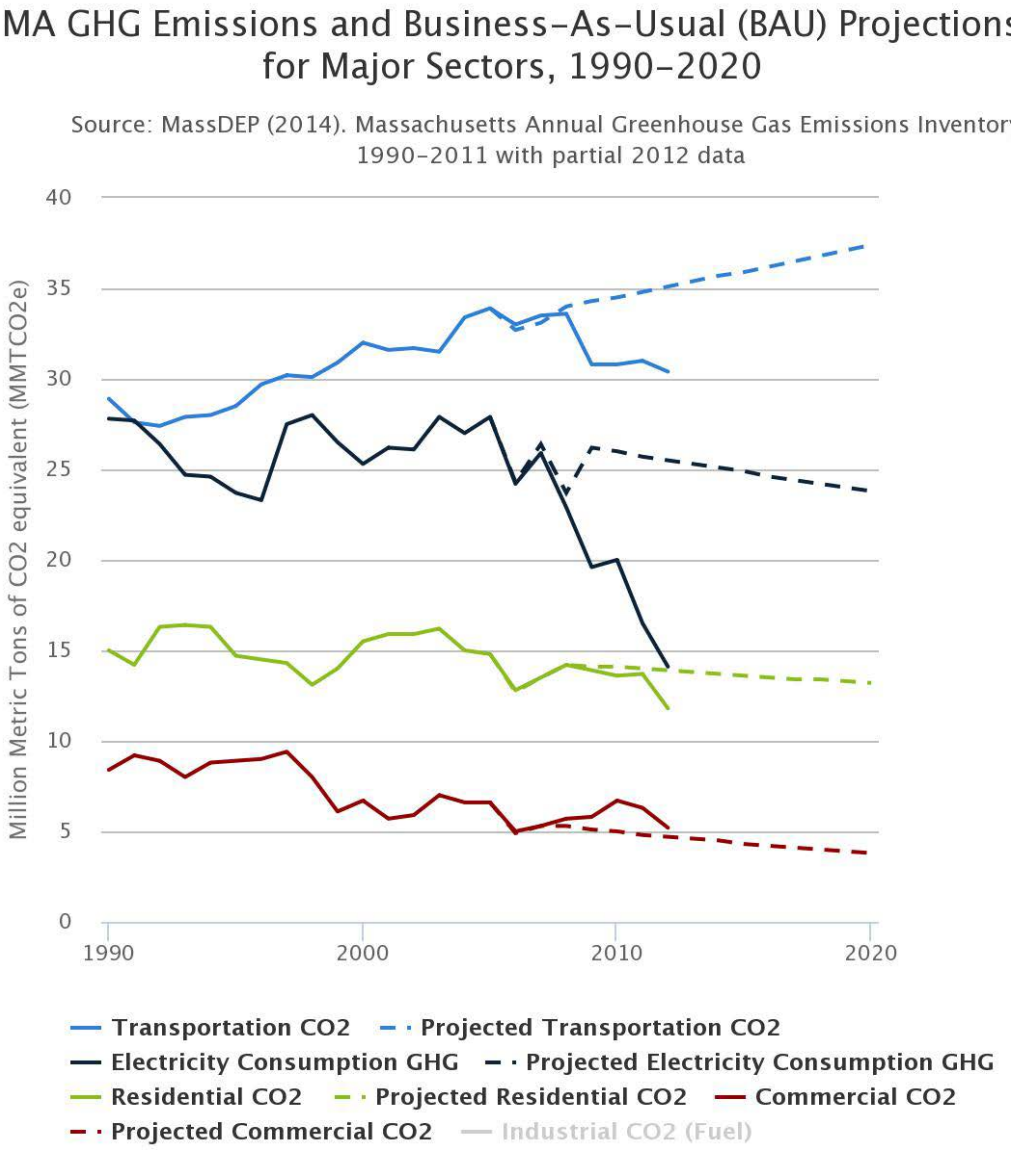
B. EXISTING CONDITIONS

The Pioneer Valley Planning Commission (PVPC) evaluates existing conditions pertaining to sustainability and transportation in a variety of ways. A number of communities in the Pioneer Valley are not served by transit or do not have enough transit services. Some communities do not have enough infrastructure in place to make them pedestrian and bicycle friendly. However, in the last few years communities in the region had a great success in improving bicycle infrastructure, sidewalks and introducing new bicycle/pedestrian trails. In the Pioneer Valley we have almost 84 miles of on and off-road bikepaths.

Along with bicycle and pedestrian facilities, Pioneer Valley has 43 fixed transit routes with an estimated 15,000 to 20,000 regular riders. Between 2003 and 2015, there was an overall increase of 128,000 miles per average weekday in the regional VMT. Many of our communities are not well served by transit, nor are they bicycle or pedestrian friendly.

With all this progress our transportation system is still a not well-balanced system with accommodations for multiple modes of users. Our transportation system has a very negative effect on our environment: air, water, land and plants, and on our people. Many of these negative conditions that are diminishing the quality of life in the Pioneer Valley are directly or indirectly caused or exacerbated by our transportation system and the vehicles that use it. Preliminary analyses of sources of the region's GHG emissions suggest that, like the rest of the Commonwealth, approximately one-third of our GHG emissions come from transportation. Run-off from paved surfaces, both roads and especially parking lots, is polluting our rivers and streams. And since the vast majority of people in the region are dependent on the automobile for transportation, health professionals link it to increases in human sicknesses like cancer, obesity, heart problems and diabetes.

Figure 10-1 – Projected Greenhouse Gas Emissions



A good transportation system is vital for the Pioneer Valley region because none of the 43 cities and towns in the region are able to functions independently. Everyone who lives here moves from municipality to municipality to shop, work, go to school, visit family and friends, or for recreational purposes. Because of this interconnection, people rely on automobiles which make up the largest part of the transportation system. There are people that don't have access to a personal vehicle or would prefer other modes of transportation. This brings up a need to enhance the transportation system to expand transit, walking and bicycling infrastructure for all to use.

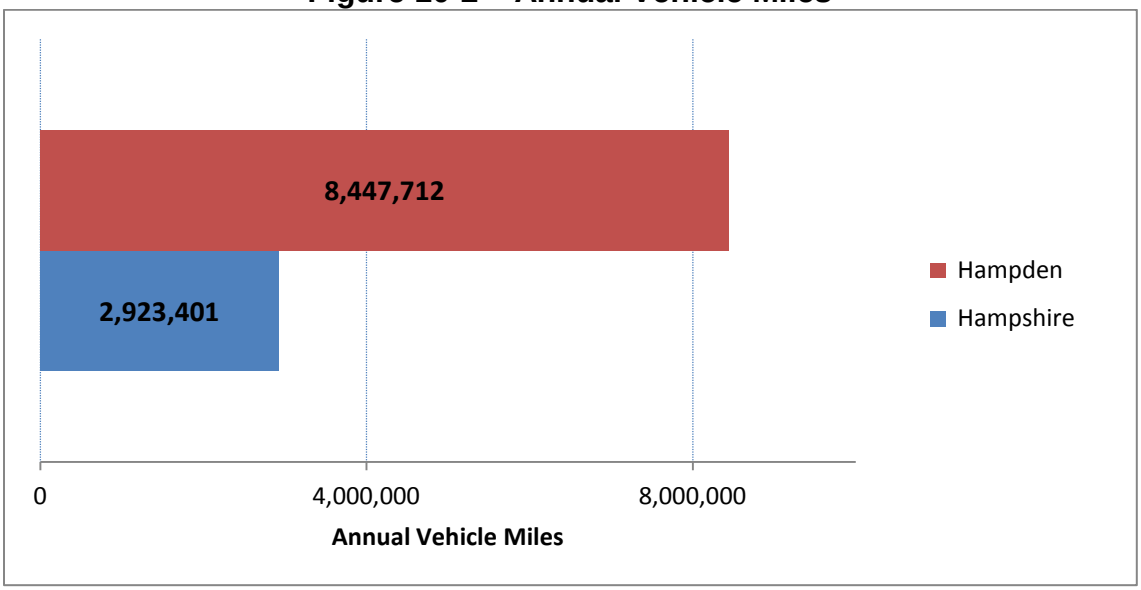
The Pioneer Valley Sustainability Network has identified 10 key indicators of sustainability. They are:

- Air quality
- Water quality
- Green House Gas Emissions (GHG)
- Health status
- Voter registration
- Recycling rate
- Housing affordability
- Graduation rate
- Local food production
- Vehicle Miles Traveled

To varying degrees, each of these indicators is affected by transportation. Motorized vehicles consume fossil fuels to operate and necessarily produce exhaust and other GHG emissions from burning these fuels. This affects air quality. Motorized vehicles require impervious surfaces, which pollute ground water, as well as surface water sources. Roads are impervious surfaces across which water has to run before being absorbed into surface water bodies or the ground. As noted above, the transportation sector is Massachusetts largest GHG emitter, producing 31% of 1990 emissions and projected to produce 38% of 2020 emissions. Transportation affects voter turnout by making it more or less easy to get to polls. Lack of transit services can hamper lower income people's ability to get to polls to participate in the democratic process. A balanced transportation system is more sustainable, as it meets more people's needs while using resources efficiently to make it more likely that future transportation systems will meet future generations' needs. Transportation doesn't have a very direct affect on recycling rate, but it certainly can affect housing affordability. Sprawl is the dominant form of housing development, and as a result homes are less affordable than in a region characterized by mixed use development. Local food production is not directly affected by transportation, although having the opportunity to produce local food can minimize transportation of food from outside the region to feed residents. The last sustainability indicator, VMT, is the cornerstone measurement of a sustainable transportation system.

The goal of PVPC's sustainable transportation system is to consistently reduce VMT per population. This can be accomplished by providing more access to resource efficient transportation options, especially public transportation. This, in turn can maximize social equity, increase social connectivity, maximize safety and maximize resource efficiency. Furthermore, public transit and ridesharing can reduce vehicle numbers on the road. Transportation efficiency benefits society and reduces its impacts, which account for one-third of greenhouse gas emissions and 20-25% of average U.S. household expenditures.

Figure 10-2 – Annual Vehicle Miles



In addition to the Pioneer Valley Sustainability Network's indicators of sustainability, the Pioneer Valley Planning Commission has identified a number of indicators to assess the overall state of the region. One of the measures tracked is the annual dollar value of transportation improvement projects advertised for bid that rely on federal and/or state financial resources.

Transportation Improvement Projects included in this value are highway improvement projects identified through the Transportation Improvement Program report by the Pioneer Valley Planning Commission and Franklin Regional Council of Governments, and advertised by MassDOT. Between 2013 and 2014 Hampshire County saw an increase of $12.5 million but Hampden Country saw a decrease of $3.5 million. Constant level of transportation investment is highly desirable to sustain the transportation system.

B. ENHANCING SUSTAINABILITY

Many transportation initiatives are underway to enhance sustainability. The top priority new initiatives are described in greater detail below.

1. Promoting Smart Growth and Climate Action

Transportation planning needs to place greater emphasis on land use and development patterns; more concentrated development should be encouraged in urban areas and suburban development should be deemphasized. The goal should be to reduce the conversion of open land to development and make it easier and more attractive to develop underutilized urban land through improved transportation accessibility—especially transit.

Transit oriented development (TOD) should be planned regionally over the long-term and consideration of innovative financing, such as TOD land banks, should be explored. Transit oriented development can simultaneously improve both housing and transportation in urban areas. There also needs to be more express bus routes and park and ride lots to help reduce single occupancy vehicle trips. The RTP should encourage the adoption of more mixed use zoning and land uses to help achieve higher densities in areas that are already built and served by transit.

In addition, green house gas (GHG) monitoring and reduction measures need to receive greater study and be incorporated in transportation planning. Transportation planning needs to address the issue of adaptation to climate change (rather than focus only on the mitigation of GHG emissions). One important example is the need to improve the capacity and number of stream crossings of roadways to reduce the number and frequency of washouts. Most Pioneer Valley municipalities have hazard mitigation plans that identify problem culverts and areas that consistently flood. These plans should be used to identify and prioritize funding for replacement of under-sized culverts with ecologically friendly infrastructure alternatives.

Federal Highway has identified four primary strategies to reduce GHG from transportation. They are:

- Improve System and Operational Efficiencies
- Reduce Growth of Vehicle Miles Traveled (VMT)
- Transition to Lower GHG Fuels
- Improve Vehicle Technologies

These strategies should be integrated into the region's transportation planning activities. The strategies will help guide decisions by providing a framework to reduce GHG in the region. To be most effective, the region must pursue all four strategies together.

Every effort should be made to integrate the RTP with the state's Climate Change Mitigation Plan. All proposed and approved projects should demonstrate consistency with the recently implemented EOEEA GHG emissions reduction policy, even if the projects do not meet the threshold requirements of the GHG policy.

The allocation of Chapter 90 funds for local roadway repairs should be prioritized based on the density of population adjacent to the roadway and/or the usage of the road. The goal is to achieve the greatest benefit for the greatest number of drivers.

2. Ensuring Health and Safety

Health-related impacts of transportation projects, particularly those on environmental justice populations, need to receive greater consideration in transportation planning. The impacts of the aging population should receive greater consideration, as well as access to medical care and sources of healthy foods for all segments of the population. Both Springfield and Holyoke have been cited as "urban food deserts" where there are few supermarkets or grocery stores where fresh fruits and vegetables and unprocessed foods are available. Transportation planning needs to include measures and strategies to improve accessibility to healthy foods.

3. Avoided Trips

Transportation planning needs to place greater emphasis on broadband internet service throughout the region to help more people work at home, which will also reduce single occupancy vehicle trips. As noted previously, western Massachusetts is still relatively under-served with respect to broadband internet access and this hampers people's ability to telecommute, shop on-line, and take classes on-line, making it more likely that they will need to drive to perform these functions of daily life.

4. Technology-Enhance Capacity of Existing Infrastructure

Intelligent transportation system (ITS) technologies need to be implemented to help existing transportation systems work more efficiently, rather than be expanded. This includes traffic congestion monitoring and transit schedule information as well as ride and car sharing programs linked to smart phones. Transportation planning needs to address and include electric charging infrastructure for electric-only vehicles coming from an expanding market. As the number of free electric car charging stations in Pioneer Valley grows, electric cars will become a more appealing choice for local residents. The use of highway medians and other transportation property for solar energy production needs to be studied. The use of recycled roadway materials should be encouraged on roadway projects carried out by MassDOT and municipal DPWs.

5. Complete Streets

The Complete Streets approach to roadway and street design should be incorporated in transportation projects in the region. This should include planting of trees on sidewalks, as the heat reduction benefits of urban foliage are significant. The RTP should offer a sample bylaw for requiring a tree canopy be retained wherever possible. Transportation planning needs to place greater emphasis on

pedestrian facilities, both for people who choose to walk for their trips as well as people who walk to transit and park and ride lots for car/van pools. Integral to complete streets is the need to have each complete street connected to other complete streets within a community.

6. Land Use Policy

Road discontinuation, especially in rural areas of the region, is an opportunity to help municipalities reduce maintenance costs, as well as reduce approval not required ("ANR") residential development. Using the Congestion Management Process (CMP) to identify top priority projects based on congestion integrates the goal of reducing GHG emissions into planning because where there is congestion, there is excess GHG emissions.

7. Invest in Transit

Funding should be increased for greater PVTA bus operating frequencies and hours (especially Sunday service). Promote and encourage transportation centers, such as the Holyoke Transportation Center, Westfield Transportation Center and Springfield Union Station, because they expand transit accessibility and connect the region to destinations outside the region.

8. Institutionalize Sustainability and Smart Growth into Decision-Making Process

Regional and municipal planners should strive to do more prioritization of the transportation assets in greatest need of maintenance, such as specific portions of roadway that would do the most damage if they were to fail, or areas with high numbers of wildlife collisions. Design guidelines for transportation projects should place greater emphasis on mitigating impacts to natural resources. The FEMA natural hazard resource map is one source of information for this type of prioritization.

The region will continue to monitor the progress of FHWA Infrastructure Voluntary Evaluation Sustainability Tool (INVEST). INVEST was developed by FHWA as a practical, web-based, collection of voluntary best practices, called criteria, designed to help transportation agencies integrate sustainability into their programs (policies, processes, procedures and practices) and projects.

9. Education/Training

The PVPC should consider offering a briefing to incoming elected municipal officials on the overall regional transportation planning process and the development and evaluation of individual transportation projects.

C. SUSTAINABILE TRANSPORTATION ELEMENT PLAN

The Pioneer Valley has actively incorporated sustainability planning practices to improve the regional quality of life. These projects improve livability of neighborhoods, promote alternate modes of transportations to reduce environmental impacts and enhance access for pedestrian, bicycle and transit use. Increased access to bicycling, transit and walking reduces individual reliance on automobiles and can improve the local environment by using a cleaner and healthier mode of transportation.

The Sustainable Transportation Element Plan is a recent document prepared by PVPC in February, 2014. The document identifies the existing sustainable transportation initiatives in the region and develops strategies to improve the sustainability of the regional transportation system. The plan identified how sustainability can be incorporated into the transportation planning process in order to meet existing needs without compromising the assets of future generations.

While sustainability can be measured using a wide variety of indicators, the indicators used in Table 8-1 were chosen because they have a direct relationship to transportation planning practices. Each sustainability project has a relationship to one of the transportation sustainability indicators seen in Table 10-1. Each indicator has a correlating recommending agency: Federal Highway Administration (FHWA), MassDOT, or the PVSustain Network. The FHWA recommendations were formulated through information from “Context Sensitive Solutions: Integrating Sustainability and Climate Change Concerns and CSS Principle” and “Four Strategies to Reduce Green House Gases.” MassDOT recommendations were formulated through “GreenDOT’s Policy Directive.” Lastly, transportation related sustainability indicators were selected from the Pioneer Valley Sustainability Network. These three agencies were used to integrate federal, state and regional sustainability goals.

Table 10-1 – Transportation Sustainability Indicators

Transportation Sustainability Indicators	Effect	Recommending Agency
Reduce VMT	Implementing land use strategies and transportation alternaitves that lessen the need to drive. Providing transit options, pedestrian and bicycle facilities, park and ride facilities, telecommuting and travel demand management programs.	FHWA (Context Sensitive Solutions, Strategy to Reduce GHG)
Reduced GHG Emissions	Reduce GHG emissions from transportation construction and operations. Reduced GHG would improve regional air quality as well as the health of the region's population.	FHWA, MassDOT, PVSustain
Improved Transit Accessibility	Investment in transit infrastructure to expand services to larger population and improve the system's ease of use.	MassDOT
Livability	Livability is about tying the quality and location of transportation facilities to broader opportunities such as access to good jobs, affordable housing, quality schools, and safe streets. This includes addressing safety and capacity issues on all roads through better planning and design, maximizing and expanding new technologies such as ITS and the use of quiet pavements, using Travel Demand Management approaches to system planning and operations, etc.	FHWA, GreenDOT (Smart Growth)
Promote Healthy Transportation Modes	Reducing automobile travel resulting from transportation investments that improve pedestrian, bicycle and public transit infrastructure and operation.	FHWA and MassDOT
Transition to Lower GHG Fuels	Replacing gasoline and diesel with fuels and systems which emit less GHG over the lifecycle.	FHWA, PVSustain
Water Quality	Water nourishes human communities, wildlife and the natural and built landscape. It contributes to aesthetic and recreational values that often translate into higher property values. Drinking water quality is a community and public health asset. Protecting water quality in our streams, ponds, lakes, rivers and aquifers is the focus of much regulatory policy at all levels of government.	PVSustain

1. Bus System

The bus system is operated by the Pioneer Valley Transit Authority (PVTA) and is one of the primary mechanisms the Pioneer Valley possesses to attain greater sustainability. The system currently operates in 24 of the region's 43 communities and provides connection to academic institutions, major places of employment, shopping centers, and recreational areas. The transit system promotes regional

sustainability by reducing the number of vehicle trips, reducing emissions from fewer vehicle trips, promoting transportation options, and by providing connection to intermodal facilities.

The PVTA has pursued sustainability efforts from two perspectives: capital improvements and operational improvements. Capital improvements include improvements to the infrastructure of the system and the vehicles that operate on the system (e.g. bus replacement, facility improvement, and shelter maintenance). Operational improvements include efforts to make the system function more efficiently (e.g. ITS, traffic signal prioritization, and surveying).

a) Capital Improvements

i) Intermodal Centers and Transportation Centers

The PVTA has actively pursued planning and construction efforts of intermodal and transportation centers within the region to improve connectivity and increase rider experience. These transportation centers enhance sustainability by improving transit access, increasing livability and promoting healthy transportation options.

Transit access is improved by providing hub points for passengers to transfer to intraregional bus routes and to intercity bus carriers. Rider experience is increased through the provision of amenities not typically associated with an outdoor bus stop. These constructed and proposed centers possess indoor waiting areas, bathrooms, customer service booth(s), and television monitors displaying schedule departures. The centers amenities make the system easier to use for riders.

ii) Vehicle Improvements

Vehicle improvement is a direct method to impact system reliability and system energy requirements and can optimize a user's ability of the system. PVTA phases the replacement of their vehicles to limit capital expense each year. Bus emissions have improved as technology has improved. Newer buses produce less GHG's than their earlier counterparts. Replacement of vehicles is one of the most effective methods for PVTA to reduce their vehicle emissions. In 2011-2013 PVTA has received 31 new Gillig busses as well as 29 Xcelsior Diesel New Flyers, 10 Xcelsior Diesel Hybrid New Flyers and 4 articulated hybrid buses. The new Diesel and Hybrid buses replaced 1995 Conventional Diesel buses that exceeded their useful life. PVTA continues to pursue grant funding opportunities for hybrid vehicles, including articulated buses with greater passenger carrying capacity.

iii) PVTA Amenities

Bus system amenities can attract new riders who would otherwise travel using another mode. PVTA has bus shelters along many of the routes, and the majority of them have benches and trash cans. Shelters improve the accessibility of transit through protection of riders from weather such as rain and snow, and

provide shade in the summer. PVTA is now installing solar-powered lighting at shelters and bus stops, as funds permit.

b) Operational Improvements

i) Surveys

Surveys of the existing PVTA passengers and routes provide an opportunity to identify system deficiencies and barriers that customers face when using the service. Once challenges have been identified, measures can be implemented to improve the systems efficiency and ease of use. Removing barriers is important to generate new riders and retain current riders. In order to better align existing services with customer demand, PVTA retained a consulting team of Nelson\Nygaard Consulting Associates and ASG Planning to prepare a Comprehensive Service Analysis (CSA). The objective of the CSA was to conduct a detailed review of existing transit services, identify strengths and weaknesses, and develop recommendations to improve service for existing riders and attract new riders. The effort was closely coordinated with Pioneer Valley Planning Commission (PVPC), one of PVTA's partners in designing and planning transit services for the region.

Completion of this effort brings PVTA into compliance with the requirements of the Massachusetts Transportation Finance Act of 2013 which directed each regional transit authority to develop a comprehensive regional transit plan. The plan involved consultation with the Massachusetts Department of Transportation (MassDOT), local employers, business associations, labor organizations and transit authority riders.

ii) Intelligent Transportation Systems

An intelligent transportation system enables systems to operate more efficiently, saving resources and energy, and improving rider experience. These systems use high tech solutions to allow the system to communicate information instantaneously. This information improves the ability of transit operators to react to daily challenges and allows more in depth data on route usage. Passenger experience will improve, as bus arrival and departure times will be more easily attainable for customer service agents.

2. Bicycle Planning

The Pioneer Valley region possess high quality bike lanes and bike trails that connect people to neighborhoods, shopping, recreational areas, major places of employment, and schools. These trails and lanes allow users to travel safely and quickly to accomplish daily activities. The extensive network of bike lanes and the areas they serve make the bicycle a viable transportation option in the Pioneer Valley region.

The network consists of on-road bike lanes and off-road bike trails. The on-road bike lanes have pavement markings and are approximately 3.5 feet wide. Bike lanes must have the appropriate width to allow for safe and adequate spacing between

automobile and bicycle. The majority of the region's off-road bike trails are placed on top of old rail lines, a strategy and program known as "rails-to-trails." The majority of the industry that utilized the rail system has left the Valley and provided an opportunity to expand alternate mode facilities on former rights of way.

a) Regional Bike Share Study

A feasibility study of a regional bicycle sharing system was completed in 2014. Amherst, Northampton, Holyoke, and Springfield were included in the study, which explored and evaluated the approaches of purchasing or leasing bicycle share equipment and operational services on a regional basis to serve the four communities. An advanced feasibility study will be completed in 2015 to evaluate vendor cost estimates, etc. A regional bike share program would utilize existing on- and off-road bicycle networks in and between these communities.

b) Bicycle Linkages

Among the many existing and planned bicycle routes throughout the region, there are multiple linkages that would help form a connected network. An analysis and prioritization of these linkages is currently underway, with a focus on those linkages that form an in-tact network north-south along the river; between the college towns of Northampton and Amherst; and over the border into Connecticut.

c) Other Bicycle Planning Efforts

Bicycle planning efforts are also pursued through regular surveying and marketing. Surveying users of these trail systems provides an opportunity to identify system deficiencies and barriers individuals face when using the system. Once challenges have been identified measures can be implemented to improve the systems ease of use. Marketing efforts such as Bay State Bike Week promotes the use of bicycles. This week long initiative encourages people to use their bikes to complete their commuting, shopping, recreational and social trips.

3. Passenger and Freight Rail

The Pioneer Valley is served by both passenger and freight rail. Possessing these rail lines expands transportation options for traveling within the region and allows more environmentally friendly modes of transport for goods imported and exported. Springfield's Union Station is currently served by 11 trains daily providing extensive service in the northeastern U.S. and connections nationwide. Passenger Rail service is provided on both East-West routes and North-South Routes through the region. The Pioneer Valley has an additional station located in Amherst that is served by two trains per day. The region's major freight and intermodal yard is located in West Springfield (CSX). CSX has made significant infrastructure improvement to the West Springfield facility. The region is served by two class one shippers, Pan Am and Norfolk Southern. Goods are also transported by CSX Transportation, New England Central, Pioneer Valley Railroad and MassCentral Railroad.

4. HUD Sustainable Communities Initiative Grant

PVPC, in collaboration with the Capitol Region Council of Governments (CRCOG) in Hartford and the Central Connecticut Regional Planning Agency (CCRPA), was awarded a federal Sustainable Communities Initiative regional planning grant from the Department of Housing and Urban Development, (HUD) with an explicit goal of lessening the transportation and housing burden on the region's population via promotion of transit-oriented development.

This grant resulted in the development and adoption of the region's first sustainability plan, titled ***Our Next Future,*** which was adopted by vote of the full Pioneer Valley Planning Commission in October 2014. ***Our Next Future*** contains sections on Sustainable Transportation and Green Infrastructure.

Moving forward land use, housing, and transportation must be planned together to create a sustainable region. The two main goals of the HUD Sustainable Communities Initiative regional planning program are:

- To identify sustainable transportation strategies and projects for the Knowledge Corridor.
- To advance Transit-Oriented Development (TOD) in the Pioneer Valley.

5. Land Use

The coordination of Land Use and Transportation Planning is an essential step in attaining sustainability opportunities for the region. Moving Ahead for Progress in the Twenty-first Century (MAP-21) promotes the coordination of transportation with land use, particularly early in the alternatives analysis/NEPA process. This means that plans created by communities are even more important to the development of transportation project alternatives. Coordination of transportation and land use provides opportunities to maximize the potential use and efficiency of development and transportation investments. Some of the most effective coordination efforts come from city and town master planning, transit oriented development districts, and creation of bicycle parking standards.

a) Master Planning

Master plans provide a vision for how a given municipality will grow, plan, and develop for the future. Incorporating sustainability into this process encourages towns to implement the concept into their standard practices. A number of municipalities in the region are currently updating their own master plans, including Holland and Plainfield.

b) Transit Oriented Development

Transit Oriented Development (TOD) promotes a balance of jobs and housing, and encourages the use of bus and other transit opportunities, combined with walking

and bicycling, to create a vibrant environment in which it is convenient and desirable for people to reduce their single occupant vehicle trips and bicycle, use public transit or walk. TOD is also strategy to limit suburban sprawl, improve air quality, and provide access to goods, services and jobs in close proximity to residential areas. This is accomplished because TOD districts offer higher density development that increases the viability of transit. TOD applications in the region are expected to increase as the use of rail becomes a more viable option for the region's population. The Knowledge Corridor rail line opened in late 2014 and has proved popular. Increased frequency of passenger cars along the Corridor and more direct connections to cities outside the region (such as Boston) will create more opportunities to concentrate development in areas served by multiple modes of transportation (cars, buses, streetcars, intercity buses, and more).

6. Gravel Roads

Gravel roads require proper design, maintenance and repair to prevent erosion and sedimentation. Heavy storms produce rapid water velocities that increase the potential for soil erosion, especially on and around gravel roads. Pollutants such as oil and grease can also be washed from gravel roads along with exposed soil, fine sands and silts. These sediments and pollutants are then carried away into nearby streams and ponds. Gravel roads can contribute heavily to significant water pollution problems if not managed properly. Sediment loading is a major cause of water quality problems in both lakes and streams, often carrying phosphorous and nitrogen that can lead to algal growth, or clouding cold water fisheries that are important to fish reproduction. Management of gravel roads is especially important in the face of increased intensity storm events due to climate change.

D. SUMMARY OF RELATED REGIONAL SUSTAINABILITY PLANS

A series of regional plans focusing on sustainability in various topics of regional importance have been produced since the 2012 RTP was adopted. These new plans are:

- Pioneer Valley Brownfields Plan 2014
- Pioneer Valley Climate Action and Clean Energy Plan 2014
- Pioneer Valley Regional Housing Plan 2014
- Pioneer Valley Environment Plan 2014
- Pioneer Valley Food Security Plan 2014
- Pioneer Valley Green Infrastructure Plan 2014
- One Region, One Future: An Action Agenda for a Connected, Competitive, Vibrant Green Sustainable Knowledge Corridor 2014 (PVPC, CRCOG, CCRPA)

This section summarizes the key findings and recommendations of these plans as they relate to regional transportation. Copies of these plans are available at www.pvpc.org

1. Pioneer Valley Brownfields Plan 2014

This plan facilitates the assessment, cleanup, and redevelopment of contaminated and blighted properties in the region by identifying 20 neighborhood-scale Areas of Brownfield Interest (ABI) where brownfields are pervasive, and resources to address them are most needed. The plan analyzes the location of brownfields in the context of low income and minority block groups and offers a series of strategies for each ABI relative to site-specific environmental assessment, cleanup and/or redevelopment planning.

One key finding of the Brownfields Plan is that minority and low-income populations disproportionately live in brownfield areas. Because brownfields are often an impediment to the redevelopment of downtowns, they are a factor in driving urban sprawl. The plan supports the development of transit-oriented development in urban centers in order to help the assessment and remediation of brownfields.

a) Transportation-related Recommendations and Integration with RTP

In addition to generally supporting transit-oriented development in urban centers, the plan identifies ABI-specific strategies throughout the region. Some of these ABIs are sites that support the region's current or future transportation network:

- Complete Site Cleanup in Holyoke: Train Station (among other non-transportation-related sites)
- Undertake Union Station Site Cleanup: Complete site cleanup, including partial demolition (baggage warehouse); Site cleanup at adjacent vacant lot (former Hotel Charles); Complete Phase I construction of bus terminal and parking garage; Restore pedestrian tunnel linking the station with train

boarding platforms and Lyman Street; Advance Phase II construction including addition of more office and retail space in the terminal building.

2. Pioneer Valley Climate Action and Clean Energy Plan 2014

This plan promotes greater understanding of the causes and consequences of climate change in the Pioneer Valley. Significantly, the plan found that more than 38% of GHG emissions in the region are generated by transportation-related sources.

This plan presents strategies for local and regional stakeholders to reduce greenhouse gas emissions through greater energy efficiency, produce more clean and renewable energy; it also offers recommendations to help protect people and infrastructure from climate-related damage by adapting to help make communities more resilient and able to recover from disasters.

a) Transportation-related Recommendations and Integration with RTP

- Transit Oriented Development (TOD) Zoning: Promote transit-oriented development through support for municipal adoption of TOD zoning districts around and along high-volume PVTA hubs and corridors, as well as passenger rail stations.
- Sustainable Transportation Project Criteria: Work with MDOT, Joint Transportation Committee and the PVMPO to advance adoption of sustainable project review criteria for review and ranking of transportation projects in regional Transportation Improvement Plan (TIP).
- Regional Funding for TODs: Regional planning and transportation agencies in many areas of the United States provide funding to promote and support TODs for a variety of uses including TOD planning, site acquisition and clearance, and project development costs.
- Transportation Funding Strategies: Utilize Congestion Mitigation Air Quality (CMAQ) funds for projects that reduce GHGs.
- Trip Reduction: Municipalities can require trip reduction plans for large-scale commercial and residential developments to reduce single-occupancy automobile travel.
- GHG Emissions Tracking: Tracking of GHG emissions is needed to understand progress of transportation-related emissions reduction efforts and progress toward the GHG targets specified in the 2008 Massachusetts Global Warming Solutions Act.
- Complete Streets Policies: Encourage municipal adoption and implementation of complete streets, including: bike lanes, sidewalks, traffic calming devices, pedestrian crosswalks, street furniture, bus shelters, bike racks, trees, sidewalk pavers, and interconnected streets.
- Fuel Efficient Vehicles: Local governments and private companies can require that new vehicles purchases are fuel efficient and/or run on cleaner fuels.
- Safe Routes to Schools: Improvements to increase safety and number of children walking to school, including continuous and wider sidewalks,

improvements to inter-sections and traffic signals, pedestrian connections and snow clearing.

- Safe Biking: Safer bicycling routes, including bike lanes and off-road bike paths.
- LED Traffic Signals and Street Lights: LED traffic signals and lights consume 80% to 90% less power and last up to six to eight times longer than conventional lights.
- Idling Reduction Campaign: Local governments should implement anti-idling educational campaigns using parents of school-age children as a target population.
- Revised Parking Regulations: Municipal parking requirements for multi-family and apartment residences could be set at a maximum of 1 car per unit, with developer incentives for units with no or shared parking.
- Highway Tolls and Climate Revenues: Implement tolls on major highways, scaled to weight of vehicle and time of day, thereby reflecting the greater impact that heavier vehicles have on road conditions and the greater GHGs emitted.
- "Farebox Free" Bus Fares: A prepaid bus fare program, modeled on the system that is already in use in the UMass/Amherst PVTA service area, could replace the farebox share of the cost of PVTA service (typically 15-20%). Possible revenue sources include employer contributions, regional self-assessments, municipal self-assessments, additional state and federal support, tolls on single-occupant vehicles, savings from the elimination of the farebox system, or a combination of these.
- Improved Regional Ride Sharing: Support for private or nonprofit entities that use social media or web-based technologies to increase user trust of shared rides, such as institutional sponsorship, certification and user satisfaction reports.
- Park and Ride Lots: Work with MassDOT to expand the availability of park and ride lots to promote ease of commuter ride sharing.
- Telecommuting Centers: Establish telecommuting centers where workers can use computers and the internet to reduce the number and distance of commutes to employment centers.
- Inventory, Vulnerability Assessments and Protection of Critical Infrastructure: Assessments of critical infrastructure are needed to understand vulnerabilities from flooding and severe weather. The resiliency of transportation facilities, especially roads and highways, are critical to disaster recovery.
- Upgrades of Stream Crossings, Bridges and Culverts: Pro-active replacement of underperforming culverts and bridges with larger structures that are adequately designed to accommodate floods and promote wildlife passage is essential.

3. Pioneer Valley Regional Housing Plan 2014

This plan identifies opportunities to improve housing market stability, housing affordability and fair access to housing in the Pioneer Valley. The overall goal is to

create a region in which all residents are able to choose housing that is affordable and appropriate to their needs. The plan is geared to assist municipal officials, state government, and fair housing associations in creating a sustainable region that empowers our urban, suburban, and rural places.

One key finding of this plan is a significant shortage of multi-family homes throughout the region. Location of multi-family homes within walking distance of public transportation services is cited by the plan as a critical goal for meeting the demand for housing by younger families ("millenials" age 20 to 35) who are more open to a car-free lifestyle than older generations. The plan also cites lack of public transportation in suburban and rural areas as an impediment to greater choice in the housing market, as well as a lack of convenient transportation links from these communities to employment centers.

a) Transportation-related Recommendations and Integration with RTP

This plan does not contain recommendations that directly involve transportation. This plan does cite the general role that transportation plays in the "liveability" of a community, which is one of the key attributes in attracting a variety of housing types and diversity of residents.

This plan notes the importance of transportation connections between homes and employment centers. Commute times of 10 minutes or less by car, 15 minutes by transit and 20 minutes by bike or on foot are desirable—as well as having key destinations for shopping, school and recreation within these ranges. Areas with this level of access are considered to be of "high economic opportunity," while those that are more remote or less connected, particularly by public transit, are considered to be of "low economic opportunity."

This plan also cites the "drive to quality" phenomena in which housing prices or rents near employment centers have risen to a level where workers must seek homes further and further from their jobs in order to find a one for which they can satisfy bank financing requirements. Transportation is a relatively non-discretionary part of family budgets, for which a desirable target is no more than 15% of total household monthly costs to avoid being "cost-burdened."

Finally, a principal theme of this plan is that public and private investments in housing need to be balanced with those in transportation, infrastructure, services, environmental conservation and other factors to achieve the desired goal of a more equitable and stable housing market.

4. Pioneer Valley Environment Plan 2014

This plan presents strategies to protect ecosystems, biodiversity, wildlife habitat, and water quality, and to coordinate land uses in ways that are harmonious with the environment. The plan also aims to protect farmland and create a regional trail network.

One key finding of this plan is that water quality is improving, particularly along the Connecticut River, but that public access to the river is limited and inconsistent. Investment in riverfronts – such as through riverwalks and strategically located trail networks – is one way to both enhance environmental stewardship of rivers and also increase the regional transportation network.

a) Transportation-related Recommendations and Integration with RTP

- Upgrade stream crossings and culverts: Integrate culvert and bridge replacement into road and utility maintenance projects in order to upgrade underperforming culverts/bridges with those that meet MA Stream Crossing standards.
- Create storm-proofed infrastructure: Increase the resilience of infrastructure, including roads and bridges, to withstand severe storm events and flooding due to climate change.
- Conduct a Bi-State Trail Linkages Study: Conduct a bi-state trail linkages study to identify opportunities for linking trails, such as the Connecticut Riverwalk and Farmington Canal Heritage Trail, between Massachusetts and Connecticut.
- Support Pioneer Valley Regional Trails Coalition: Participate in the development and implementation of a Pioneer Valley Regional Trails Coalition to increase local/ regional capacity for developing and stewarding regional trail networks
- Implement Zoning for Bike and Pedestrian Amenities to Support an Intermodal Pedestrian and Bicycle Network: Help communities adopt zoning bylaws to require sidewalks, bike path connectors, bike parking and amenities in new developments, and internal pedestrian linkages in large projects.
- Complete the Connecticut Riverwalk and Bikeway Buildout: Work with Chicopee, Agawam, West Springfield and Holyoke to complete the design and build-out of Connecticut Riverwalk segments.
- Design and construct four trails and river access areas along Connecticut River Byway (Red Rocks River Trail along the riverbank in North Hadley, MA; Porter Phelps Huntington House to Mount Warner Trail in Hadley; Connecticut River to Mount Holyoke Range Trail in South Hadley; and Connecticut River Car-top Boat Access at Ferry Road in North Hadley, MA.)
- Create Connecticut River Greenway Park and Trail, Northampton, MA: Develop river access for CT River Greenway riverfront park and multi-use trail along CT River from Norwottuck Rail Trail on Damon Road to Elm Court, Hatfield.
- Create linkages: Create trail linkages between Connecticut Riverwalk at the Chicopee River delta, and connection to the Chicopee Riverwalk in downtown Chicopee; and link the Connecticut Riverwalk to Forest Park and Agawam.

5. Pioneer Valley Food Security Plan 2014

Plan Description: This plan is strategic in nature, created to help the region's food producers, consumers, hunger relief organizations and others advance their shared

goals and strategies for creating a more robust and sustainable food system. The plan is organized around two large and inspirational themes: “No one goes hungry” and “We grow our own food.”

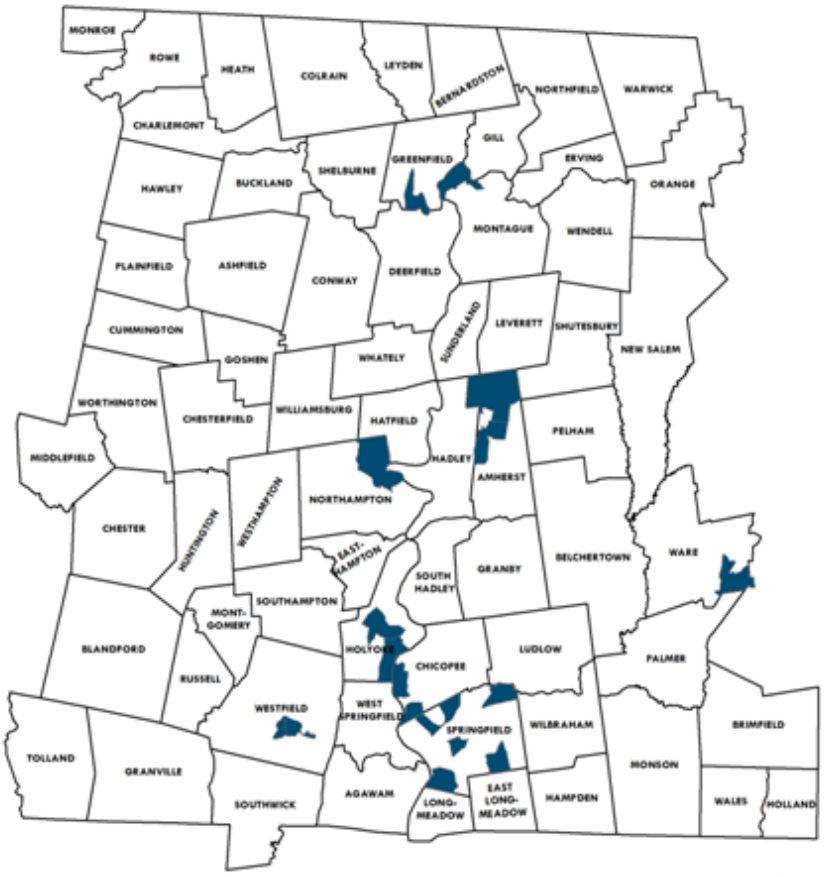
The lack of access to healthy food is a critical concern in the Pioneer Valley. Of the region’s 695,000 residents,[7] an estimated 91,000 people (12%) do not have enough money to regularly buy food for a healthy diet.[8] Approximately 35,500 people of the region (5%) live in so-called “Food Deserts” – neighborhoods that are considered by the U.S. Department of Agriculture (USDA) to have “low access” to sources of healthy food, usually no full line supermarket.[9] And up to 24,627 people (4%) live in rural areas more than 10 miles from the closest store that sells fresh foods.[10]

To begin to address this concern, the Food Security Plan includes an analysis of food accessibility to help set priorities for efforts to improve access to healthy food. This analysis considered three key factors (drawn from USDA Food Desert analysis) that are related to a person’s mobility and ability to buy food from supermarkets:

- Poverty (defined as the federal poverty level of $15,000 per year per person)
- Distance from a supermarket (outside a 1-mile walk or connecting PVTA bus route in urban areas, or outside a 10-mile drive in rural areas)
- Access to a private automobile.

[7] U.S. Census 2010. Hampden, Hampshire and Franklin Counties.
[8] Feeding America. “Hunger in America.” 2011.
[9] U.S. Department of Agriculture. Food Desert Locator Tool. Accessed 10/15/12.
[10] Pioneer Valley Planning Commission. Analysis of U.S. Census 2010.

Figure 10-3 – Target Priority Areas for Improved Access to Healthy Food



This analysis finds that lack of access to healthy food is a widespread problem for residents of the region, but especially for those living in the 18 target areas identified by analyzing poverty, proximity and transportation availability of residents in the region.

Similarly, in 2014 a municipal-scale grocery store accessibility analysis for residents of housing developments in Amherst was produced by PVPC as part of the implementation of the Food Security Plan. This analysis found that lack of access to a car more than doubled travel times to stores that were less than 3 miles away, highlighting the inconveniences that people throughout the region face in trying to shop for healthy food without a car. As a result, many people choose less healthy options, such as highly processed and high calorie foods, simply because they are available at nearby convenience stores and restaurants.

a) Transportation-related Recommendations and Integration with RTP

The Food Security Plan offers 31 recommendations geared to enhance local food production and businesses in the region and reduce hunger and food insecurity. There is one recommendation the directly involves transportation:

- **Provide Access to Sources of Healthy Food:** Provide free or reduced-fare bus passes to low-income riders for trips to garden plots, farmers' markets and other community food sources.

6. Pioneer Valley Green Infrastructure Plan 2014

The Pioneer Valley Green Infrastructure Plan acknowledges that roads can serve to clean our water and green our neighborhoods with the integration of green infrastructure. The plan calls for green infrastructure to be integrated into new road development projects and road reconstruction projects whenever possible and feasible. Green infrastructure works by naturally filtrating stormwater from road runoff, and also provides shade and greenery for both motorists and pedestrians.

One key finding of this plan is that green infrastructure can be more cost-effective than traditional "gray" infrastructure by reducing the need for pipes, treatment systems, etc., and by reducing flooding. Sustainable funding options are needed to support green infrastructure, and one strategy is to integrate green infrastructure into already-planned road maintenance projects.

a) Transportation-related Recommendations and Integration with RTP

- Couple "complete street" with "green street" projects: Promote dialogue on how municipal stormwater managers can collaborate with their colleagues tasked with improving the street experience for pedestrians and bicyclists to produce projects that result in "complete green streets."
- Hold regular municipal cross departmental roundtable discussions to encourage the integration of green infrastructure in all projects involving stormwater management: This could lead away from single purpose construction projects to more cost effective projects that serve multiple purposes.
- Coordinate with MassDOT's Impaired Waters Program to reduce peak flow in CSO communities: Provide information to MassDOT's Impaired Waters Program about locations where runoff from MassDOT roads such as I-91 contributes to combined sewer flows.
- Amend road building practices to better reduce total impervious area and to manage stormwater runoff from roads: Update subdivision regulations, and capitalize on lane narrowing in urban locations to introduce roadside planters and other small-scale green infrastructure.
- Promote Federal Highway funding for projects that incorporate green infrastructure: Ensure that new project scoring criteria used by the Metropolitan Planning Organization in evaluating Transportation Improvement Program (TIP) projects include points for managing stormwater through green infrastructure.
- Develop a model green infrastructure policy: Including a "Green Streets Policy" to ensure that green infrastructure is included in all new road and road reconstruction projects.

7. One Region, One Future: An Action Agenda for the Sustainable Knowledge Corridor 2014

This plan presents a action agenda for the broader Knowledge Corridor region that includes the Pioneer Valley, Greater Hartford and Central Connecticut planning areas. This plan is a summation of the Sustainable Knowledge Corridor regional planning project supported by the HUD Sustainable Communities Initiative regional planning program. The plan's overall goals are to create a region that is connected, competitive, vibrant and has a green future.

This plan presents the following goals that are most directly related to regional transportation**:**

- Increased transportation and communication choices.
- Access to passenger rail and bus rapid transit services through the New Haven-Hartford- Springfield and Vermonter rail projects, and the CTfastrak bus rapid transit project.
- A network of bicycle and pedestrian paths, bike lanes, sidewalks, bike share programs, and related bike infrastructure.
- Complete streets that provide safe and convenient access for pedestrians and bicyclists, as well as vehicles.
- Reduced dependency on auto trips and resulting savings in energy use and less air pollution.
- High speed internet access for all businesses, schools, residences and local governments throughout the region

E. DOCUMENTING GHG-EMISSIONS REDUCTION FOR GREENDOT IMPLEMENTATION

MassDOT, using its statewide travel demand model, has provided the Pioneer Valley 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 16). 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 Global Warming Solutions Act (GWSA) legislation requires reductions by 2020 and further reductions by 2050, relative to the 1990 baseline. The project mix from this RTP (and all other RTPs) was modeled for both 2020 and 2035 using an Action (Build) vs. Baseline (No-Build) analysis to determine the CO_2 emissions attributed to the all MPO's mix of projects and smart-growth land use assumptions. The estimates of the modeled CO_2 emissions are provided below:

Table 10-2 – 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.

Working closely with MassDOT, the Pioneer Valley 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.

F. IMPLEMENTATION PROJECTS

Implementation projects are transportation plans and projects that are expected to be completed over the next few years that will assist in the advancement of the Sustainable Transportation Plan. These projects are summarized in Table 10-3.

Table 10-3 – Sustainable Transportation Plan Implementation Projects

PROJECT NAME	RESPONSIBLE PARTY
TOD Market Analysis	CRCOG/PVPC
TOD Transit Planning Study	PVPC
Regional Greenhouse Gas Monitoring	PVPC
Transportation Evaluation Criteria	MassDOT, Pioneer Valley MPO
East/West Passenger Rail Study	MassDOT
TOD Investment Fund	PVPC
Green Street Policies	PVPC, DPWs, MassDOT
Replacement of Under-sized Culverts and Stream Crossings	PVPC, MassDOT, FEMA
Reduce CSO Impacts	PVPC, MassDOT
Funding for Bikeway/Walkway Projects	PVPC, MassDOT
Land Use Priority Plan	PVPC, EOHED, EOEEA
Regional Bike Share Program	PVPC, communities

1. TOD Market Analysis

The Pioneer Valley Sustainable Knowledge Corridor Transportation and TOD element plan is a parallel effort alongside a broader real estate market analysis for the 10 Knowledge Corridor passenger rail stations in Massachusetts and Connecticut with new or increased Amtrak and commuter rail service and the 11 CT Fastrak bus rapid transit stations between New Britain and downtown Hartford. The TOD market analysis is an implementation-oriented effort that is identifying the types of TOD investments that are likely to attract and retain homeowners, renters and commercial property owners within walking distance of these stations. For each station type, the analysis proposes strategies that can be initiated at the state, regional and local levels to support desired development. Key emerging strategies include the active engagement of major educational and medical anchor institutions in TOD planning, the creation of TOD zoning districts, streetscape inventories and bike/pedestrian enhancements, and land banking, to name a few.

2. TOD Transit Planning Study

An ongoing component of the Sustainable Transportation Element Plan is an analysis of the level and type of development transit can support in the Pioneer Valley region. The PVPC has developed a process to build upon existing regional plans such as Valley Vision 4 and the Plan for Progress to identify a series of potential sites for Transit Oriented Development (TOD) demonstration projects. An alternatives analysis of select regional sites that have the potential to support TOD sites will be performed to identify the transportation merits of each location. This alternatives analysis will be matrix driven and include information on the

demographics, existing transit service, known transportation needs, and potential to support TOD.

Upon completion of the alternatives analysis, one site will be chosen for a more detailed analysis geared towards the implementation of TOD in the future. Specifically, ridership surveys will be conducted along PVTA routes that are anticipated to be impacted by the proposed site to identify how proposed transit route modifications might impact existing ridership. In addition, an assessment of the location and condition of existing sidewalks in the vicinity of the proposed site will be conducted to identify key maintenance projects to maintain a safe walking environment. A series of short and long term recommendations would be developed based on the results of the analysis to assist in fostering economic development, advance projects that address congestion and pedestrian needs, and identify performance measures that can assist in monitoring effectiveness.

The goal of this study will be to develop substantive next action steps in cooperation with an expanded project advisory committee to instruct how to achieve measurable results. Potential placed-based actions include: TOD overlay zoning, TOD amenities to encourage bicycle, transit and pedestrian improvements, promotion of a TOD investment fund, and enhanced coordination of transit services for residents with income and language barriers.

3. Regional Greenhouse Gas Monitoring

The Pioneer Valley Planning Commission recently procured a greenhouse gas monitor for the University of Massachusetts Transit Services (UMass Transit) as part of a FTA grant to fund their new bus garage. The Picarro Cavity Ring Down Spectroscopy (CRDS) Analyzer measures three primary greenhouse gases, CO2, CH4 and H2O, down to parts-per-billion (ppb) sensitivity. The analyzer incorporates temperature and pressure control and uses time-based measurement system via a laser to quantify the greenhouse gases. The analyzer can be used as a stationary device or as a mobile device.

PVPC is working in cooperation with the University of Massachusetts to identify uses for the monitor. Current efforts are focused on integrating mobile measurements taken by the analyzer into the regional Congestion Management Process (CMP). It is necessary to quantify greenhouse gas levels along CMP corridors in order to develop new performance measures to assist in identifying and prioritizing congestion in the region. The device will also be used at congested intersections to demonstrate the impact peak hour traffic flows have on green house gas production.

4. Transportation Evaluation Criteria

Projects considered for funding as part of the Transportation Improvement Program for the Pioneer Valley (TIP) are reviewed using project review criteria endorsed by the Pioneer Valley Metropolitan Planning Organization (MPO). This criteria was

updated in 2015 to incorporate the requirements of the new federal MAP-21 legislation as well as the GreenDOT policy to promote smart growth and green infrastructure, and reduce greenhouse gas emissions as appropriate. More information on the update to the Transportation Evaluation Criteria is provided in Chapter 12.

5. East / West Passenger Rail Study

MassDOT and the Vermont Agency of Transportation, in collaboration with the Connecticut Department of Transportation, are conducting a study to examine the opportunities and impacts of more frequent and higher speed intercity passenger rail service on two major rail corridors known as the Inland Route and the Boston to Montreal Route. The study of these two rail corridors has been designated the Northern New England Intercity Rail Initiative. The consulting firm HDR in Boston has been retained to conduct this study which is expected to be complete by 2015. This planning effort provides an opportunity to develop a long term master plan for Passenger Rail in Southern New England. It is the intention that this plan will explore opportunities for passenger rail service and provide a scalable, incremental plan for implementation of new or expanded services. Particular emphasis will be placed on developing an innovative funding strategy as well as looking at the economic impacts that rail service would have on affected communities.

6. TOD Investment Fund

A Transit-Oriented Development (TOD) Investment Fund can be an effective tool to promote TOD development around the region, especially near high-volume passenger rail stations in Springfield, Northampton and Holyoke. TOD Investment Funds could be utilized for advance public acquisition of underutilized properties near rail stations and for public infrastructure improvements, in order to provide incentives for re-development of these properties for mixed use development. TOD investment funds have been used successfully in many U.S. cities, including Minneapolis and Atlanta.

7. Green Streets Policies

The Pioneer Valley Planning Commission has developed a model “Green Streets and Green Infrastructure Policy Statement”, which promotes the use of green street facilities and green infrastructure in public and private development through regulatory, capital investment, and management mechanisms as a cost-effective and sustainable practice for stormwater management in current and future projects wherever technically and economically feasible. This includes:

- Road reconstruction, new road development and bicycle or pedestrian projects;
- Stormwater projects; and
- New development and redevelopment projects

The Green Streets Policy further establishes new city policies to:

- Incorporate and maintain green street facilities and green infrastructure into all City-funded development, redevelopment, and enhancement projects, to the extent technically and economically feasible, and utilizing the best technology available at the time to meet water quality goals with the lowest maintenance costs; and
- Ensure that regulations require and incentivize all development to incorporate some Green Streets and green infrastructure features; and
- Ensure coordination and communication between City departments, in particular, Public Works and Planning and Sustainability, to ensure implementation of this policy, as well as fully addressing competing priorities.

PVPC has worked with the City of Northampton toward adoption of this policy, and offers technical assistance to other communities in adoption.

8. Replacement of Undersized Culverts and Stream Crossings

Hurricane Irene and its after-effects clearly demonstrated that many of the region's roadway culverts and stream crossings are undersized for major storm events, and vulnerable to being damaged or washed away. In addition, recent work by the University of Massachusetts has identified that many of the region's roadway culverts and stream crossings are improperly designed to facilitate fish and wildlife passage. In PVPC's ***Climate Action and Clean Energy Plan,*** culverts and stream crossings that could improve ecological and hydrological connectivity are mapped, and recommended for upgrades.

The region should take advantage of all opportunities to upgrade its roadway culverts and stream crossings to meet the twin and compatible goals of:

- Improving the readiness of the region's infrastructure for severe storm events;
- Improving the region's culverts and stream crossing to promote fish and wildlife passage.

Opportunities for culvert and stream crossing improvement include: using federal FEMA mitigation grants; roadway reconstruction projects; and new construction.

9. Reduce Combined Sewer Overflow Impacts from State Highways

Runoff from state highways, particularly Interstates 91 and 291 has continued to be a source of stormwater inflow to combined sewer overflows (CSOs) in Springfield and Holyoke, causing increased frequency and volume of CSO pollution to the Connecticut River. The Connecticut River Clean-up Committee, created by an intergovernmental compact between Springfield, Holyoke, Chicopee, Ludlow and PVPC, made a formal request of MassDOT to prioritize reducing stormwater to CSOs from state highways in the Pioneer Valley region.

During storm events the runoff from these large impervious highway areas can quickly enter the CSO systems, where such resulting high stormwater flow rates

displaces sewage, and contributes to overflows of raw sewage to the Connecticut River or its tributaries. The region has already committed over $356 million dollars to reduce and eliminate CSOs. The cities affected most by this problem, Springfield, Chicopee and Holyoke, are interested in collaborating with MDOT to help accomplish these goals.

MassDOT has indicated an interest in sewer separation as part of future programmed projects. The following specific programmed projects which could have the largest impacts on CSOs in our region if the projects are designed to include stormwater retrofits. These projects are summarized in Table 10-4.

Table 10-4 – Summary of MassDOT CSO Projects

MDOT Project Number	Location/Name	Est. Construction Date	CSO's Affected
607564	Springfield-Chicopee I-291 Maintenance	2019	CSO's #10-16
606156	I-91 Exit 17, Holyoke	2018	CSO #18
606459	I-91 Viaduct	2019	CSO #10-16
609365	Bridge Replacements, Holyoke Canals	2015, 2018	CSO's # 9,16
603264	Canalwalk, Holyoke	n.a.	CSO #11
n.a.	Heritage, front, Dwight St., Holyoke	2018	CSO #16

As the design scopes for these projects are developed, they should include consideration of CSO abatement measures. Springfield, Chicopee, and Holyoke are experienced with the type of design and construction for CSO abatement projects and have the knowledge of where MassDOT drains tie into their wastewater collection systems. Reduction and/or elimination of highway runoff from the combined sewer systems can be achieved using "grey" and "green" infrastructure, including but not limited to targeted areas of stormwater separation, stormwater detention, infiltration, including but not limited to targeted areas of stormwater separation, stormwater detention, infiltration, green streets and the use of various forms of rain gardens and vegetated swales.

Each of these communities is under significant regulatory pressure to reduce, and where possible eliminate CSO. Including the Connecticut River Clean-up Committee in the planning phase of these projects can insure that MassDOT fully understands the significant impacts that highway runoff has on the issues associated with CSOs.

10. Funding for Bikeway/Walkway Projects

PVPC has established a goal, in the ***Our Next Future,*** to build a linked network of off-road bicycle and pedestrian paths and on-road bike routes. In order to achieve this goal, the region must incrementally allocate funding toward construction of bikeway/walkway projects in its regional Transportation Improvement Plan. The region has utilized funding programs such as the Congestion Mitigation Air Quality program (CMAQ) to advance bikeway/walkway projects in the region.

PVPC has developed an analysis of the region's bikeway-walkway network linkage needs and opportunities that can help to guide this process. Key components of the region's bikeway-walkway system that provide a backbone for future additions include:

- Connecticut Riverwalk and Bikeway
- Norwottuck Trail
- Manhan Trail
- Northampton Bikeway
- Southwick-Westfield Rail Trail.

11. Land Use Priority Plan

In 2014-15, PVPC has worked with the Massachusetts EOEEA and EOHED, to prepare a Land Use Priority Plan (LUPP). This plan, which was formally adopted by vote of the full PVPC, includes the following components:

- Maps of regional priority development and regional priority preservation areas,
- Lists of local and regional priority development areas and priority preservation areas,
- A summary of the process for updating the regional priority areas
- A summary of the EOHED/EOEEA state priority mapping and analysis, as well as a map of the state priority areas.

The overall purpose of the LUPP is to help better guide growth and development in the region, better coordinate state and regional priority areas, and to promote smart growth, compact mixed use development, protection of key resources.

The primary purpose of the Regionally-identified Priority Development and Protection Areas is to guide in development of local master plans, open space plans and zoning, and guide local decisions in land protection and economic development.

The primary purpose of the State-identified Priority Development and Protection Areas is to guide state investments for land protection and economic development.

12. Regional Bike Share Program

The Pioneer Valley region and its member communities are committed to creating more livable communities and downtowns, as well as reducing single occupancy vehicle trips and the resulting air pollution and greenhouse gas emissions. The region is working to increase bicycling, transit and walking. The region is also seeking to establish commuter rail service along the north-south Amtrak rail line serving Springfield, Holyoke and Northampton, and a bike share program could provide a complementary "last mile" component to this service.

In 2014, PVPC developed a detailed Feasibility Study for a Pioneer Valley Bike Share Program, in collaboration with the communities of Northampton, Springfield, Amherst and Holyoke. This study included:

- Evaluation of existing bike share programs;
- Identification of regional characteristics that support bike share;
- Demand analysis and proposed service area;
- Potential funding sources and financing options;
- Financial analysis of financing and operation costs;
- Recommended Business Model, Operating Structure, and Financing;
- Recommended Implementation Framework

PVPC is currently conducting advanced feasibility analysis for a pilot scale bike share program.

CHAPTER 11

LIVABILITY AND CLIMATE CHANGE

Federal Highway Administration (FHWA) describes Livability as tying the quality and location of transportation facilities to broader opportunities such as access to good jobs, affordable housing, quality schools, and safer streets and roads.

As part of the Department of Transportation's Livability Initiative, FHWA works within the HUD/DOT/EPA Interagency Partnership for Sustainable Communities which developed the following principles to guide efforts:

- Provide more transportation choices.
- Promote equitable, affordable housing.
- Enhance economic competitiveness.
- Support existing communities.
- Coordinate policies and leverage investment.
- Value communities and neighborhoods.

PVPC is determined to aid local communities and organizations in improving livability in the region. This includes mitigation and adaptation to change in the weather patterns and other climate characteristics. In the Pioneer Valley we are most concerned about temperature and precipitation changes.

A. REGIONAL WEATHER TRENDS AND ANTICIPATED CHANGES

The transportation sector is a significant source of greenhouse gases, accounting for 1/3 of the Pioneer Valleys emissions. While it is widely recognized that emissions from transportation have a major impact on climate, climate change will have a major impact on transportation.

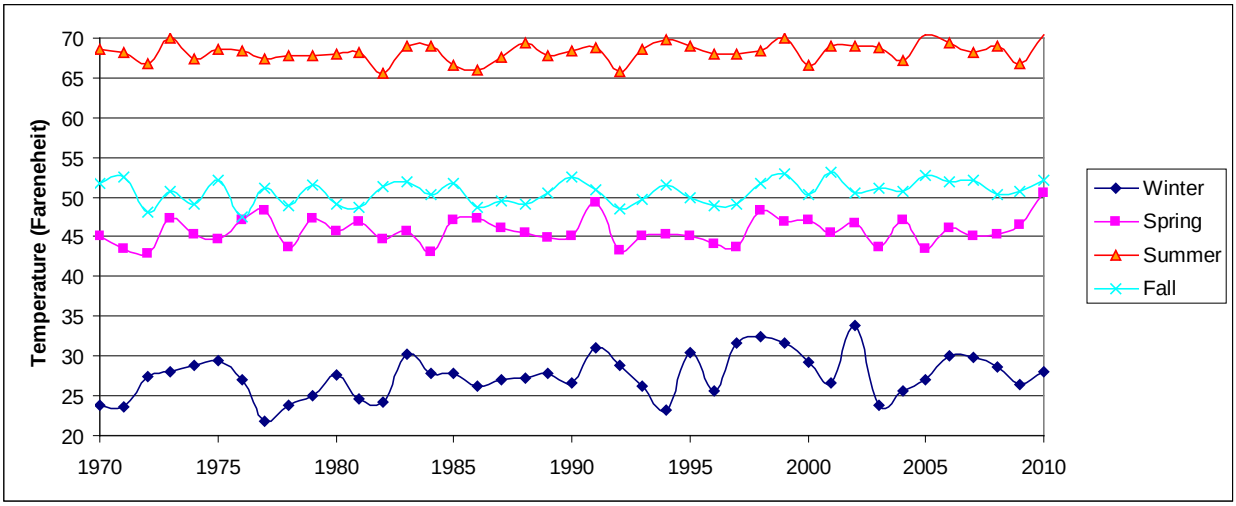
1. Temperature

Since the 1970s the Pioneer Valley had a small temperature increase in the spring, summer and fall months. Winter months have increased 2 degrees Fahrenheit on average during that same time period. The increase in temperature has resulted in many other climate-related changes, including:

- More frequent days with temperature above 90 degrees Fahrenheit
- A longer growing season
- Reduced snowpack
- Earlier breakup of winter ice on lakes and rivers
- Earlier spring snowmelt resulting in earlier peak river flows

- More freeze-thaw conditions are projected to occur in northern states, creating frost heaves and potholes on road and bridge surfaces and resulting in load restrictions on certain roads to minimize the damage.

Figure 11-1 – Regional Temperature Trends by Season (1970-2010)



The 2009 U.S. Global Change Research Program (USGCRP) report anticipates a continued seasonal increase of temperatures; winter months are expected to have the highest average temperature increase. The USGCRP reports evaluated weather conditions under a low and a high emission scenario when calculating predicted weather changes. The two scenarios allow for demonstration of uncertain future mode share changes and transportation enhancements for emissions. Using these two scenarios a range of anticipated "likely" and "very likely" weather conditions can be created over the next 19 years.

Table 11-1 below summarizes anticipated temperature changes and temperature change range by season. Both low and high emission scenarios anticipate a minimum increase of 2 degree for each season. Additionally, the "likely" and "very likely" ranges for each season predict increases in temperature for each season. The northeast should anticipate a continued temperature increase over the next 19 years.

Table 11-1 – Northeast Anticipated Temperature Changes by Season

Anticipated Temperature Changes for the Northeast	Average Temperature Increase for Northeast (F°)		Average Temperature Increase Range for Northeast from 2010 to 2029	
Season	B1 (Low Emission Scenario)	A2 (High Emission Scenario)	Likely	Very Likely
Winter	2.8	3	1.8 to 3.8	0.9 to 4.7
Spring	2.3	2.5	1.8 to 3.1	1.3 to 3.7
Summer	2	2.2	1.2 to 3.0	0.4 to 3.8
Fall	2.5	2.7	1.9 to 3.3	1.2 to 3.9
Source: USGCRP				

Figure 11-2 – Potential Future Summer Heat Index for Massachusetts

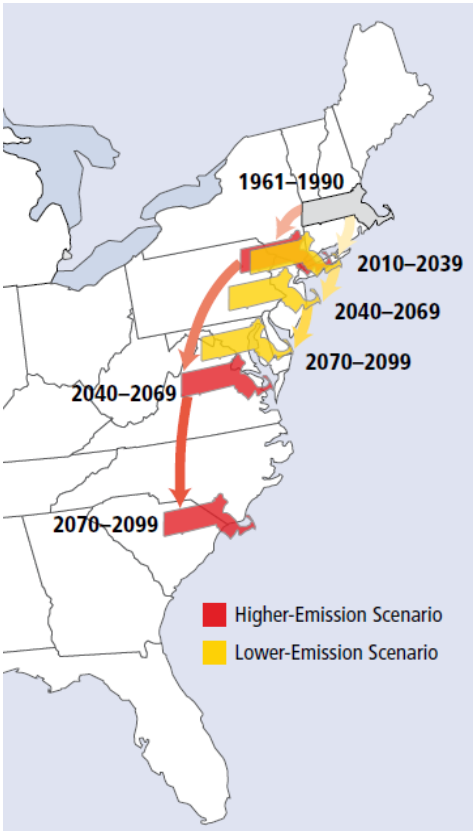


Figure 11-2 displays the anticipated change in the average summer heat index for Massachusetts. This prediction was guided by the low and high emission scenarios created in the USGCRP report. The heat index is measured by combining air temperature and relative humidity. The heat index measurement provides the human perceived temperature. The higher temperatures and climate change could affect the quality of life in the future of Massachusetts residents. The emissions scenarios predict what the perceived summer temperatures might feel like over the next century. The red arrows track the higher emissions scenario while the yellow tracks the low emission scenario.

The USGCRP report predicted extreme heat conditions for the City of Hartford. Hartford is located 20 miles south of Springfield, MA and weather conditions are consistently similar. The Pioneer Valley should anticipate similar future weather patterns due to this geographic proximity. Extreme heat is the approximate number of days per year of extreme heat greater than 90 degrees F. Hartford is predicted to average 22 to 25 days from 2010-2040 which is an increase from 1960-1990 when the city averaged 15 days. From

2001 to 2005 the average summer in Massachusetts included nearly 20 days that did not meet EPA's air-quality standards for ground-level ozone, putting additional stress on people with respiratory diseases.

Source: NEICA

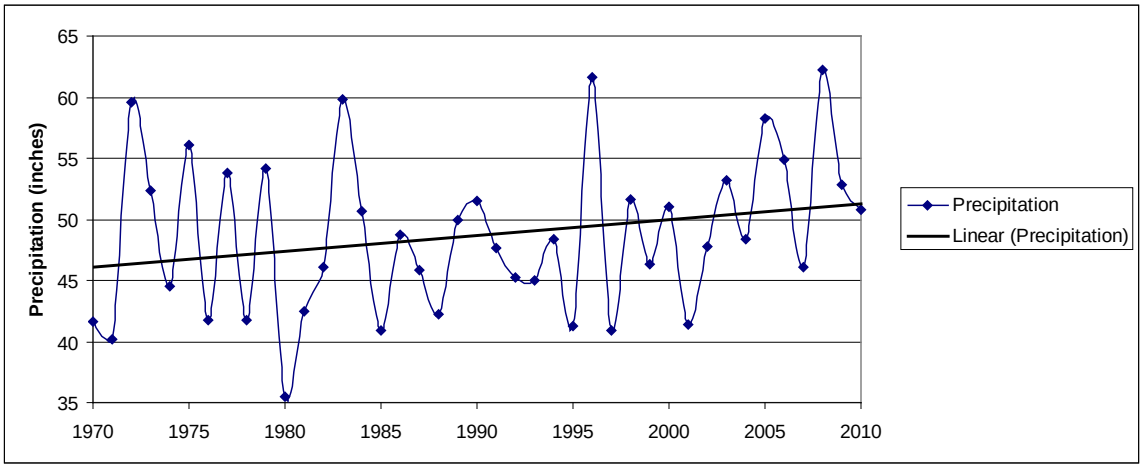
- Longer periods of extreme heat in summer can damage roads in several ways, including softening of asphalt that leads to rutting from heavy traffic.
- Extreme heat can cause deformities in rail tracks, at minimum resulting in speed restrictions and at worst causing derailments.
- Increases in very hot days and heat waves are expected to limit construction activities due to health and safety concerns for highway workers.
- Extreme heat creates poor air quality which reduces the length of time individuals can spend outside. Exposure to poor air quality has been connected to respiratory alignments such as asthma. Furthermore, children have proven to be the most susceptible to poor air quality due to their increased respiratory rate.

2. Precipitation

Throughout the northeast heavy, damaging rainfall events have increased measurably in recent decades. The Pioneer Valley was also subject to an increase in total rainfall and an increase in heavy rain events. This has also caused flooding events on many of the regions river's including the Mill River in Northampton in March of 2011. The increase in precipitation has resulted in many other climate-related changes, including:

- Increased heavy precipitation events
- Less winter precipitation as snow and more as rain
- Increased frequency of flooding events

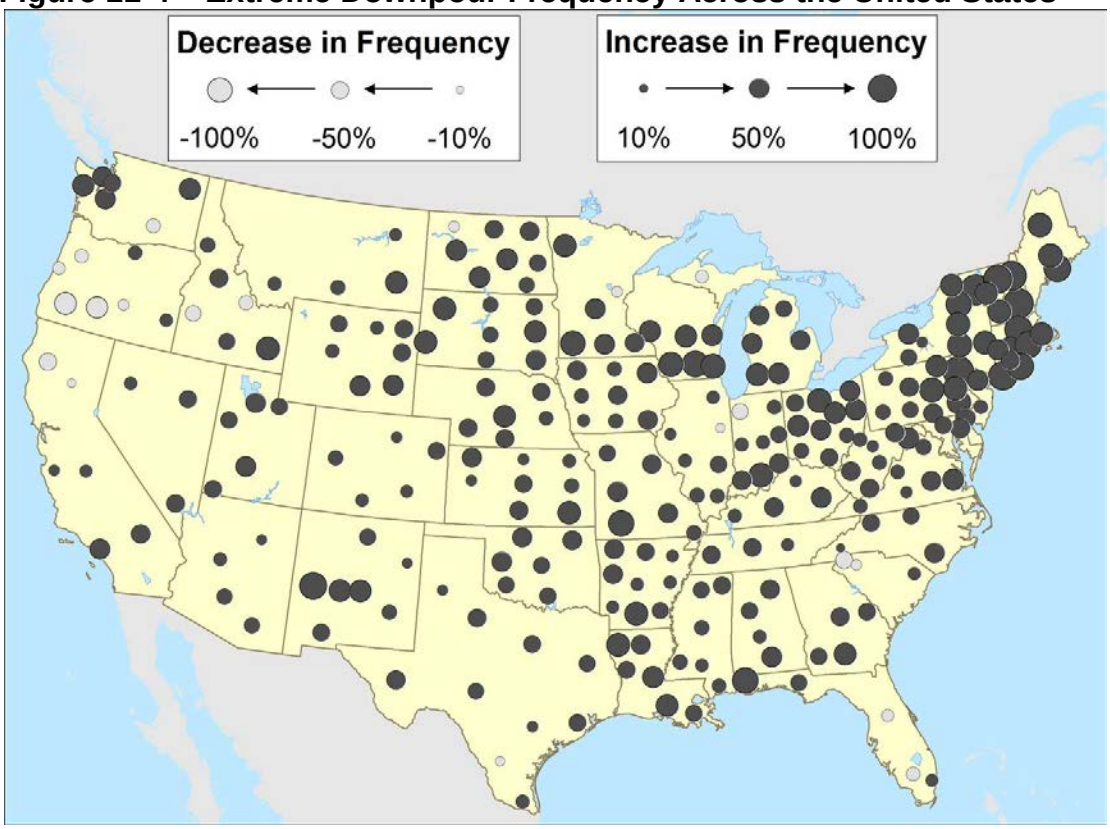
Figure 11-3 – Regional Precipitation Trends by Season (1970-2010)



The 2009 USGCRP report anticipates a continued precipitation increase annually from 2010 to 2040. The Northeast region is projected to see an increase in winter precipitation on the order of 20 to 30 percent. The ranges reflect the uncertainty of future weather events, as shown in the "very likely" range precipitation has a small potential to decrease over this 30 year period.

Environment America Research & Policy Center analyzed more than 80 million daily precipitation records from across the contiguous United States reveals that intense rainstorms and snowstorms have already become more frequent and more severe. Figure 11-4 shows how frequency of extreme downpours has increased in the US. Heavy rain is causing flooding in the Pioneer Valley region and is damaging to local roads and transportation infrastructure.

Figure 11-4 – Extreme Downpour Frequency Across the United States



Source: Environment America Research and Policy Center

The Northeast Climate Impacts Assessment (NEICA) reports that the number of days with rain greater than 2 inches to increase 1 day (low scenario) to 1.25 day (high scenario). The increase in heavy precipitation could potentially result in weather-related crashes, delays, and road closures in a network already challenged by increasing congestion. Other effects that climate change will have on the transportation system include:

- Increased flooding of roadways, rail lines, and underground tunnels
- Drainage systems will be overloaded more frequently and severely, causing backups and street flooding. Areas where flooding is already common will face more frequent and severe problems.
- Limitation on visibility because of precipitation and windshield obstruction
- Decreased skid resistance affecting vehicles performance, including traction and maneuverability, resulting in loss of control and skidding
- Lower travel speeds and greater speed variability resulting from differing driving habits and abilities

These climate change effects may reduce roadway capacity, travel speed, increase delay, increase crash risk and flooding events may cause road closures.

Table 11-2 – Northeast Anticipated Precipitation Annual % Change

Anticipated Northeast Precipitation Events	Average % Change for Northeast		Average % Change Range for Northeast from 2010 to 2029	
	B1 (High Emission Scenario)	A2 (Low Emission Scenario)	Likely	Very Likely
Annual	3.2%	2.9%	0.5 to 5.8%	(-2.0) to 8.0%

Table 11-2 above summarizes anticipated precipitation percentage change and precipitation percentage change range by season. Both low and high emission scenarios anticipate a percentage increase of approximately 3%. The "likely" and "very likely" percentage change ranges demonstrate the unpredictability of future weather trends. While the "likely" range anticipates there will be an increase in precipitation, the "very likely" range demonstrates that there is a possibility of a reduction in precipitation.

An increase in precipitation and flooding events could potential impact critical transportation links in the region. Figure 11-5 below displays major roadways and railroad lines proximity to 100 year and 500 year flood zones. A 100 year flood zone began in the 1960s when "the United States government decided to use the 1-percent annual exceedance probability (AEP) flood as the basis for the national flood insurance. The 1-percent AEP flood has a 1 in 100 chance of being equaled or exceeded in any 1 year, and has an average recurrence interval of 100 years, it is often referred to as the 100-year flood. The 500 year flood corresponds to an AEP of 0.2 percent, which means a flood of that size or greater has a 0.2 percent chance (or 1 in 500 chance) of occurring in a given year[11]." While the likelihood of a flood of either magnitude is minimal, these events would require numerous roadway closures. This would detour many transportation services onto surrounding roadways. While many of the major roadways in the region are affected by these flood zones the areas identified in this report highlight the roadways and areas that move large volumes of population and goods.

[11] U.S. Department of the Interior, *General Information Packet 106*, April 2010

Figure 11-5 – 100 and 500 Year Flood Areas

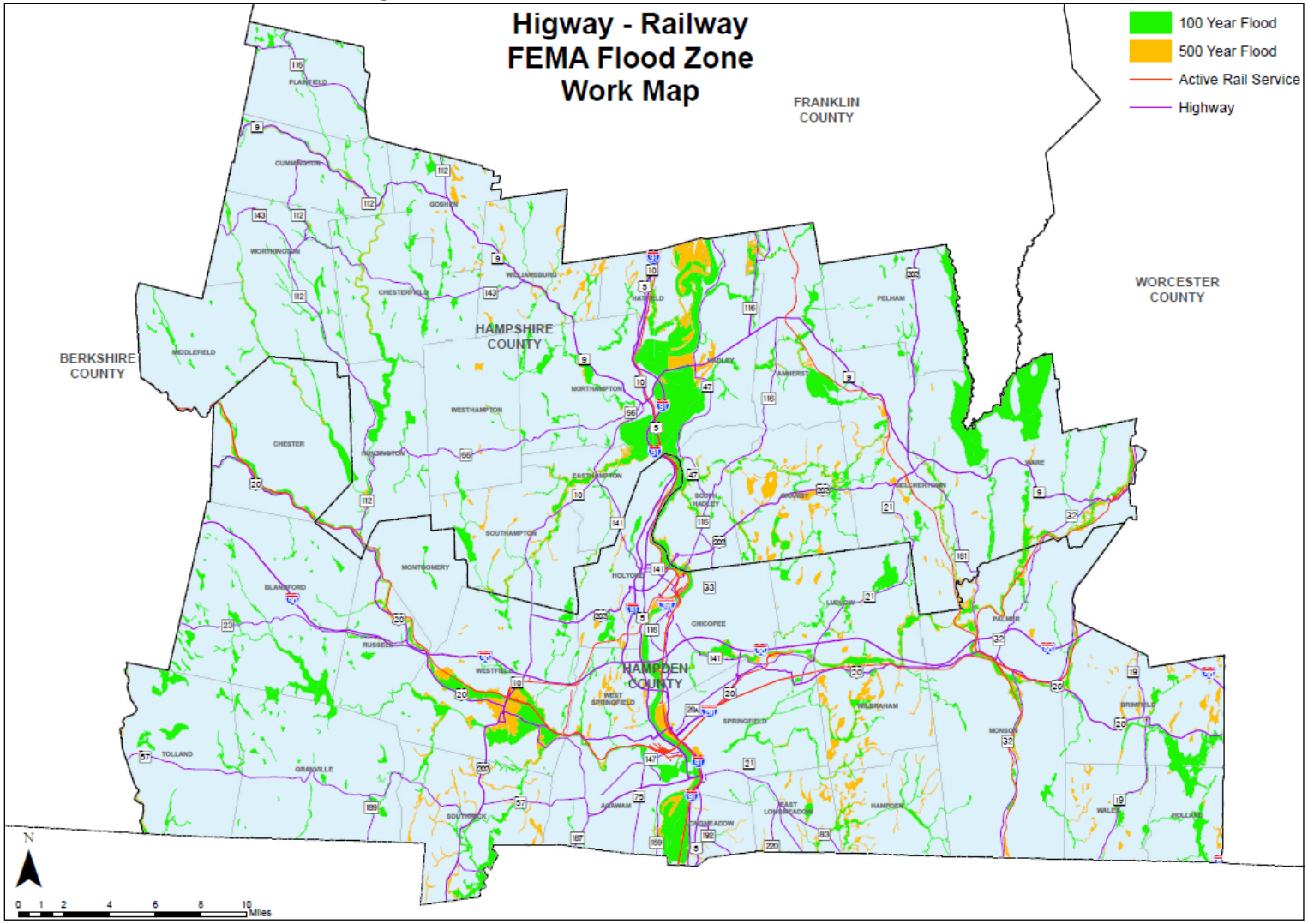
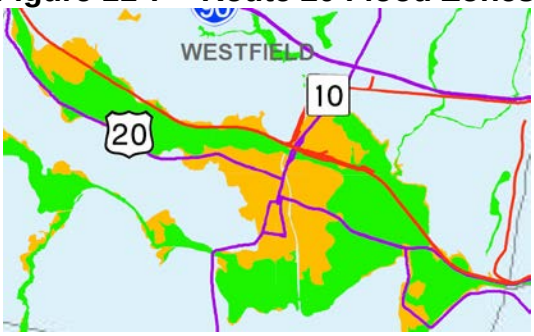


Figure 11-6 – Route 9 Flood Zones

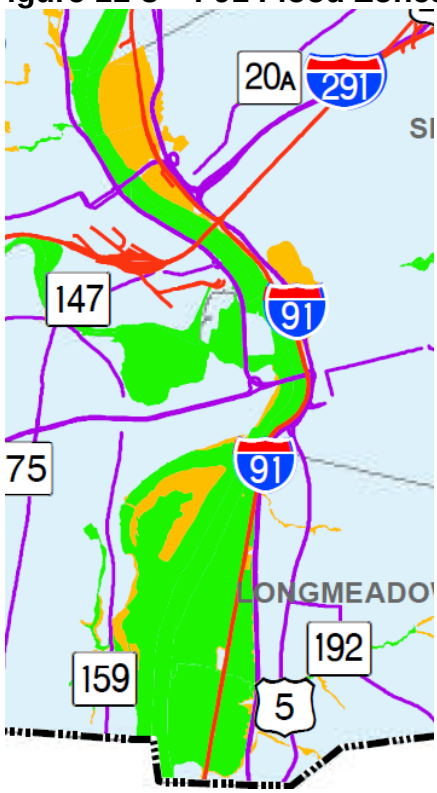
Hadley/Northampton-The western border of Hadley and the eastern border of Northampton possess a 100 year flood zone. During flood events road closures could potentially occur on Routes 5, 9, and 47. The Connecticut River would be the source of the flooding event.

Figure 11-7 – Route 20 Flood Zones



Westfield-The commercial and industrial areas along Route 20 and Union Street respectively are within the 100 year flood zone. During a 100 year flood Route 20 and Union Street could potentially be closed. The CSX rail line could also be potentially flooded at its lower elevation points through Westfield. Downtown Westfield is within the 500 year flood zone. If a flood of that magnitude occurs the area potentially could have Routes 10, 20, and 202 as well as other local road closures. The CSX line could potentially be flooded during this event as well. The Westfield River would be the source of the flooding event.

Figure 11-8 – I-91 Flood Zones



I-91 Ramps - I-91 is expected to be accessible during a flood event due to the higher elevation. However, many ramps in near downtown Springfield are at a lower elevation and at risk of flooding.

Knowledge Corridor-The proposed realignment under the "Knowledge Corridor" plan utilizes rail lines that are in close proximity to the Connecticut River. The rail line runs north through Chicopee and across the river to Holyoke. The rail line travels on the western side of the Connecticut River through Easthampton and parts of Northampton. Portions of the rail line through Easthampton and Northampton are within the 100 year flood zone.

In addition to flood zones, in the Pioneer Valley, severe storms are causing an increasing number of washouts of culverts and bridge structures. In 2011, Tropical Storm Irene caused more than $25 million of roadway damage in the region, including many culvert wash outs. There are 2,885 culverts and 678 bridges in the region. Culverts and bridges are structures usually built to carry a road, rail line or path over a stream or river. Culverts and bridges are usually located at points where the banks narrow, either naturally or as a result of man-made earthworks. In either case, the effect is to create a potential "choke point" in the downstream water flow.

All culverts in the region are mapped on Figure 11-9 and summarized by municipality. The top 5% deemed most ecologically vulnerable or sensitive to extreme weather and heavy rain are shown in red. Additional information on the

potential increase in habitat connectivity that can result from improving a road-stream crossing is presented in Chapter 17 on Figure 17-8.

Figure 11-9 – Culverts for Roadway Crossings in the Pioneer Valley

TOWN	Total	in top 5%	TOWN	Total	in top 5%	TOWN	Total	in top 5%
Agawam	100		Hadley	61	1	Plainfield	34	3
Amherst	87		Hampden	47	4	Russell	37	
Belchertown	146		Hatfield	32	1	South Hadley	46	
Blandford	74	10	Holland	35	2	Southampton	54	4
Brimfield	119	10	Holyoke	86		Southwick	72	
Chester	65	13	Huntington	41	3	Springfield	146	
Chesterfield	25		Longmeadow	35		Tolland	38	7
Chicopee	60		Ludlow	117	4	Wales	60	4
Cummington	44	8	Middlefield	29	5	Ware	95	
E. Longmeadow	45		Monson	124	4	W. Springfield	90	
Easthampton	45		Montgomery	32	2	Westfield	130	4
Goshen	27	3	Northampton	109		Westhampton	43	8
Granby	71	1	Palmer	92	3	Wilbraham	82	1
Granville	72	13	Pelham	36	16	Williamsburg	53	6
						Worthington	49	4
						TOTAL:	**2,885**	**145**

B. EXISTING POLICIES

EPA and the National Highway Traffic Safety Administration (NHTSA) have set GHG emissions standards and fuel efficiency standards for light-duty vehicles for model years 2012-2016. California is expected to propose stricter standards for model years 2017-2020, and Massachusetts law requires the state to adopt the California standards. Both EPA and NHTSA have proposed GHG emissions standards and fuel efficiency standards for medium- and heavy-duty vehicles for model years 2014-2018.

The federal renewable fuel standard requires an increase in the volume of renewable fuels used in the U.S. Additionally, Massachusetts' Biofuels Act, passed in 2008, instructs the state to pursue the development of a regional low-carbon fuel standard (LCFS). An LCFS would include targets and timelines for reducing the average carbon content of vehicle fuels. The Massachusetts' Sustainable Development Principles, last updated in 2007, are aimed at promoting clean energy to reduce GHG emissions and encouraging reductions in VMT through the creation of "pedestrian-friendly" neighborhoods.

1. Expanded Policy

It will be important to implement additional smart growth policies to make it easier for households and businesses to decrease VMT. The Plan suggests that such policies focus on influencing infrastructure investments by state agencies and planning decisions made by local governments.

C. NEW POLICIES

In 2006 the Pioneer Valley region was selected by ICLEI, Local Governments for Sustainability to participate in a pilot effort to reduce GHG emissions from transportation by promoting smart growth. Since 2007 we have partnered with the Massachusetts Department of Environmental Protection to remove old polluting vehicles from the road through our "voluntary vehicle recycling" initiative. The Pioneer Valley Planning Commission has long been recognized by MassDOT as a leader in encouraging bicycling as evidenced by our 12 years of success in facilitating Pioneer Valley Bike Commute week, a collaboration between our region and MassBike, the state bicycling advocacy program, that has now been replicated by MassDOT and MassBike at the statewide level. Thanks to diligent and ongoing education and advocacy efforts, we have many miles of on and off road bicycle ways and work to encourage sidewalks in all new developments. We have been working for 15 years to bring commuter rail back to the I-91 corridor; we have facilitated region-wide idling reduction programs and have a robust regional transit system through the Pioneer Valley Transit Authority.

In December, 2010 the Commonwealth of Massachusetts released their Clean Energy and Climate Plan for 2020 that sets out an ambitious state-wide GHG

emissions reduction target and lays out a framework for how the state will achieve that target. In January, 2008 the PVPC released our Clean Energy (and Climate Action) Plan (CEP) which set out our regions' emissions reduction targets and laid out a framework for how we would achieve those targets. The Commonwealth's Plan was released in compliance with the state's Global Warming Solutions Act of 2008 (GWSA), a legislative initiative adopted in June of 2008, six months after the release of our regional CEP. The GWSA mandates an 80 percent reduction in state-wide GHG emissions from 1990 levels by 2050. This goal is consistent with the Pioneer Valley Clean Energy Plan. In addition to a goal for 2050, GWSA required the Secretary of Energy and Environmental Affairs to establish an interim GHG emissions reduction target of between 10 and 25 percent below 1990 levels for 2020, and to issue a plan for achieving those reductions.

Both the Pioneer Valley Clean Energy Plan and the Massachusetts Clean Energy and Climate Plan include a mix of existing, expanded and recommended new policies to address climate change, including energy efficiency requirements, advanced building codes, a renewable portfolio standard (RPS), fuel efficiency standards, incentives for purchasing more efficient vehicles and reducing vehicle miles traveled (VMT), and smart growth policies. The Commonwealth's Plan portfolio of policies is broken down into five categories: buildings; electricity supply; transportation; non-energy related sources of emissions; and cross-cutting policies.

In order to meet the established interim GHG emissions reduction targets, it will be important to establish new policies that encourage a change in existing driving habits. Together, these policies and programs are estimated to reduce state-wide GHG emissions 7.6% by 2020. Below is a brief summary of the policies and programs that pertain to transportation.

- Provide incentives for consumers to shift their vehicle purchases to more fuel-efficient models, including varying the rates on new car sales taxes, annual auto excise taxes, and registration fees.
- Implement a pilot "pay-as-you-drive" (PAYD) vehicle insurance program. Under PAYD, car insurance rates would increase the more miles a person drives, creating an incentive to reduce discretionary driving.
- Implement GreenDOT, a sustainability program recently announced by the Massachusetts Department of Transportation. The program focuses on reducing GHG emissions in the transportation sector; promoting bicycling, transit and walking; and supporting smart growth development of the state's transportation systems.

In the Pioneer Valley we are committed to doing all that we can to further these policies. Our region is eager to serve as the pilot site for the PAYD vehicle insurance program and is also an established leader in understanding the connection between land use planning and transportation particularly when it comes to reducing GHG

emissions. Both our regional smart growth plan and our regional clean energy plan have been recognized through national planning awards.

D. PIONEER VALLEY CLEAN ENERGY PLAN

The Pioneer Valley Clean Energy Plan, first published in 2009 and updated in 2014 as part of the regional Climate Action and Clean Energy Plan, sets the following goals:

- Reduce regional energy use 15% by 2020 (over the 2000 baseline year) through improved energy efficiency.
- Replace non-renewable energy with clean and renewable energy that is generated locally, including sources such as wind, solar, landfill gas co-generation, hydropower, solar electric photovoltaic, solar hot water, biomass and biofuels.
- Increase the installed capacity of renewable energy production in the region to a total 754 million kWh/year by 2020; as of 2012, installed renewable capacity in the region was 281 million kWh per year, or 28% of the way toward the goal).
- Create local jobs in the clean and renewable energy sector.

The Massachusetts Global Warming Solutions Act of 2008 created statewide green house gas (GHG) emission reduction requirements of 25% by 2020 and 80% by 2050 from the 1990 baseline year. To achieve its “fair share” proportional GHG reductions to be consistent with this statewide goal, the Pioneer Valley plan identifies reductions in various sectors of energy use. In our region, transportation sources account for 31.8% of all GHG emissions (total 9.2 million tons of carbon dioxide equivalent). This means that reductions to come from the transportation sector through reduced driving, use of lighter-weight vehicles with improved aerodynamics and more energy efficient propulsion systems, as well as greater use of public transit.

Specific action recommendations to address climate change via transportation-related solutions in the Pioneer Valley Clean Energy Plan are summarized below.

a) The plan offers information and strategies intended to make it possible for people to use cars more efficiently, or not at all, including:

- Cars emit as much carbon dioxide as a typical single family home. Everything we can do to improve the fuel efficiency of cars will have an enormous impact on climate change. The Commonwealth has already committed to statewide policies requiring the most fuel efficient vehicles available, and the Green Communities program requires as one of its five criteria that municipalities commit to purchasing only fuel efficient vehicles. PVPC assists its member municipalities in obtaining Green Communities certification. In addition, we

support community-based efforts to educate drivers about fuel efficiency so they can operate their vehicles as efficiently as possible.

- PVPC promotes and encourages the use of buses, passenger rail, bicycling, walking, ride-sharing, vanpools, car-sharing and tele-commuting, tele-conferencing and webinars. We also work to create compact, mixed use communities, neighborhoods and village centers so people do not necessarily need cars to get to work, school, recreation or shopping, and we educate drivers to obey the speed limit, stop idling, and to buy fuel efficient vehicles when they can.

b) Provide financing and funding to promote fuel efficiency from the Clean Energy Plan include:

- Support redirecting fuel taxes to renewable energy, green planning, and mass transit.
- Work toward tax and regulatory policies that reflect the true cost to society of energy production and manufacturing processes based on a life-cycle "cradle to grave" analysis.
- Support an excise tax based on miles driven with funds to be used to support green transportation projects.
- Support use of fuel taxes for clean energy and green development projects.
- Support the use of congestion pricing on appropriate regional roadways.
- Work with financial institutions to promote location-efficient mortgages.
- Encourage the state to add a fee to vehicle-inspection charges to fund transportation-option education.
- Investigate a region-wide parking permit and/or state-wide registration fee based on a vehicle's greenhouse gas emissions. Revenue will be used to reduce use of single-occupancy vehicles.
- Work with the state to provide loans and other financial incentives to promote the purchase of vehicles with fuel efficiency by business, government, and individuals.

c) Specific actions that the Clean Energy Plan encourages for businesses, municipalities, and individuals:

- Provide transit passes for all residents funded through a household levy or business tax.
- Encourage the Pioneer Valley Transit Authority (PVTA) and the Franklin Regional Transit Authority (FRTA) to consider additional van pools to make connections between existing routes.
- Enhance transportation management associations (TMAs) and encourage the development of TMAs in all regional centers to make more efficient use of existing transportation resources.
- Work with the PVTA and the FRTA to improve access to transit service.
- Ensure prompt snow removal and clearing of pedestrian paths at bus stops and around traffic signal poles with crosswalk push buttons, to maintain safe access for transit riders and pedestrians.

- Encourage shared parking opportunities such as movie theaters with primary parking needs in evenings and churches or other facilities with weekend-only parking needs.
- Support park-and-ride lots to encourage car pooling.
- Provide additional services such as secure, covered bicycle parking, coffee and newspapers during peak hours, and other amenities.
- Continue and expand projects that increase pedestrian accessibility to transit stops, neighborhood shopping areas, schools, churches, and parks.
- Help transit riders to show their neighbors, friends, and co-workers how easy it is to take transit.
- Encourage citizens to commute to goods and services by bicycle or foot.
- Promote the Pioneer Valley Bicycling map and the new Franklin County Bikeway Map.
- Provide secure, covered bicycle parking at schools, in commercial districts, and at other destinations.
- Promote growth through redevelopment and infill that maintains or improves the quality of life for existing neighborhoods.
- Promote proximate commuting (i.e., living near a workplace).

d) Support continued use of transportation demand management strategies.

As noted previously, the Pioneer Valley is one of 35 regions in the country selected to receive federal funding to enhance sustainability in our region. With this federal funding we will be updating our existing regional plans, and developing a new Climate Action plan to further our region's initiatives to address climate change.

E. MERRICK AND MEMORIAL PHASE II

Merrick and Memorial Phase II Transportation and Community System Preservation study for the Merrick and Memorial Neighborhoods of West Springfield, Massachusetts. This study is a multidisciplinary effort of the Pioneer Valley Planning Commission (PVPC) and the City of West Springfield to look at how transportation and redevelopment can work together to improve the quality of life for residents and the economic vitality of businesses in these two neighborhoods.

Phase I of this study was completed in 2004 with the issuance of a Redevelopment Plan. This plan targeted several areas for economic development in the Merrick Neighborhood, including properties along Union Street, and recommended several transportation and infrastructure improvements to improve access to the CSX railyard and preserve the quality of life in surrounding residential areas.

Now complete, Phase II of the study addresses the entire study area (both Merrick and Memorial Neighborhoods). It offers recommendations that are geared to improve the efficiency of the regional transportation system, increase employment and business activity, and encourage new development and redevelopment that will enhance the livability and the quality of life for people who live and work in the Merrick and Memorial Neighborhoods.

The study specifically identified focus areas based on their potential to spur future redevelopment through Complete Streets improvements. Conceptual improvements were developed to provide concepts for discussion under various redevelopment scenarios that could be advanced in conjunction with proposed transportation enhancements. An Executive Summary and the Final Report can be downloaded on the Merrick and Memorial Neighborhood Study webpage at: http://www.pvpc.org/projects/merrick-and-memorial-neighborhood-study.

F. GREEN HOUSE GAS EMISSIONS ON I-91

The Pioneer Valley Planning Commission staff collected air samples to measure the levels of carbon dioxide along the I-91 corridor as part of its Interstate Route I-91 Corridor Planning Study Existing Conditions Report completed in November 2014. Specific points in the vicinity of highway exits were measured to identify green house gas (GHG) emissions from automobiles.

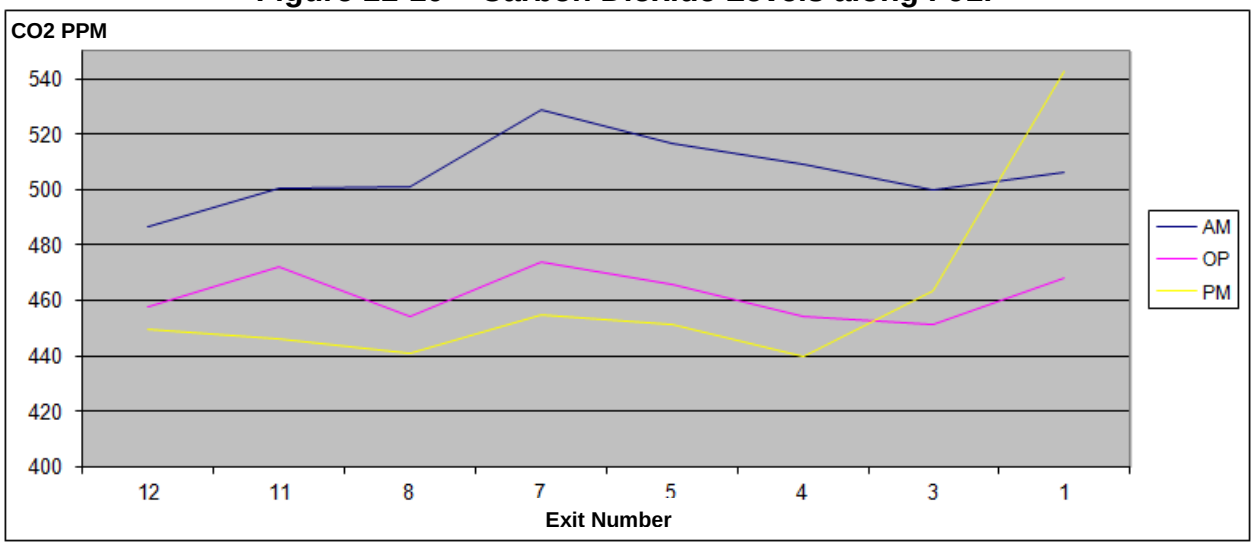
As traffic congestion increases Carbon Dioxide also increases. Carbon Dioxide emissions are sensitive to the type of driving occurring. Traveling at a steady speed will result in much lower emissions than stop and go driving patterns. For example, on a highway when travel speeds are reduced due to congestion vehicles experience frequent acceleration and deceleration events over a short travel distance, which in turn correlates with higher grams per mile emission rates. And when vehicles travel at higher speeds they experience higher engine loads which result in higher emissions rates. However, a steady velocity of 45 to 50 mph produces the minimum grams per mile of CO2 emissions.

For taking mobile observations of CO2 emissions along Interstate 91 a Picarro 2301 cavity ring-down spectrometer and mobile monitoring kit were utilized to collect samples at approximately 1 second intervals. The unit was secured in the rear of a compact car and fed the units inlet tube to the car's front bumper. The unit's mobile monitoring kit has a built in high precision GPS that records the exact location of where a sample was taken. This data was extracted from the unit and mapped using the provided latitude and longitude coordinates. A total of 3 observations were performed for this study during the morning rush hour 7:08-8:45 AM (6/5), off peak time, 2:36-3:39 PM (5/30), and afternoon rush hour 4:44-5:46 PM (5/17). Each field drive along I-91 followed the same loop passing through Longmeadow, Springfield and West Springfield from Exit 1 to Exit 13B.

The CO2 readings were charted for each of the three times of day by direction. Figure 11-10 shows the variation in CO2 readings taken on I-91 during various times of the day. The X axis lists I-91 exit numbers and the Y axis represents the level of CO2 in parts per million. Data points in this chart represent the average CO2 levels between exit locations. For example, the data point at Exit 4 represents the average CO2 emissions from Exit 3 to Exit 4. The intensity levels of CO2 along the highway

are depicted over an aerial map of the corridor area for the morning peak traffic period on Figure 11-11.

Figure 11-10 – Carbon Dioxide Levels along I-91.



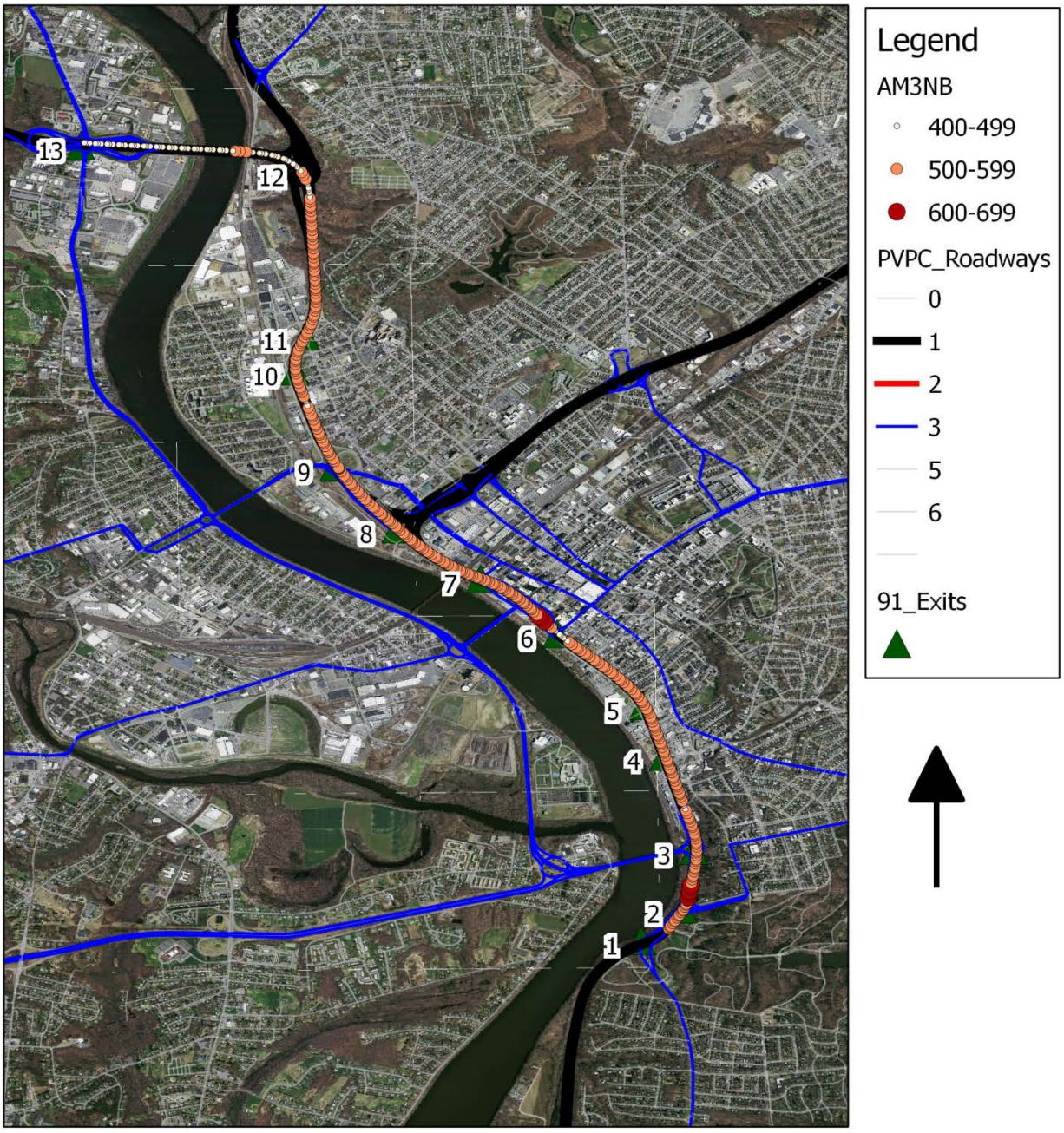
AM: Morning Peak Hour, OP: Off Peak Hour, PM: Afternoon Peak Hour.

Travel speed observations and CO2 level measurements along the I-91 corridor study area show that congestion and the acceleration/deceleration events increase emissions between Interchanges 1 and 9. There are many on/off ramps between Interchanges 1 and 9 within a short distance from one another, including a connection to Interstate 291. Therefore, the volume of merging traffic from and to these ramps negatively impacts the ability of vehicles to maintain steady travel speeds, which results in higher emissions. Traffic moves more steadily between Interchanges 9 and 13 in both directions of the highway. Due to the steadier vehicular speeds, emissions are lower between Interchanges 9 and 13. Despite the fact that vehicular travel speeds are closer to the recommended 45 to 50 mph between Exits 1 and 9, acceleration/deceleration events prevent vehicles from maintaining a steady pace.

G. NORTHEAST RESILIENCE ANALYSIS

The Nature Conservancy's Northeast Resilience Project identifies those lands most likely to be resilient to climate change. By looking at the aspects that will not change (bedrock type, elevation, topographic gradient), this analysis identifies locations that should support the highest diversity of plants and animals (and ecosystem services like clean drinking water and carbon storage), even if the individual species found in a given location do change. More information is available at: https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/ne/Pages/default.aspx

Figure 11-11 – Carbon Dioxide Intensity on I-91 Northbound - Morning Peak Hour



CHAPTER 12

REGIONAL PERFORMANCE MEASURES

MAP-21 requires a performance based planning methodology to improve decision-making through better informed planning and programming. As part of this process, each state and MPO develops goals and objectives to track the performance of key areas of the transportation system. Performance measures are tracked over time to determine the progress in meeting these goals. This tracking occurs through ongoing data collection and planning activities already performed by the PVPC. The development and tracking of performance measures allows the region to identify the areas in which they would like to place additional emphasis through transportation improvement projects that may be necessary to ensure a safe and dependable regional transportation system for all modes of travel.

A. DEVELOPMENT

The MPO designated the Pioneer Valley Joint Transportation Committee (JTC) as the advisory committee to assist in the development of regional performance measures. The JTC meets on a monthly basis and discussed the development of regional performance measures on a regular basis. The first step was the identification on existing performance measures that are utilized as part of ongoing transportation planning activities. This information is summarized in Table 12-1.

Table 12-1 – Existing Performance Based Planning Activities in the Pioneer Valley

Planning Activity	Performance Measures Used
Regional Pavement Management	Roadway overall condition index (OCI) for use in evaluating transportation improvement projects
Regional Congestion Management Process	Regional Travel Time Index, Travel Time Delay, and Congestion Ratio for identification of congestion severity and regional bottlenecks.
Top 100 High Crash Intersections Report	Equivalent Property Damage Only (EPDO) totals for high crash intersections.
Transit Route Surveys	Collection of ridership data, on-time performance, passengers per trip, and passengers per revenue hour to track the performance of fixed-route services.
CMAQ and Greenhouse Gas Analysis	Overall reduction in pollutant levels of CO2, VOC, NOx and CO for CMAQ project selection and GreenDOT analysis.

Based on the existing performance based planning activities and ongoing statewide planning activities, the JTC identified the existing performance measures that could best advance the seven national goals of MAP-21, the eight planning factors of SAFETEA-LU and the goals of the RTP. These performance measures were grouped into seven different planning areas and linked to the appropriate RTP goals and emphasis areas. This information is summarized in Table 12-2.

Table 12-2 – Regional Performance Measures for the Pioneer Valley MPO

Planning Area	Regional Performance Measures
Operations and Maintenance	• Structurally Deficient Bridges • Overall Condition Index
Safety	• Equivalent Property Damage Only (EPDO) • Fatality Rate • Top 100 High Crash Intersections
Congestion	• Travel Time Index • Regional Bottlenecks • Bicycle Condition Index • Passengers per Revenue Hour • Passengers per Trip
Green House Gas/Air Quality	• Transportation Related Green House Gas Levels • CMAQ Projects
Freight	• Restricted and Closed Bridges and Overpasses
Intermodal	• Park and Ride Occupancy • Bike Path Use Volumes
Multimodal	• Fixed Route Transit Ridership • Miles of Multi-use Paths, On-road Bike Facilities and Sidewalks.

1. Regional Performance Targets

A series of regional performance targets were developed based on the regional performance measures. Performance targets were developed to serve as indicators on how well the MPO is doing in advancing planning activities and projects to advance the goals of the RTP. Each performance target is based off of a baseline level and identifies a specific outcome over a defined timeframe. In some cases, the regional target is identical to established MassDOT targets when it was felt the state target was appropriate to advance the goals of the RTP, or that MassDOT typically plays the lead role in the advancement of projects and programs that can meet the performance target. One example is the advancement of bridge improvement projects through the TIP which is based off information received from MassDOT. The regional performance targets are summarized in Table 12-3. Tables 12-4 – 12-10 link each of the performance targets to RTP goals, emphasis areas, and state performance measures and targets.

Table 12-3 – Regional Performance Targets for the Pioneer Valley MPO

Reduce the number of structurally deficient bridges below 2014 levels.
Increase the average Overall Condition Index (OCI) for federal aid eligible roadways by 5% by 2025.
Reduce motor vehicle fatalities by 20% over five years.
Reduce the number of roadway fatalities and serious injuries by 50% by 2030.
Complete at least one safety study per year as part of the UPWP.
Reduce the average regional travel time index to less than 1.5 by 2025.
Fund at least one congestion improvement project through the TIP every 5 years.
Complete one planning study to reduce congestion per year as part of the UPWP.
Increase the total mileage of on road bicycle facilities by 10% by 2025.
Meet the minimum number of Passengers per Trip and Passengers per Revenue Hour for fixed route transit service consistent with PVTA's established tiers of service.
Reduce green house gas from the transportation sector by 25% by 2020 and 80% by 2050.
Fund at least one air quality improvement project through the TIP each year.
Minimize the impact of weight restricted, height restricted, and closed bridges.
Increase average park and ride lot use by 5% by 2025.
Demonstrate an overall annual increase in the use of regional bike paths.
Demonstrate an overall annual increase in PVTA and FRTA ridership.
Increase the total mileage of all bicycle and pedestrian infrastructure by 10% by 2025.

Table 12-4 – Operations and Maintenance Performance Measures

RTP Goal	Emphasis Areas	Objective	Statewide Performance Measures	State Target	Data Source	Regional Performance Measure	Regional Target	Data Source	MPO Action / Tracking Mechanism
To provide a transportation system that is dependable and adequately serves users of all modes. To give priority to the repair of existing streets, roads, and bridges.	The Movement of People, The Movement of Goods, Sustainability	Invest in projects that preserve the existing transportation infrastructure, while enhancing the experience for all users	# Statewide Structurally Deficient Bridges	< 461 Structurally Deficient Bridges	MassDOT Bridge Inventory	% Structurally Deficient	Reduce the number of structurally deficient bridges below 2014 levels in the PV Region	MassDOT Bridge Inventory	Prioritize funding for projects that will reduce the number of structurally deficient bridges in the Pioneer Valley. Bridge projects should continue to be funded outside of the regional target. **Tracking Mechanism = Structurally Deficient and Functionally Obsolete Bridges in Region**
			Bridge Health Index	Bridge health Index > 82		% Functionally Obsolete		MassDOT Bridge Inventory	Prioritize funding for projects that will increase Bridge Health Index **Tracking Mechanism = MassDOT Bridge Health Index**
			MassDOT Pavement Condition	65% of all pavement is in good or excellent condition	Pavement Condition Data	Overall Condition Index (OCI)	Increase the average OCI for the federal aid eligible roadways by 5% by 2025	PVPC Pavement Management Data	Prioritize funding for projects that will increase the OCI for roadways in the pioneer Valley (Included in TEC). This is contingent upon the availability of additional federal and state aid that increases incrementally over time. **Tracking Mechanism = Regional OCI by functional Classification**

Table 12-5 – Safety Performance Measures

RTP Goal	Emphasis Areas	Objective	Statewide Performance Measures	State Target	Data Source	Regional Performance Measure	Regional Target	Data Source	MPO Action / Tracking Mechanism
To provide and maintain a transportation system that is safe for all modes of travel users and their property.	The Movement of People, The Movement of Goods, Safety and Security, Sustainability	Reduce the number and severity of crashes for all users	The Equivalent Property Damage Only (EPDO) index for auto, truck, bicycle, and pedestrian crashes in the Pioneer Valley Region	Reduce motor vehicle fatalities by 20% over five years (short term)	MassDOT Registry of Motor Vehicles Crash Data	EPDO	Reduce motor vehicle fatalities by 20% over five years (short term)	Top 100 High Crash Intersections Report	Prioritize projects with high crash locations and/or major safety components that are anticipated to improve safety along a corridor (Included in TEC) **Tracking Mechanism = Top 100 High Crash Intersection List updated every 3 years**
				Halve the number of fatalities and serious injuries on roadway (long term)	MassDOT Crash Portal	Fatality Rate	Halve the number of fatalities and serious injuries on roadways by 2030 (long term)	Municipal Crash Reports	Implement intersection safety studies for the top crash locations (Included in TEC) **Tracking Mechanism = Number of safety studies completed per UPWP cycle**
			HSIP Clusters for all modes (High Crash Locations Based on EPDO Index)		MassDOT Top Crash Locations Report	Top 100 High Crash Locations	Complete 1 Safety study a year for locations indentified in the Top 100 High Crash locations report	PVPC Top 100 High Crash Locations Report	Implement intersection safety studies for the top crash locations (Included in TEC) **Tracking Mechanism = Roadway Safety Audits in PVPC Region, safety recommendations advanced through TIP**

Table 12-6 – Congestion Performance Measures

RTP Goal	Emphasis Areas	Objective	Statewide Performance Measures	State Target	Data Source	Regional Performance Measure	Regional Target	Data Source	MPO Action / Tracking Mechanism
To provide and maintain a transportation system that enhances quality of life and improves the social and economic climate of the region.	Safety and Security, The Movement of People, The Movement of Goods, Sustainability	Reduce Delay for all modes	Vehicle Hours of Delay (daily, annual), Speed Index, Travel Time Index, Volume to Capacity Ratio, Project vehicle hours of delay (daily, annual),	Maintain average driver delay at or below 4.8 hours of delay/1,000 Vehicle Miles Travelled (VMT)	Regional Transportation Model, INRIX data, Congestion Management Process (CMP)	Congestion Severity Ranking (CMP) Travel Time Index	Reduce the average regional travel time index to less than 1.5 by 2025	CMP Data collection, UPWP, FDR	Prioritize projects studied as part of the CMP, and UPWP (Included in TEC) **Tracking Mechanism = CMP Listing updated every 4 years**
		Expand the on/off Road bicycle and pedestrian network	New Miles of sidewalk, New miles of bicycle facilities (lanes, five-foot shoulders, paths)			Top Regional Bottleneck	Fund 1 congestion improvement project through the TIP every 5 years. Complete 1 congestion study per year for locations identified in the CMP / Top Bottleneck Report		Prioritize projects studied as part of the Top Bottlenecks Report, and UPWP (Included in TEC) **Tracking Mechanism = Top Bottlenecks Report updated every 4 years**
						Bicycle Condition Index (BCI)	Increase the total mileage of on road facilities by 10% by 2025	BCI analysis, Roadway inventory	Prioritize projects that include bicycle accommodations (Included in TEC) **Tracking Mechanism = on and off road bicycle and pedestrian network mileage**
		Improve the efficiency of the Public Transportation System	Vehicle peak load points by line, Vehicle loads by key bus routes			Passengers per Revenue Hour and Passengers per Trip	Meet the minimum number of Passengers per Trip and Passengers per Revenue Hour for fixed route transit service consistent with PVTA's established tiers of service.	PVTA/PVPC system analysis	Prioritize projects that include transit amenities **Tracking Mechanism = Number of new transit amenities implemented through the TIP**

Table 12-7 – Greenhouse Gas/Air Quality Performance Measures

RTP Goal	Emphasis Areas	Objective	Statewide Performance Measures	State Target	Data Source	Regional Performance Measure	Regional Target	Data Source	MPO Action / Tracking Mechanism
To minimize the transportation related adverse impacts to air, land, and water quality and strive to improve environmental conditions at every opportunity	Safety and Security, The Movement of People, The Movement of Goods, The Movement of Information, Sustainability	Reduce GHG's resulting from the transportation system	GHG, VOC, NOX, CO, PM	Reduce GHG from the transportation sector 25% by 2020 and 80% by 2050	CMAQ Analysis/ Model	GHG tracking off model and with Picarro Analyzer	Reduce GHG from the transportation sector 25% by 2020 and 80% by 2050	Local GHG Data Collection	Prioritize projects with components that could improve air quality (Included in TEC) **Tracking Mechanism = Net GHG reduction per TIP year**
						CMAQ Analysis	Fund at least 1 AQ improvement project through the TIP each year	CMAQ Analysis / FDR	Prioritize projects with components that could improve air quality (Included in TEC) **Tracking Mechanism = CMAQ project completed through TIP**

Table 12-8 – Freight Performance Measures

RTP Goal	Emphasis Areas	Objective	Statewide Performance Measures	State Target	Data Source	Regional Performance Measure	Regional Target	Data Source	MPO Action / Tracking Mechanism
To maintain a transportation system that promotes and supports economic stability and expansion.	Safety and Security, The Movement of People, The Movement of Goods, Sustainability	Improve the efficiency of the freight network	Average weekday average truck hours of delay, Number of weight restricted or closed bridges, # of projects that improve intermodal facilities		MassDOT bridge list	Minimize the impact of weight restricted, height restricted, and closed bridges.	Use State Target	MassDOT bridge list	Prioritize projects that improve efficiency of the freight network. Bridge projects should continue to be funded outside of the regional target. **Tracking Mechanism = Number of weight restricted bridges in region per TIP year**

Table 12-9 – Intermodal Performance Measures

RTP Goal	Emphasis Areas	Objective	Statewide Performance Measures	State Target	Data Source	Regional Performance Measure	Regional Target	Data Source	MPO Action / Tracking Mechanism
To provide access between travel modes for people and goods while maintaining quality and affordability of service.	Safety and Security, The Movement of People, The Movement of Goods, The Movement of Information, Sustainability	Increase the availability of bicycle and automobile parking near transit facilities				Park and Ride Occupancy	Increase average park and ride lot use by 5% by 2025	Park and Ride Data Collection	**Tracking Mechanism = Monthly occupancy tracking at park and ride lots**
		Reduce single occupancy automobile usage in Pioneer Valley				Bike Path use volume	Demonstrate an overall annual increase in the use of regional bike paths	Bike Path count program	Prioritize projects that reduce dependency on single occupancy automobiles **Tracking Mechanism = Annual Bicycle and Pedestrian counts**

Table 12-10 – Multimodal Performance Measures

RTP Goal	Emphasis Areas	Objective	Statewide Performance Measures	State Target	Data Source	Regional Performance Measure	Regional Target	Data Source	MPO Action / Tracking Mechanism
To provide a complete choice of adequate travel options that are accessible to all residents, visitors and businesses.	Safety and Security, The Movement of People, The Movement of Goods, The Movement of Information, Sustainability	Reduce single occupancy automobile usage in Pioneer Valley	Mode Share, Transit Ridership			PVTA and FRTA Ridership	Demonstrate an overall annual increase in PVTA and FRTA ridership	FRTA/PVTA/ PVPC system analysis	Prioritize projects that close gaps between modes of transportation **Tracking Mechanism = Map known gaps in regional transportation system to promote connectivity**
		Increase Access to multi use paths	Access points and miles of shard use paths			New miles of multi use paths, on-road bike facilities, and sidewalks	Increase the total mileage of all bicycle and pedestrian infrastructure by 10% by 2025 (No more than 5% off road paths)	RTP, UPWP, TEC, TIP	Prioritize projects that enhance access for bicycles and pedestrians via on-road improvements, new sidewalks, and new multi use paths **Tracking Mechanism = Map access points, monitor and track usage**

B. TRANSPORTATION EVALUATION CRITERIA

The Transportation Evaluation Criteria (TEC) is the system utilized by the MPO to determine the regional impact of Federal Aid eligible transportation improvement projects. Projects are funded in part based on their TEC score, design readiness, and available funding for the current Federal Fiscal year. The current TEC was adopted by the MPO in February, 2015. This new criteria was developed as part of a comprehensive regional process to integrate performance based planning into the project selection process to assist in advancing projects that advance regional performance measures and goals. A summary of the TEC scoring is shown in Table 12-11.

The new TEC was developed in close consultation with the Pioneer Valley JTC and MPO. An online survey was developed to collect information on the types of transportation improvement projects that were important to residents in the region. Over 600 responses were received to the survey. This data was used to assist in the prioritization of each transportation scoring criteria to reflect the needs of the existing transportation infrastructure and advance projects that promote quality of life.

The JTC utilized the new TEC for the first time in March 2015 to assist in the development of the FY2016 – 2019 TIP. Overall, the new TEC was found to be an improvement to the previous criteria as it clearly identified how many points a specific project was eligible for under each category. The JTC will continue to track the new TEC and its impact on advancing projects that assist in meeting regional performance targets. More information on the TEC is available on the PVPC website: http://www.pvpc.org/projects/transportation-evaluation-criteria-information-center.

Table 12-11 – TEC Scoring Summary

System Preservation, Modernization and Efficiency	Livability	Mobility	Smart Growth and Economic Development	Safety and Security	Environment and Climate Change	Quality of Life	Environmental Justice
Improves Substandard Pavement 8	Design is consistent with Complete Streets policies 3	Improves efficiency, reliability and attractiveness of public transit 4	Encourages development around existing infrastructure 2	Reduces number and severity of collisions 7	Preserves floodplains and wetlands 1	Enhances or preserves greenways and blueways 1	Reduces and limits disproportionate impacts on an EJ community 1
Improves Intersection Operations 6	Provides multi-modal access to a downtown, village center, or employment center 2	Improves existing peak hour LOS 6	Prioritizes transportation investments that support land use and economic development goals 1	Promotes safe and accessible pedestrian and bike environment 5	Promotes green infrastructure and low impact development to reduce stormwater impacts 2	Improves access to parks, open lands and open space 1	Improves transit for EJ populations 2
In a Congestion Management Process Area 5	Reduces auto-dependency 2	Reduces traffic congestion 7	Provides services to a TOD, TND or cluster 0.5	Improves emergency response 4	Reduced impervious surfaces 0.5	Improves access to jobs 2	Creates an EJ Burden -5
	Project serves a targeted development site 2		Supports mixed-use downtowns and village centers 0.5		Protects or enhances environmental assets 0.5	Preserves historical and cultural resources 0.5	
	Completes off-road bike and ped network 3		Improves Intermodal Connections 4		Supports Brownfield redevelopment 0.5	Preserves prime agricultural land 0.5	
			Reduces congestion on freight routes 2		Improves air quality 1	Provides safe and reliable access to education 0.5	
					Reduces CO2 emissions 1	Supports designated scenic byways 0.5	
					Promotes mode shift 1	Implements ITS Strategies 2	
					Improves fish and wildlife passage 1	Improves Network Wayfinding 1	
					Supports Green Communities 0.5	Health Impact Assessment 1	
					Improves storm resilience 3		
Maximum Score							
19	**12**	**17**	**10**	**16**	**12**	**10**	**3**

C. SYSTEM PERFORMANCE REPORT

A system performance report was developed to assist in identifying the status of the transportation system prior to the implementation of the regional performance measures and targets. Historic information on each of the regional performance measures was used to identify current status of each regional performance target. Each performance target was assessed an evaluation ranking of excellent, good, or needs improvement based on its current status. The definition of each of the three evaluation rankings are summarized below:

- **Excellent** – The performance measure currently meets or exceeds its performance target.
- **Good** – The performance measure is on track to meet its performance target by the established deadline.
- **Needs Improvement** – The performance measure is not on track to meet its performance target by the established deadline, or the data is not yet available for the performance measure.

a) Structurally Deficient Bridges

Performance Target = Reduce the number of structurally deficient bridges below 2014 levels.

Table 12-12 – Structurally Deficient Bridges in the Pioneer Valley Since 2009

	2009	2010	2011	2012	2014
Structurally Deficient Bridges	75	69	63	65	53
Total Bridges	674	674	669	676	678

While the MassDOT Bridge data does show improvement over the last few years, the performance target cannot be accurately assessed until the 2015 bridge data is reported.

RTP Assessment: **Needs Improvement**

b) Overall Condition Index

Performance Target = Increase the average Overall Condition Index (OCI) for federal aid eligible roadways by 5% by 2025.

Table 12-13 – Regional OCI By RTP Year

	2012	2016
Overall Condition Index	77.6	71.1

The average OCI has decreased by 6.5 since the 2012 RTP. While the average pavement condition is still considered to be in "good" condition, it does not come close to meeting the established performance target.

RTP Assessment: **Needs Improvement**

c) Motor Vehicle Fatalities

Performance Target = Reduce motor vehicle fatalities by 20% over five years.

Table 12-14 – Fatal Crashes in the Pioneer Valley 2008 - 2012

2008	2009	2010	2011	2012
35	41	37	34	44

While a downward trend in fatal crashes occurred from 2009 to 2011, a large increase in fatal crashes occurred in 2012.

RTP Assessment: **Needs Improvement**

d) Roadway Fatalities and Serious Injuries

Performance Target = Reduce the number of roadway fatalities and serious injuries by 50% by 2030.

Table 12-15 – Fatal and Serious Injury Crashes in the Pioneer Valley 2008 - 2012

2008	2009	2010	2011	2012
277	249	269	514	486

The spike in the number of fatal and serious injury crashes from 2010 to 2011 are a result of improvements in crash data reporting by local communities and more accurate data on the severity of the injury. The number of fatal and serious crashes decreased by nearly 6% from 2011 to 2012, however more data is necessary to determine if this trend can be expected to continue over time.

RTP Assessment: **Needs Improvement**

e) Safety Studies

Performance Target = Complete at least one safety study per year as part of the UPWP.

Table 12-16 – Safety Studies Completed Over the Past 3 Years

2012	2013	2014
4	1	2

Currently, the region is exceeding the target to complete at least one safety study as part of the UPWP.

RTP Assessment: **Excellent**

f) Average Driver Delay

Performance Target = Reduce the average regional travel time index to less than 1.5 by 2025.

Table 12-17 – Average Regional Travel Time Index by CMP Analysis Year

2010	2015
1.56	1.71

The average regional travel time index has increased from 2010 to 2015. This is due in part to the expansion of the CMP network after 2010 to include more roadway miles. It will be important to continue to track the travel time index on regional CMP routes.

RTP Assessment: **Needs Improvement**

g) Congestion Improvement Projects

Performance Target = Fund at least one congestion improvement project through the TIP every 5 years.

Table 12-18 – Congestion Improvement Projects Completed Over the Past 5 Years

2011	2012	2013	2014	2015
1	1	1	2	2

Historically, the Pioneer Valley region has completed at least one congestion improvement project through the TIP over the last five years.

RTP Assessment: **Excellent**

h) Congestion-related Planning Studies

Performance Target = Complete one planning study to reduce congestion per year as part of the UPWP.

Table 12-19 – Congestion-related Planning Studies Completed Over the Past 3 Years

2012	2013	2014
1	0	2

A total of three congestion-related planning studies were completed as part of the UPWP over the last three years, however, the study included as part of the 2013 UPWP was actually finished in 2014.

RTP Assessment: **Good**

i) On road Bicycle Facility Mileage

Performance Target = Increase the total mileage of on-road bicycle facilities by 10% by 2025.

Table 12-20 – On-road Bicycle Facility Mileage in the Pioneer Valley

2000	2005	2010	2015
4.50	7.25	8.95	17.95

As can be seen from the table, the region has experienced a dramatic increase in on-road bicycle facilities over the last 15 years. We are currently meeting this performance target.

RTP Assessment: **Excellent**

j) Passengers per Trip and Passengers per Revenue Hour

Performance Target = Meet the minimum number of Passengers per Trip and Passengers per Revenue Hour for fixed route transit service consistent with PVTA's established tiers of service.

Table 12-21 – PVTA Routes That Meet Passengers per Trip and Passengers per Revenue Hour Standards

	September/2014 – April/2015
Number of Routes that Meet Minimum Performance Standards	34
Total PVTA Routes	47

PVTA began reviewing routes to determine if the minimum number of Passengers per Trip and Passengers per Revenue Hour for fixed route transit service is consistent with the minimum performance standards based on PVTA's established tiers of service. Currently 72% of all routes are meeting the minimum performance standards on the average weekday.

RTP Assessment: **Good**

k) Transportation Sector Green House Gas Emissions

Performance Target = Reduce green house gas from the transportation sector by 25% by 2020 and 80% by 2050.

Table 12-22 – Green House Gas Emissions (CO2) from the Transportation Sector

2008	**2009**	**2010**	**2011**	**2012**
33.6	30.8	30.8	31.0	30.4

Source: Massachusetts Annual Greenhouse Gas Emissions Inventory, July 2014

Based on the latest inventory of green house gas emissions, CO2 production from the transportation sector is down by 10.5% since 2008.

RTP Assessment: **Good**

l) Air Quality Improvement Projects

Performance Target = Fund at least one air quality improvement project through the TIP each year.

Table 12-23 – Air Quality Improvement Projects Completed Over the Past 5 Years

2011	2012	2013	2014	2015
1	1	1	2	3

The region has successfully programmed air quality improvement projects over the last 5 years as part of the CMAQ program.

RTP Assessment: **Excellent**

m) Weight Restricted, Height Restricted, and Closed Bridges

Performance Target = Minimize the impact of weight restricted, height restricted, and closed bridges.

Table 12-24 – Restricted and Closed Bridges

	2011	2014
Weight Restricted Bridges	92	63
Bridges with Vertical Clearance Restrictions	73	65
Closed Bridges	14	13

Overall, the region has seen a reduction in the number of restricted and closed bridges. It will be important to continue to track this data to determine the long term impacts on the region.

RTP Assessment: **Good**

n) Average Park and Ride Lot Use

Performance Target = Increase average park and ride lot use by 5% by 2025.

Table 12-25 – Average Park and Ride Lot Occupancy 2011 -2015

2011	2012	2013	2014	2015
136	138.6	118.3	99.9	76.5

Average Park and Ride Lot usage has been steadily decreasing over the last 3 years. While 2015 data only represents partially data for the year, the average use trend is much lower than in previous year. Part of the decline can be attributed to ongoing construction that impacted a few of the parking lots in 2014 and 2015, however, 2015 data also includes a new park and ride lot at the Veterans Affairs Medical Center in Northampton, MA.

RTP Assessment: **Needs Improvement**

o) Regional Bike Path Usage

Performance Target = Demonstrate an overall annual increase in the use of regional bike paths.

Table 12-26 – Historic Use of the Springfield Riverwalk

2012	2013	2014
56	100	189

Use of the Springfield Riverwalk has been steadily increasing. In general, bike paths in the Pioneer Valley are popular and well utilized. It will be important to develop an ongoing data collection program to track bike path use for all facilities in the Pioneer Valley region.

RTP Assessment: **Good**

p) PVTA and FRTA Ridership

Performance Target = Demonstrate an overall annual increase in PVTA and FRTA ridership.

Table 12-27 – PVTA and FRTA Total Annual Ridership 2009 - 2013

	2009	2010	2011	2012	2013	2014
PVTA	9,897,009	9,743,568	10,152,139	10,872,898	11,128,713	11,415,923

Transit ridership has been steadily increasing on the PVTA route system over the last 5 years.

RTP Assessment: **Good**

q) Bicycle and Pedestrian Infrastructure Mileage

Performance Target = Increase the total mileage of all bicycle and pedestrian infrastructure by 10% by 2025.

A complete breakdown of existing pedestrian infrastructure mileage is not available for the entire region at this time. Existing efforts will need to be focused to develop an accurate baseline to allow for tracking of this performance target over time.

RTP Assessment: **Needs Improvement**

1. Overall System Performance Assessment

Based on the results of the system performance assessment, 10 of the 17 defined regional performance targets are either currently met or on track to be met by established deadlines. Seven of the targets require additional data or are currently not being met. This information is summarized in Table 12-28.

Table 12-28 – Summary of System Performance Assessment

Excellent	Good	Needs Improvement
4	6	7

CHAPTER 13

FUTURE FORECASTS

Air quality conformity regulations related to the latest planning assumptions require a consistent approach to estimate future population, household and employment data used in the regional transportation plan. This data is input into the regional transportation model to estimate future traffic volumes in the region which can in turn be used to analyze the effects of transportation improvement projects, identify areas where congestion could occur in the future, and perform an air quality conformity determination for the region.

The MassDOT Office of Transportation Planning (OTP) developed the forecasts for future population and employment for Massachusetts and each MPO region. Five data sources were used in developing the forecasts and are listed in Table 13-1. Procedures and preliminary estimates were reviewed by the Pioneer Valley Planning Commission (PVPC) and modifications were made. Control totals were allocated to the 43 communities in the Pioneer Valley region based on current trends and potential for future growth. Household projections were calculated based on population projections derived from the 2010 Census estimates of the five year American Community Survey (ACS).

Table 13-1 – Data Sources of Forecasts for the Pioneer Valley Region

UMass Donahue Institute Population Projections V2015 pre-release February 10, 2015
RPA inputs to MAPC's development database: December 2014 -February 2015
MAPC's land use allocation model results, March 2015
MassDOT Planning staff calculations, March 2015
PVPC Planning staff adjustments and calculations: April - May 2015
MassDOT Planning staff calculations of the Census 2010 ACS Five Year Estimates

Initial municipal population and employment projection estimates were provided by MassDOT. Thereafter, PVPC staff adjusted the values by reallocating growth differently among each community based on current trends and local staff knowledge of the opportunity for additional growth and major development planned through all forecast years 2010 through 2040. The resulting forecasts for population, households and employment completed in May 2015 are shown in Tables 13-2 – 13-4. A description of the forecast process and summary of the calculation methods follows.

A. POPULATION

Each community was reviewed in great detail with regards to population projections. Staff looked specifically at past trends, growth allocations in past projections, as well as recent building permit activity. A recent rise in building permit activity was viewed as an indicator for potential growth. Therefore, adjustments were made to projections based on past growth patterns, land use, economic development, and transportation trends while continuing to maintain the regional control total developed by MassDOT.

B. HOUSEHOLDS

Since there was only one year of household data provided by MassDOT, PVPC staff performed research to assist in developing regional household projections. The main assumption used in the household projection calculations is that between 2010 and 2040 communities will have the same change in the share of overall population and households as a percentage of the whole region. The basis for the calculations was the 2010 Census division of total number of households into the various Transportation Analysis Zones (TAZs) by planning staff at MassDOT. Thereafter, PVPC staff calculated the household projections for the model years 2020, 2030, and 2040. The value of household population is equal to the total population minus the group quarter (GQ) population. Regional and community totals for household numbers were calculated by using the following steps and assumptions:

- Calculate the average household size: The average household size was established by dividing the household population by number of households for each TAZ.
- Calculate group quarter (GQ) population projections: Established a ratio of GQ population compared to total population by TAZ for the model base year 2010. The GQ ratio was then multiplied by the previously projected total population of each TAZ to obtain the GQ population value for each future projection year. This assumed that the GQ ratio stays the same over the years.
- Calculate the household population per TAZ: GQ population was subtracted from the total population to obtain the household population by each TAZ for each future model year.
- Calculate the number of households per TAZ: The household population was divided by the average household size to obtain the number of households in a TAZ.
- Calculate household community totals: The number of households by TAZ were summed by community to arrive at community totals.
- Calculate regional community totals: Added the household community totals to provide regional projection totals for future model years 2020, 2030 and 2040.

C. EMPLOYMENT

Workplace-based employment data was used in the projections. The regional and community employment projections were provided by MassDOT staff and PVPC staff adjusted community totals while holding the regional projection estimates constant. The focus was on the 2040 totals as they compared to the 2010 total employment. The adjusted values assumed a potential positive impact on regional employment by a casino development in the City of Springfield. Community total employment values were divided using TAZ ratios according to a table received from MassDOT planning staff. The table contained adjusted employment by industry by TAZ for the Pioneer Valley Region. The sources of this data were the 2010 Census Transportation Planning Products (CTPP) and the Massachusetts Executive Office of Labor and Workforce Development (EOLWD). This data presented CTPP estimates adjusted to EOLWD totals at the community level. CTPP estimates were based on survey data collected between 2006 and 2010. TAZ ratios estimated for the 2010 model year were then applied to future model year employment projections by community while assuming that the TAZ ratios would remain the same for all years.

Table 13-2 – Population Forecast for the Pioneer Valley Region

	Population 2010	Population 2020	Population 2030	Population 2040
Agawam	28,438	29,176	29,712	30,002
Amherst	37,819	38,862	40,260	41,601
Belchertown	14,649	15,641	16,482	16,920
Blandford	1,233	1,230	1,225	1,219
Brimfield	3,609	3,692	3,768	3,807
Chester	1,337	1,318	1,297	1,270
Chesterfield	1,222	1,221	1,219	1,216
Chicopee	55,298	57,034	58,633	59,445
Cummington	872	846	819	785
East Longmeadow	15,720	16,719	17,706	18,707
Easthampton	16,053	16,811	17,438	17,642
Goshen	1,054	1,082	1,119	1,149
Granby	6,240	6,325	6,327	6,151
Granville	1,566	1,572	1,579	1,582
Hadley	5,250	5,497	5,679	5,723
Hampden	5,139	5,513	5,790	5,910
Hatfield	3,279	3,341	3,397	3,410
Holland	2,481	2,530	2,549	2,555
Holyoke	39,880	41,412	42,908	43,708
Huntington	2,180	2,151	2,114	2,006
Longmeadow	15,784	15,803	15,832	15,871
Ludlow	21,103	21,756	22,336	22,580
Middlefield	521	510	500	469
Monson	8,560	8,630	8,689	8,712
Montgomery	838	873	898	904
Northampton	28,549	28,702	28,832	28,834
Palmer	12,140	12,017	11,883	11,714
Pelham	1,321	1,337	1,348	1,337
Plainfield	648	678	700	704
Russell	1,775	1,777	1,781	1,782
South hadley	17,514	17,775	17,971	18,074
Southampton	5,792	6,109	6,330	6,429
Southwick	9,502	9,955	10,280	10,345
Springfield	153,060	158,284	164,120	167,987
Tolland	485	485	486	486
Wales	1,838	1,879	1,914	1,930
Ware	9,872	9,874	9,798	9,675
West Springfield	28,391	29,083	29,742	29,811
Westfield	41,094	42,099	43,064	43,285
Westhampton	1,607	1,700	1,781	1,792
Wilbraham	14,219	14,593	15,131	15,925
Williamsburg	2,482	2,507	2,526	2,532
Worthington	1,156	1,109	1,063	1,011
Pioneer Valley	**621,570**	**639,508**	**657,026**	**666,997**

Table 13-3 – Household Forecast for the Pioneer Valley Region

	Households 2010	Households 2020	Households 2030	Households 2040
Agawam	11,664	11,967	12,187	12,305
Amherst	9,259	9,514	9,857	10,185
Belchertown	5,595	5,974	6,295	6,462
Blandford	492	491	489	486
Brimfield	1,429	1,462	1,492	1,507
Chester	543	535	527	516
Chesterfield	511	511	510	508
Chicopee	23,739	24,484	25,171	25,519
Cummington	404	392	379	364
East Longmeadow	5,851	6,223	6,590	6,963
Easthampton	7,224	7,565	7,847	7,939
Goshen	416	427	442	453
Granby	2,374	2,406	2,407	2,340
Granville	608	610	613	614
Hadley	2,107	2,206	2,279	2,297
Hampden	1,898	2,036	2,138	2,183
Hatfield	1,483	1,511	1,536	1,542
Holland	994	1,014	1,021	1,024
Holyoke	15,361	15,951	16,527	16,835
Huntington	868	856	842	800
Longmeadow	5,741	5,748	5,758	5,773
Ludlow	8,080	8,330	8,552	8,646
Middlefield	218	225	221	207
Monson	3,279	3,306	3,328	3,337
Montgomery	330	344	354	356
Northampton	12,000	12,064	12,119	12,120
Palmer	5,099	5,047	4,991	4,920
Pelham	549	556	560	556
Plainfield	269	281	291	292
Russell	656	657	658	659
South hadley	6,793	6,894	6,970	7,010
Southampton	2,249	2,372	2,458	2,496
Southwick	3,710	3,887	4,014	4,039
Springfield	56,752	58,690	60,854	62,288
Tolland	197	197	197	197
Wales	736	752	766	773
Ware	4,120	4,121	4,089	4,038
West Springfield	12,124	12,420	12,701	12,730
Westfield	15,335	15,710	16,070	16,153
Westhampton	623	659	690	695
Wilbraham	5,309	5,449	5,650	5,946
Williamsburg	1,118	1,129	1,138	1,141
Worthington	522	490	470	446
Pioneer Valley	**238,630**	**245,463**	**252,048**	**255,660**

Table 13-4 – Employment Forecast for the Pioneer Valley Region

	Employment 2010	Employment 2020	Employment 2030	Employment 2040
Agawam	11,668	12,348	12,305	12,376
Amherst	14,733	15,226	15,143	15,175
Belchertown	2,619	2,725	2,752	2,776
Blandford	223	255	273	284
Brimfield	540	571	570	573
Chester	110	122	127	130
Chesterfield	123	130	130	130
Chicopee	19,003	20,065	20,228	20,428
Cummington	208	220	219	220
East Longmeadow	7,927	8,389	8,360	8,408
Easthampton	4,341	4,670	4,731	4,797
Goshen	158	172	177	180
Granby	753	815	829	842
Granville	157	166	166	167
Hadley	5,307	5,760	5,965	6,103
Hampden	821	870	867	871
Hatfield	1,965	2,098	2,110	2,132
Holland	147	156	155	156
Holyoke	21,164	22,408	22,539	22,751
Huntington	420	444	443	446
Longmeadow	3,376	3,493	3,401	3,381
Ludlow	6,431	6,678	6,662	6,688
Middlefield	39	42	42	42
Monson	1,295	1,370	1,366	1,373
Montgomery	26	27	28	28
Northampton	18,129	18,614	18,480	18,491
Palmer	4,986	5,116	5,100	5,111
Pelham	155	164	164	165
Plainfield	40	43	43	43
Russell	182	196	198	200
South hadley	4,441	4,484	4,481	4,486
Southampton	1,085	1,149	1,145	1,151
Southwick	2,533	2,668	2,645	2,655
Springfield	74,924	80,882	80,169	80,668
Tolland	37	40	40	40
Wales	150	159	158	159
Ware	2,728	2,887	2,876	2,893
West Springfield	16,922	17,812	17,653	17,707
Westfield	16,736	17,547	17,320	17,339
Westhampton	291	307	307	309
Wilbraham	4,510	4,773	4,756	4,784
Williamsburg	555	587	586	589
Worthington	194	205	204	205
Pioneer Valley	**252,156**	**266,854**	**265,913**	**267,456**

D. STATEWIDE TRAVEL SURVEY

The Statewide Travel Survey (MTS) is a multi-modal household travel survey conducted on behalf of the Massachusetts Department of Transportation (MassDOT) and the 13 Metropolitan Planning Organizations (MPOs) of the Commonwealth. The survey design, implementation, and results analyses were guided by MassDOT staff and a working group of transportation professionals from the MPOs. The survey was conducted in 2010-2011 to study the demographic and travel behavior characteristics of residents within the Commonwealth of Massachusetts. The survey data obtained through this effort provided substantially updated information on travel and mobility patterns to enable updates for state and regional travel demand models, and ultimately assist planners and decision makers in better understanding the needs of the traveling public – all of which will support making the best investments in transportation.

The MTS targets included demographic and trip data collected from a minimum of 15,000 households, including a sub-sample of at least 500 households that would also provide global positioning system (GPS) data. A total of 25,331 households were recruited for the full study. The total number of households surveyed in Massachusetts yielded information for 37,023 persons, 26,488 vehicles, and 190,215 places. The final data set contains information for 15,033 households, of which 611 households also provided GPS data. The project was conducted by NuStats, in association with GeoStats, with a portion of the Computer-Assisted-Telephone-Interviewing conducted by Wilkins Research Services.

The survey design employed a generally accepted research method for household travel surveys that included a subsample of households equipped with global positioning system (GPS) equipment to provide an independent measure of travel. Household members (age 14 and older) recorded all trips for a specified 24-hour period using a specially designed diary.

1. Pioneer Valley General Results

The statewide travel survey achieved 1,488 completed household surveys with a retrieval rate of 58.7 percent from the Pioneer Valley region. Households surveyed constituted 9.4 percent of out of 238,629 households in the Pioneer Valley Region. The 24-hour period travel diary of the Day of Survey was evenly distributed among each weekday: Monday (20.5 percent), Tuesday (19.9 percent), Wednesday (20.5 percent), Thursday (19.1 percent), and Friday (20.1 percent). Survey results related to household, person, and location related data are summarized below.

a) Household Data (n = 1,488)

- The average household size is 2.4 household members.
- On average, households reported 1.6 vehicles, with 35.7 percent of households reporting two vehicles and 36.3 percent of household reporting one vehicle.
- Households reported having an average of 1.1 household workers. Zero-worker households constituted 30.5 percent, one-worker households constituted 34.8 percent, and two-person households constituted 27.7 percent.
- The average household income category with the highest percentage of respondents (19.1 percent) was between $50,000 and $74,999.

b) Person Data

- Twenty-nine percent of respondents were aged 35 to 54 years of age; forty-three percent were younger than 35 years of age.
- Forty-three percent of respondents reported being unemployed.
- Workers in the study area average 1.46 jobs each.
- Eighty-two percent of respondents reported having a valid driver's license.
- Fifteen percent of respondents reported being a student.

c) Place Data

- Households reported an average of 10.2 daily household trips and 4.1 daily person trips.
- Sixty-nine percent of all trips were made by automobile, either as the driver or passenger.
- The non-motorized transportation mode for all trips included walk (14 percent) and bike (1.3 percent).
- Transit transportation mode for all trips included Public Bus (3.2 percent), Train (0.1 percent)

2. Pioneer Valley Detailed Results

The survey population represents all 2,547,075 households residing in the thirteen MPO regions in the Commonwealth of Massachusetts, however, according to the 2010 Census a total of 238,629 people, or 9.4%, live in the Pioneer Valley Region. While a total of 2,537 households were recruited from the Pioneer Valley Region to participate in the MTS survey, only 1,488 households actually completed surveys. This amounts to 9.9% of total survey responses statewide. As a result, survey results for the Pioneer Valley MPO were weighted. A selection of household, person, vehicle, and place characteristics along with their travel behavior descriptions are presented in the following tables.

a) Household Characteristics

As shown in Table 13-5, one-third of all households surveyed reported having two household members; another 30 percent of households reported only one household member.

Table 13-5 – Household Size

Household Size	Count	Percent
1	70763	29.9%
2	78501	33.2%
3	36836	15.6%
4	35826	15.2%
5	9826	4.2%
6	3046	1.3%
7	1398	0.6%
8 or More	140	0.1%
Total	236337	100.0%

The majority of households (84 percent) reported they do not use transit on a regular basis, as shown in Table 13-6.

Table 13-6 – Transit Used on Regular Basis

Transit Used on Regular Basis	Count	Percent
Yes	38743	16.4%
No	197326	83.5%
Don't Know	268	0.1%
Total	236337	100.0%

Overall, two thirds of all households (60 percent) reported having at least one household bicycle; of those, 17 percent reported having two bicycles available to the household, and 19 percent reported one bicycle. On the other hand, 40 percent of households reported not having a household bicycle. See Table 13-7 for more detail.

Table 13-7 – Household Bicycles

Household Bicycles	Count	Percent
0	95131	40.3%
1	40011	16.9%
2	45279	19.2%
3	23129	9.8%
4	17851	7.6%
5	8318	3.5%
6	4114	1.7%
7	950	0.4%
8	1431	0.6%
Don't Know	123	0.1%
Total	236337	100.0%

Thirty-six percent of households reported having two vehicles available to the household, 36 percent reported having one vehicle available, while 13 percent reported having no vehicles (see Table 13-8).

Table 13-8 – Household Number of Vehicles

Household Vehicles	Count	Percent
0	30459	12.9%
1	85891	36.3%
2	84407	35.7%
3	22615	9.6%
4	8796	3.7%
5	2750	1.2%
6	913	0.4%
7	412	0.2%
8 or More	93	0.0%
Total	236337	100.0%

Regarding ethnicity of the participating households (Table 13-9), the majority (83 percent) reported White Alone, 5 percent reported Black or African American Alone, while 7 percent reported Some Other Race Alone.

Table 13-9 – Household Ethnicity

Household Ethnicity	Count	Percent
White Alone	196969	83.3%
Black or African American Alone	12371	5.2%
American Indian or Alaskan Native Alone	87	0.0%
Asian Alone	2208	0.9%
Some Other Race Alone	16785	7.1%
Two or More Races	5919	2.5%
Refused	1997	0.8%
Total	236337	100.0%

Overall participation of Hispanic or Latino households in the survey was nearly 11 percent, as shown in Table 13-10.

Table 13-10 – Hispanic or Latino Households

Hispanic or Latino Household	Count	Percent
Yes	24952	10.6%
No	210020	88.9%
Refused	1365	0.6%
Total	236337	100.0%

As shown in Table 13-11, on their travel day, 29 percent of households made 6–10 trips, while 32 percent made 1–5 trips. Sixteen percent made 11–15 trips, 9 percent made 16–20 trips, and another 9 percent of households made at least 21 trips on their travel day. Nearly 5 percent of household reported making no trips.

Table 13-11 – Trips Made by Household on Travel Day

Trips Made by Household on Travel Day	Count	Percent
None	11824	5.0%
1 to 5	75176	31.8%
6 to 10	69556	29.4%
11 to 15	37080	15.7%
16 to 20	21830	9.2%
21 to 30	16482	7.0%
31 to 50	4253	1.8%
50+	135	0.1%
Total	236337	100.0%

As summarized in Table 13-12, the majority of households (64 percent) reported having no students in the household. Of those households that did, 17 percent reported 1 student, 13 percent reported 2 students, and 5 percent reported 3 students.

Table 13-12 – Household Students

Household Students	Count	Percent
0	151347	64.0%
1	39355	16.7%
2	30774	13.0%
3	11482	4.9%
4	1960	0.8%
5	1058	0.4%
6	360	0.2%
Total	236337	100.0%

Two-thirds of all households reported having one or two workers in the household, while 5.5 percent reported having three workers. A total of 30.5 percent of households reported having no workers within the household. See Table 13-13 for more information.

Table 13-13 – Household Workers

Household Workers	Count	Percent
0	72162	30.5%
1	82164	34.8%
2	65535	27.7%
3	13030	5.5%
4	2660	1.1%
5	693	0.3%
6	93	0.0%
Total	236337	100.0%

Nearly half of all households reported having two licensed drivers in the household, while 35 percent reported having one licensed driver. Nine percent reported having no licensed drivers (Table 13-14).

Table 13-14 – Licensed Drivers in Household

Licensed Drivers in Household	Count	Percent
0	20293	8.6%
1	82103	34.7%
2	106720	45.2%
3	21253	9.0%
4	4937	2.1%
5	847	0.4%
6	185	0.1%
Total	236337	100.0%

b) Person Characteristics

As indicated in Table 13-15, the majority of survey respondents (82 percent) reported having a valid driver's license.

Table 13-15 – Valid Driver's License

Valid Driver's License	Count	Percent
Yes	399552	81.8%
No	88833	18.2%
Refused	94	0.0%
Total	488478	100.0%

Only eight percent of all respondents reported having a transit pass; the remaining 91 percent reported not having a transit pass. The distribution is reported in Table 13-16.

Table 13-16 – Respondent has Transit Pass

Respondent has Transit Pass	Count	Percent
Yes	39862	8.2%
No	446286	91.4%
Don't Know	2236	0.5%
Refused	94	0.0%
Total	488478	100.0%

As shown in Table 13-17, the majority of respondents (66 percent) work a typical five-day work week, while 10 percent of respondents work four days a week. Seven percent work three days a week, and 8 percent work six days a week.

Table 13-17 – Respondent Average Number of Days Worked Per Week

Days Worked Per Week	Count	Percent
1	4910	1.8%
2	9422	3.4%
3	20515	7.3%
4	28624	10.2%
5	184868	66.1%
6	21933	7.8%
7	8682	3.1%
Don't Know	600	0.2%
Refused	147	0.1%
Total	279701	100.0%

Table 13-18 summarizes telecommute status of workers. Of the respondents who work, 16 percent telecommute.

Table 13-18 – Telecommute Status

Worker Telecommutes	Count	Percent
Yes	45485	16.3%
No	231256	82.7%
Don't Know	2866	1.0%
Refused	95	0.0%
Total	279701	100.0%

Table 13-19 summarizes whether workers participate in flexible work programs. For those who are offered a flexible work program at work, 87 percent participate in one of the programs offered to them; 10 percent do not participate.

Table 13-19 – Respondent Participates in Flexible Work Program

Respondent Participates in Flexible Work Program	Count	Percent
Yes	48500	86.5%
No	5729	10.2%
Don't Know	1827	3.3%
Total	56056	100.0%

Table 13-20 reports recent transit trips. The majority of respondents made no transit trips in the week prior to their survey travel day. Three percent reported making two transit trips, and three percent reported making ten transit trips.

Table 13-20 – Transit Trips Made in Past Week

Transit Trips Made in Past Week	Count	Percent
0	498010	82.0%
1	11562	1.9%
2	20329	3.3%
3	10675	1.8%
4	7908	1.3%
5	6081	1.0%
6	7410	1.2%
7	2879	0.5%
8	3936	0.6%
9	428	0.1%
10	17527	2.9%
11	222	0.0%
12	1486	0.2%
13	506	0.1%
14	6033	1.0%
15	895	0.1%
16	1553	0.3%
18	52	0.0%
20	294	0.0%
21	173	0.0%
25	523	0.1%
30	521	0.1%
34	152	0.0%
35	148	0.0%
75	162	0.0%
87	81	0.0%
Don't Know	7625	1.3%
Refused	94	0.0%
Total	607263	100.0%

c) Vehicle Characteristics

Table 13-21 presents distribution of vehicle fuel types. The vast majority of all respondents' vehicles (96 percent) run using the traditional gasoline engine; 2 percent of respondent vehicles are hybrid vehicles, while 1 percent use diesel fuel.

Table 13-21 – Vehicle Fuel Type

Vehicle Fuel Type	Count	Percent
Gas	365043	95.9%
Diesel	4205	1.1%
Hybrid	7716	2.0%
Flex Fuel	1211	0.3%
Other, SPECIFY	803	0.2%
Don't Know	134	0.0%
Refused	1480	0.4%
Total	380592	100.0%

d) Place Characteristics

Overall, 46 percent of all trips made were to return home for non-work-related activities, shown in Table 13-22. Other frequently reported reasons for traveling included change mode of transportation (6 percent), work/job (7 percent), and routine shopping (8 percent).

Table 13-22 – Primary Trip Purpose

Primary Trip Purpose	Count	Percent
All other home activities	1347859	45.3%
Routine shopping (groceries, clothing, convenience store, HH maintenance)	224937	7.6%
Work/Job	217829	7.3%
Changed type of transportation	173929	5.8%
Visit friends/relatives	102281	3.4%
Eat meal outside of home	96901	3.3%
Drop off passenger from car	96245	3.2%
Attending Class	93022	3.1%
Pick up passenger from car	86881	2.9%
Household errands (bank, dry cleaning, etc.)	80494	2.7%
Work Business Related	72342	2.4%
Outdoor recreation/entertainment	66402	2.2%
Personal business (visit government office, attorney, accountant)	65137	2.2%
Health care (doctor, dentist)	63334	2.1%
Indoor recreation/entertainment	62312	2.1%
Service private vehicle (gas, oil lube, etc.)	31030	1.0%
Civic/Religious activities	29006	1.0%
Working at home (for pay)	19926	0.7%
Shopping for major purchases or specialty items (appliance, electronics, new vehicle, major HH repairs)	17242	0.6%
All other School Activities	10515	0.4%
All other activities at work	9195	0.3%
Loop trip	5097	0.2%
Other, SPECIFY	1212	0.0%
Volunteer Work/Activities	567	0.0%
While Traveling -- Other, Specify	0	0.0%
Total	2973695	100.0%

Summarized in Table 13-23, the majority of trips (52 percent) were made with only one person in the travel party; 29 percent of trips were made with two people in the travel party, and another 12 percent of trips were made with three people in the travel party.

Table 13-23 – Total People Traveling in Travel Party, Including Respondent

Total People Traveling	Count	Percent
1 person	1184590	51.5%
2 persons	677414	29.4%
3 persons	277001	12.0%
4 persons	104867	4.6%
5 persons	56579	2.5%
Total	2300452	100.0%

As shown in Table 13-24, for the majority of trips (95 percent), a toll road was not used and only 2% used a toll road.

Table 13-24 – Toll Road Used on Trip

Use a Toll Road	Count	Percent
Yes	34428	1.9%
No	1771652	95.4%
Don't Know	49062	2.6%
Refused	2495	0.1%
Total	1857637	100.0%

e) Travel Behavior

The purpose of this section is to review the travel behavior reported by the 1,488 participating households in order to document the extent to which their travel behavior varies. This section includes summaries of trip rates by the different household and person characteristics in the total study area. As is shown in Table 13-25, the overall daily trip rate by households in the Pioneer Valley Region is 10.6 trips, whereas the overall trip rate per person is 4.1 trips.

Table 13-25 – Average Household and Person Trip Rates

	Average Trip Rate
Household	10.6
Person	4.1

As one may expect, the larger the household, the more trips they report. This trend is summarized in Table 13-26. The larger households (8 or more members) reported the highest trip rate—29.8. One-person households reported 4.5 trips, two-person households reported 8.3 trips, three-person households reported 13.6 trips, four-

person households reported 17.5 trips, five-person households reported 22.2 trips, while six person households reported 26.6 trips. Finally, seven-person households reported 24.8 trips.

Table 13-26 – Trip Rates by Household Size

Household Size	Trip Rate
1	4.5
2	8.3
3	13.6
4	17.5
5	22.2
6	26.6
7	24.8
8 or more	29.8
Total	10.6

Of all trips, 55 percent were reported as being made by auto/van/truck as a driver, 14 percent were reported as walk trips, while 24 percent were reported as being made in an auto/van/truck as a passenger. Nearly 4 percent of trips were made via some sort of transit and 3 percent made by school bus. See Table 13-27 for more information on travel mode.

Table 13-27 – All Trip Modes

Transportation Mode	Count	Percent
Walk	321837	13.6%
Bike	29757	1.3%
Auto/Van/Truck Driver	1295841	54.8%
Auto/Van/Truck Passenger	558839	23.6%
Public Bus	75832	3.2%
Train	3525	0.1%
Dial-A-Ride/Paratransit	8062	0.3%
Taxi	5094	0.2%
School bus	60887	2.6%
Motorcycle Driver	2280	0.1%
Motorcycle Passenger	678	0.0%
Other, SPECIFY	3802	0.2%
Total	2366432	100.0%

Table 13-28 summarizes mode to work information. For those trips made to work, 76 percent were reported as being made by auto/van/truck as a driver, 4 percent were reported as being made by bus/public transit, 5 percent were reported as walk trips, while 7 percent were reported as being made as an auto/van/truck passenger. Six percent of those who work do so from home and therefore require no transportation.

Table 13-28 – Mode to Work

Mode to Work	Count	Percent
Works from home	15493	5.5%
Walk	12485	4.5%
Bike	3726	1.3%
Auto/Van/Truck Driver	211362	75.6%
Auto/Van/Truck Passenger	20511	7.3%
Bus / Public Transit	10716	3.8%
Dial-A-Ride/Paratransit	644	0.2%
Motorcycle Driver	159	0.1%
Other, SPECIFY	2857	1.0%
Don't Know	1067	0.4%
Refused	682	0.2%
Total	279701	100.0%

Table 13-29 summarizes typical mode to school. For those trips made to school, 28 percent were reported as being made via school bus, 31 percent were reported as being made as an auto/van/truck passenger, 17 percent were reported as being made by auto/van/truck driver, while 11 percent of trips were reported as walk trips.

Table 13-29 – Mode to School

Mode to School	Count	Percent
Home schooled	5966	3.4%
Walk	18733	10.7%
Bike	3332	1.9%
Auto/Van/Truck Driver	30094	17.2%
Auto/Van/Truck Passenger	53940	30.8%
Bus / Public Transit	8625	4.9%
Dial-A-Ride/Paratransit	548	0.3%
School Bus	49247	28.1%
Other, SPECIFY	2706	1.5%
Don't Know	1823	1.0%
Refused	94	0.1%
Total	175107	100.0%

E. DEMOGRAPHIC SCENARIO PLANNING

The Metropolitan Area Planning Council (MAPC) in collaboration with MassDOT's Office of Transportation Planning and the University of Massachusetts Donahue Institute projected the potential for future growth and decline across the state over 30 years from 2010 to 2040. The study presented two alternative scenarios called "Status Quo" and "Stronger State" for statewide growth.

1. Regional Demographic Projections

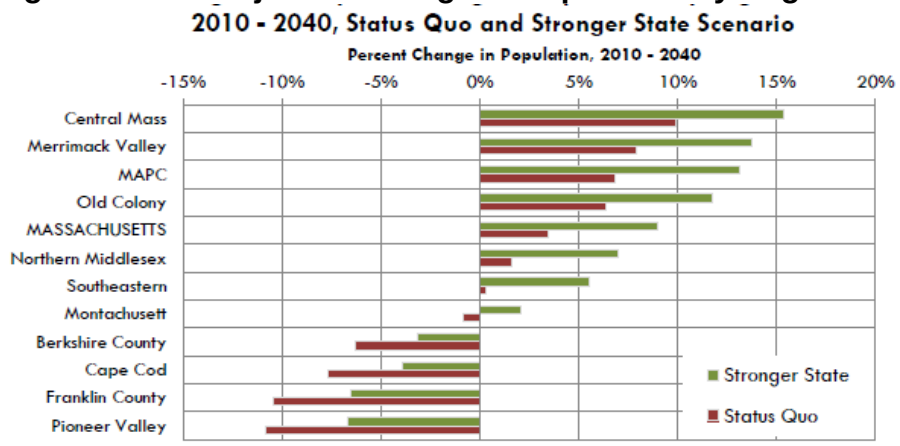
According to this study, the projections under both scenarios show a change in demographics in the Pioneer Valley region with an overall decline in population, households and employment. The details of this study as it pertains to the Pioneer Valley are presented below.

a) Population Change

The "Stronger State" scenario projects population to be 3% to 6% higher than "Status Quo" scenario across all regions of Massachusetts. However, the Pioneer Valley region, specifically, is expected to encounter a total population loss of about 7% under the "Stronger State" scenario and a 11% population loss under the "Status Quo" scenario. The varied demographics and migration patterns that exist in

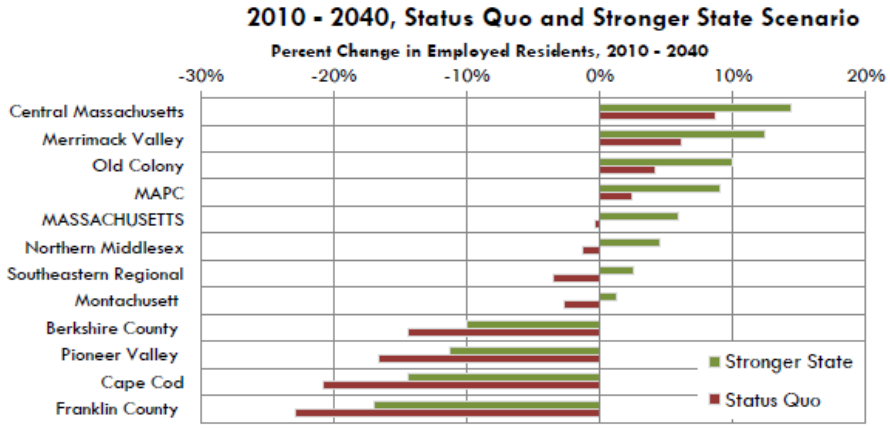
different regions means that population and labor force changes will not occur uniformly across the state.

Figure 13-1 – Projected Change in Population by Region



In the Pioneer Valley, the labor force is expected to decline about 17% even under the "Stronger State" scenario. The resident labor force is driven by the total population change as well as the age distribution of the population. The Pioneer Valley's decrease in labor force is likely due to the fact that the labor force may contract more quickly than the population overall.

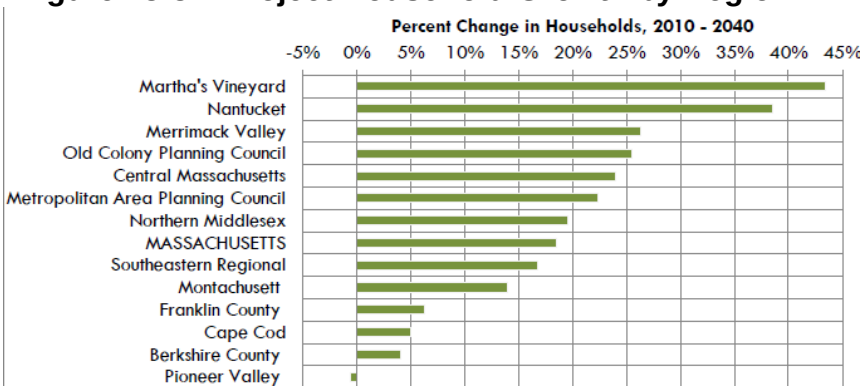
Figure 13-2 – Projected Change in Employed Residents by Region



b) Household Change

Despite modest population growth or even population declines in some regions, Massachusetts will still experience substantial growth in the number of households over the coming decades. However, as seen in Figure 13-3, the Pioneer Valley is projected to experience a loss of about 0.5% in household growth.

Figure 13-3 – Project Household Growth by Region



c) Regional Employment Change

As indicated in Table 13-30, The Pioneer Valley is projected to see labor force declines over the long term. Since the total non-Metro labor force is projected to decline, the initial totals regarding employment were adjusted slightly upward to match the non-Metro employment total derived from the shift-share method. The Pioneer Valley is projected to have an increase in employment between 2010 and 2020, but will rapidly decrease in the following two decades.

Table 13-30 – Projected Employment Change by Region

Forecast Region	Employment, 2010	Employment Change 2010-20	Employment Change 2020 - 2030	Employment Change 2030 - 2040
Berkshire County	60,200	2,400	-3,000	-5,400
Cape Cod	88,600	3,400	-5,300	-10,900
Central Massachusetts: Non Metro	180,100	25,500	-	300
Central Massachusetts: Metro	43,900	TBD	TBD	TBD
Franklin County	25,700	500	-2,000	-2,900
Martha's Vineyard	7,700	1,000	300	-300
Metro Boston (including all of MAPC, Old Colony, Northern Middlesex, and Merrimack Valley)	2,303,500	160,800	13,200	10,300
Montachusett: Non Metro	56,100	5,500	-3,200	-3,800
Montachusett: Metro	22,300	TBD	TBD	TBD
Nantucket	5,700	400	500	200
Pioneer Valley	252,200	9,200	-18,800	-19,000
Southeastern Regional: Non Metro	133,400	7,500	-1,900	-5,900
Southeastern Regional: Metro	94,400	TBD	TBD	TBD
MASSACHUSETTS	**3,113,200**	**196,700**	**-4,100**	**-8,000**

d) Summary

The findings presented here regarding the potential change in the Pioneer Valley region do not align with the regional projections presented earlier in this chapter.

This discrepancy is based in part on the regional projections placing a greater weight on major development such as the MGM casino development project in the center of Springfield on regional population and employment. The regional projections also assume a positive impact on population and employment as a result of expanded passenger rail service along the Knowledge Corridor line.

F. REGIONAL TRAVEL DEMAND MODEL

Travel demand forecasting is a major step in the transportation planning process. By simulating the current roadway conditions and the travel demand on those roadways, deficiencies in the system are identified. This is an important tool in planning future network enhancements and analyzing currently proposed projects.

Travel demand models are developed to simulate actual travel patterns and existing demand conditions. Networks are constructed using current roadway inventory files containing data for each roadway within the network. Travel demand is generated using socioeconomic data such as household size, automobile availability and employment data. Once the existing conditions are evaluated and adjusted to satisfactorily replicate actual travel patterns and vehicle roadway volumes, the model inputs are then altered to project future year conditions.

There are four basic steps in the traditional travel demand forecasting process: trip generation, trip distribution, modal choice, and trip assignment. There is also a preliminary step of network and zone development and a subsequent step of forecasting future conditions. The Pioneer Valley Planning Commission (PVPC) uses the TransCAD software to perform a 3-step process for forecasting near and future conditions including trip generation, trip distribution and trip assignment.

1. Network and Zone Development

a) Highway Network

The preliminary step in the development of a travel demand model is identifying the network and dividing the area into workable units. The highway network is composed of nodes and lines. Nodes represent intersections or centroids. Centroids are used to identify the center of activity within a zone and connect the zone to the highway network. Lines represent roadway segments or centroid connectors. Centroid connectors represent the path from a centroid to the highway network and typically represent the local roads and private driveways within the centroid. General information required for network developments include system length, demand, service conditions and connections to zones.

b) Transportation Analysis Zones

A Transportation Analysis Zone (TAZ) is the basic geographic unit representing tabulated data of individual households and business establishments aggregated for a region. The activity center of a zones is represented by a centroid. The centroid is

not necessarily the geographic center of a zone, but rather the point that best represents the average trip time in and out of a zone. A centroid connector links the zone with the roadway network. It often represents local streets that carry traffic out of or into a zone. Centroid connectors generally connect to adjacent collector or arterial roads.

1. Trip Generation

Trip generation is the first step in the modeling process. The goal of which is to identify the number of person trips that are made to and from traffic analysis areas (TAZ's). Trip generation analysis estimates the number of trips that are produced by each zone and the number of trips attracted to each zone for each of the three trip purposes:

- Home-Based Work (HBW) - trips from home to work;
- Home-Based Non-Work (HBNW) - trips from home to other destinations other than work; and
- Non-Home Based (NHB) - trips from a place other than home.

Households generally produce trips, while employment and other activity centers generally attract trips. Estimates of household based trips are affected by socioeconomic factors, such as auto ownership, and household size. Employment based trips depend on employment type and size. The trip generation model uses forecasted demographic and employment data associated with a zone to calculate person trips. Subsequently, total trips produced are balanced with the total trips attracted to reconcile inconsistencies between them. Consistency is reached by holding either trip productions or trip attractions constant an then redistributing the other category of tips.

2. Trip Distribution

Trip distribution determines the destination of the vehicle trips produced in each zone and how they are divided among all the other zones in the area. A relationship is developed between the number of trips produced by and attracted to zones and the accessibility of zones to other zones in terms of time and distance.

A basic trip distribution model is the gravity distribution model. In the gravity model, trips between zones are calculated based on the origin zone size; possible destinations size; as well as distance to neighboring zones. A friction factor is used in the gravity model to relate travel time to zone attractiveness. Travel time between two zones is based on the travel route selected and the speed on each road along the travel route. The following points list assumptions and inputs of the gravity model:

- Zone size is measured in terms of total population and total employment.
- Distance is measured in terms of travel time.

- A computerized assignment program designed to find the absolute shortest route between each pair of zones selects the travel route.

3. Mode Usage

This step in the development of the travel model estimates the distribution of previous trips to various alternative mode choices. Mode choices may include personal vehicle, transit, walking, bicycling, etc. Several factors affect a traveler's decision regarding the travel modes available. These include the characteristics of the person making the trip, the characteristics of the trip, and the characteristics of the transportation system.

4. Trip Assignment

Trip assignment is used to estimate the flow of traffic on a network. The trip assignment model takes as input a matrix of flows that indicate the volume of traffic between origin and destination pairs. The flows for each origin and destination pair are loaded on the network based upon the travel time or impedance of the alternative paths that could carry this traffic.

5. Forecasts

The preparation of a future year socioeconomic database is the last step in the travel demand forecast process. Forecasts of population and socioeconomic data as well as the attributes affecting travel are used to determine the number of trips that will be made in the future. The basic future year forecasts include total regional population, total number of households, and total number of jobs. The forecasted values are then divided by community in a region and subsequently divided into the various Transportation Analysis Zones. The zone-level estimates that forecasts provide are direct inputs in the travel demand forecasting model. Once travel demand is known and deficiencies identified, alternative transportation systems may be developed.

G. 2010 BASE YEAR MODEL

The regional travel demand model is made up of three major components: a roadway network, transportation analysis zones, and socioeconomic data. Each of these components add a critical contribution to the development of a working transportation simulation model. Initial 2010 base year model efforts included using 2010 socioeconomic data in a Quick Response trip generation model to calculate the home-based work trips (HBW), and the home-based non work trips (HBNW) productions per housing unit. As well as calculating the non home-based trips (NHB) production per retail employee, non-retail employee, and household. Standard vehicle occupancy rates were used to convert personal trips into vehicle trips before conducting the trip assignment process. This model continues to be updated according to the guidance of the MassDOT planning staff to a 2010 Base

Year Model using information from the 2010 Census as part of the Federal Fiscal Year 2015 Unified Planning Work Program for the Pioneer Valley MPO.

1. Network

A roadway network represents the regional transportation system in the regional travel demand model. A highway network was developed based on the federal functional classification of roadways. All roadways in the region classified as interstate, principal arterial and collector were included in this highway network. Local roads carrying minimal through traffic were represented only as centroid connectors to areas of traffic activity in a TAZ.

The characteristics of a roadway were coded as attributes and tabulated in a regional database for each line representing the roadway. Generally, speed and capacity attributes were based on the functional classification of a roadway and determined from the state roadway inventory files for the region. Adjustments were made to these attributes based on field observations, examination of aerial photographs, and review of regional and local traffic studies. Adjustments to these inputs were also made to better replicate regional travel activity in the model simulation. Out of the 45,722 roadway links in the Pioneer Valley regional network, a third (15,476) are included in the model. Local roadway links with a functional classification of zero are excluded from the model.

2. Transportation Analysis Zones

Transportation Analysis Zones are geographic divisions of a region into analysis units that allow linking tabulated data to a physical location serviced by the roadway network. Attributes of a TAZ include socioeconomic data which would impact the generation of trips in a zone either by spurring the production of trips or the attraction of trips to that zone. The current TAZ's size and location is based on the 2010 Census because it is the most comprehensive, current, and readily available source of socioeconomic and demographic information. The Pioneer Valley area is divided by the census into units of geographic areas called blocks containing the socioeconomic and demographic information and aggregated into block groups. The 2010 TAZ's geographic boundaries match the 2010 census block group boundaries for the most part except for certain urban areas warranting further detail due to a concentration of activity. On the other hand two block groups were aggregated in a rural area with minimal activity. The Pioneer Valley region 2010 base year model has 462 internal zones, and 62 external zones that represent external stations.

3. Socioeconomic Data

Basic socioeconomic data for the 2010 base year model came from the 2010 Census at the block level. Detailed socioeconomic data was obtained from the American Community Survey (ACS) 2009-2013 five year estimates at the tract level.

The socio economic data included the following list of variables: population, number of households, population in households, population in group quarters, auto availability, income, and number of workers.

The employment data was obtained from the department of labor for each of the communities in the region. The total number of workers in community was then distributed into the various zones in that community according to their ratios in the ACS survey. After breaking down of the number of jobs by job types they were aggregated into three categories: Basic, Retail, and Service.

To build the 2010 Census block / TAZ and 2010 Census tract / TAZ lookup tables used to generate the demographic tables, the following steps were performed by the MassDOT planning staff:

- The original TAZ shapefile based on the 2000 Census geographies was overlayed with 2010 Census block polygon features from the 2012 TIGER base map (ArcGIS identity tool). The quality of the 2012 TIGER is much better than that of earlier generations, and the features align quite well with those of other datasets in our spatial database as well as with aerial imagery.
- The resulting polygon attributes were edited to ensure that TAZs nest completely within a single town (except zone 10, which includes all of Middlefield and Worthington).
- Attributes were edited to ensure that 2010 Census blocks are not split among multiple TAZs. There is one exception to the no splits rule for Springfield tract 800900, block 1000 which is split between zones 245 and 246. For this block "Google Street View" was used to count the housing units in the zone 245 portion in order to estimate a factor for splitting the block data between the two zones.
- The resulting block / TAZ lookup table were used to estimate total population, household population and group quarters population by TAZ from 2010 Census Summary File 1 block level statistics. This block / TAZ lookup was also used to generate the various factors in the 2010 Census tract / TAZ lookup table.
- The tract / TAZ lookup table was used to generate the tables of household statistics (vehicles, workers, income) from the 2010 American Community Survey 5-year Summary File. Tract statistics were used to generate these tables due to high margins of error among block group estimates. The ACS household statistics were adjusted at the tract level to match 2010 Census total households before applying the tract / TAZ factors to generate the TAZ summaries.
- The employment data was extracted from the AASHTO Census Transportation Planning Products (CTPP) web query tool. This data is published at the tract level as well, and was allocated to TAZ based on the percentage of the land area of a tract that is contained in each of one or more TAZs. The CTPP employment estimates (collected between 2006 and 2010)

were then adjusted so that town totals match the ES-202 totals published by the Massachusetts Executive Office of Labor and Workforce Development.

4. Regionally Significant Projects

Only "regionally significant" projects are required to be included in 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.

"Non-Exempt" projects add capacity to the existing transportation system and must be included as part of the air quality conformity determination for the RTP. Examples of "Non-Exempt" projects include those defined as regionally significant in addition to projects expected to widen roadways for the purpose of providing additional travel lanes.

Projects considered regionally significant were included as part of the 2010 Baseline model network and subsequent future model networks based on the project's expected construction date. These projects include non exempt system expansion projects that were financially constrained.

The 2010 base year roadway network includes all regionally significant TIP projects that were already included in the 2000 Baseline model network as well as projects that were completed by the end of 2010. Those projects include the following:

- Hadley: Widening Route 9 from two lanes to four lanes from West Street to Coolidge Bridge.
- Hadley/Northampton: Rehabilitation of the Coolidge Bridge with lane addition and widening from three lanes to four lanes.
- Springfield: Reverse the direction of four existing I-91 ramps.
- Westfield: Route 10/202 Great River Bridge - two bridges acting as one-way pairs.
- Holyoke: Commercial Street extension project from the I-391 ramp to Appleton Street.
- Chester: Maple Street Bridge one way northbound, connecting Route 20 to Main Street.

The 2020 model network will include the following regionally significant projects:

- Wilbraham: Boston Road reconstruction. Currently one lane in each direction, will become two lanes in each direction. Project starts at the Springfield City Line and continues east to Stony Hill Road (0.28 miles), but does not include Stony Hill Road. Expected in 2016.
- Through the region: New Commuter Rail Service from Hartford, CT to Greenfield, MA. (Currently not modeled)
- Hadley: Route 9 Phase 1 - Widens Route 9 from one lane to two lanes in each direction. Project starts west of Middle Street and continues till East Street. Expected in 2020.

The 2030 model network will include the following regionally significant projects:

- Hadley: Route 9 Phase 2 - Widens Route 9 from one lane to two lanes in each direction. Starts at East Street and continues to the Lowe's driveway. Expected in 2023
- Hadley: Route 9 Phase 3 - Widens Route 9 from one lane to two lanes in each direction. Project starts east of the Lowe's driveway and continues to the Home Depot driveway. Expected in 2026.

CHAPTER 14

NEEDS, STRATEGIES AND PROJECTS

The vision of the RTP focuses on the attainment of a safe and dependable transportation system. In a first step to achieve this vision and its associated goals, the system's present and future needs have been identified. The second step is to develop appropriate strategies to address these needs while adhering to the policies and objectives of the RTP. The third and final step is to advance planning studies and implement program improvement activities that will enhance the transportation system. This continual process will simultaneously alleviate problems in the regional transportation system and advance the goals of the RTP.

A total of five emphasis areas were identified to assist in the development of the regional transportation needs, strategies, and projects required to assist in the achievement of the RTP vision and goals. These emphasis areas are not intended to be a replacement for the regional transportation goals. Instead they were established with the recognition that many of the transportation improvement strategies included as part of the RTP Update can meet multiple regional transportation goals. The five emphasis areas are:

- Safety and Security
- The Movement of People
- The Movement of Goods
- The Movement of Information
- Sustainability

The transportation emphasis areas consist of broad topics related to transportation planning that are related to each of the thirteen Regional Transportation Goals. Regional Transportation Needs, Strategies, and Projects were developed for each emphasis area in this RTP Update to advance each of the thirteen goals without the need for repetitiveness.

A. SAFETY AND SECURITY

Safety is a principal concern in most transportation plans and designs. Highway Safety focuses on the reduction of crashes and resulting deaths, injuries and property damage occurring on public roads. Passenger vehicle movements, truck conflicts, pedestrian and bicycle travel, and bridge conditions are all included as part of Highway Safety.

The security of the regional transportation system is an ever increasing priority. It is critical to ensure that the highest levels of security are provided for the users of our regional transportation system and that appropriate measures are taken to restrict access to our critical transportation infrastructure.

1. Needs

A number of needs in the areas of Safety and Security have been identified for inclusion in the RTP. These needs have been summarized in Table 14-1. Each need has been prioritized as either "Immediate," "Future," or "Ongoing." Immediate needs are areas that are a high priority and must be addressed through the implementation of future planning studies and projects. Future needs are considered to be areas of a medium importance that should be addressed in the development of future projects. Ongoing needs are areas that require routine attention and that are typically already included as part of the regional transportation planning process.

Table 14-1 – Summary of Safety and Security Needs

Reduce the number of fatal and personal injury crashes for both pedestrians and vehicles in the region.	Ongoing
Improve coordination and information exchange between emergency service providers and transportation agencies.	Ongoing
Examine the safety of at-grade railroad crossings.	Ongoing
Improve the safety and security of existing freight railyards and facilities.	Ongoing
Reduce the number of roadway departure crashes.	Ongoing
Improve knowledge and compliance with existing Emergency Evacuation plans.	Ongoing
Protect regional transportation choke points such as bridges, airports, railyards, bus terminals, etc.	Ongoing
Ensure the safety and security of mass transit facilities and equipment.	Ongoing
Provide for the safety and security of hazardous material transportation in and through the region.	Immediate
Improve access to driver, bicycle, and pedestrian education.	Immediate
Identify deficiencies to make major routes more suitable for non-motorized traffic and transit users.	Immediate

a) Reduce the number of fatal and personal injury crashes for both pedestrians and vehicles in the region.

Chapter 6 of this document summarizes recent safety trends in the Pioneer Valley region. In order to assist in the reduction of personal injury and fatal crashes, MassDOT developed a Strategic Highway Safety Plan (SHSP). The goals of the SHSP have been integrated into the regional performance targets

included as part of Chapter 12. Information on the progress to date in meeting the goals of the SHSP is presented in Chapter 6.

b) Improve coordination and information exchange between emergency service providers and transportation agencies.

Emergency service providers rely on a safe and efficient transportation system in order to minimize their response time. It is important that advance notice be given to these agencies on ongoing construction projects and major incidents that could have negative impacts on their ability to serve the public. Similarly, it is also important to keep the emergency service providers closely involved in the transportation planning process to ensure that future transportation improvement projects can meet their needs.

c) Examine the safety of at-grade railroad crossings.

Many of the at-grade railroad crossings in the PVPC region do not have safety gates to separate motor vehicle traffic from railroad traffic. In addition, supplemental warning devices such as flashing lights, warning signs and pavement markings require routine maintenance in order to provide maximum effectiveness. It is important to maintain an inventory of these at-grade crossings in order to determine when increases in traffic and surrounding developments require the installation of safety gates and other appropriate devices.

d) Improve the safety and security of existing freight railyards and facilities.

Similar to air and bus transportation, rail transportation has several unique features that leave it vulnerable to attack. Passenger and freight rail serve dense urban areas with multiple points for access. Both also serve vast rural areas that can be difficult to secure. Additional security measures are required that do not result in increases to service time but improve the safety and security of both rail passengers and cargo in the region.

e) Reduce the number of roadway departure crashes.

More than half of the fatalities in the State during the calendar years of 2005, 2006, 2007, and 2009 involved roadway departure crashes. Roadway departure crashes were also responsible in causing nearly 60% of fatalities in the Pioneer Valley during the calendar years of 2006, 2007, and 2008. It is important to identify areas that have a history of roadway departure crashes and implement appropriate transportation improvement projects to improve safety in these areas.

f) Improve knowledge and compliance with existing Emergency Evacuation plans.

It is critical to educate residents about their community's emergency preparedness routine and resources. Residents should know who their municipalities' Emergency Management Director (EMD) is and where to find out:

- Emergency shelter locations
- Evacuation routes
- Sources for local emergency information

g) Protect regional transportation choke points such as bridges, airports, railyards, bus terminals, etc.

A key component of homeland security is the ability to work with federal, regional, local, and private partners to identify the critical infrastructure that is at the greatest risk and take the necessary steps to mitigate these risks. This begins through the identification of our critical links in the transportation infrastructure and the agencies responsible for the maintenance and security of these areas. This is an ongoing process that is defined in the State Homeland Security Strategy (SHSS) for the Commonwealth of Massachusetts. The following needs have been identified as part of the SHSS:

- Continue to establish a prioritized list of potential targets and potential methodologies of attack.
- Share target lists with key officials.
- Identify conditions that may facilitate the ability of a terrorist to carry out an attack.
- Disseminate important information to key entities, and support the development and implementation of risk mitigation efforts.
- Develop and track defined performance metrics that will allow for performance based management of risk mitigation efforts.

h) Ensure the safety and security of mass transit facilities and equipment.

There are several safety and security concerns related to the region's mass transit system. Foremost among these is personal safety of passengers and employees at the Springfield Bus Terminal, PVTA's major hub. In addition, PVTA's maintenance facility at 2840 Main Street in Springfield is increasingly overextended by the need to repair both buses and vans. This facility was initially constructed to service streetcars and, even with numerous expansions over the years, has limited space to service the large number of vehicles that

PVTA operates. PVTA is now developing plans for a Level I maintenance and storage facility to serve its Springfield and Holyoke area routes and alleviate the overcrowding and security concerns at the Main Street facility. It will be important to ensure the safety and security of all of PVTA's facilities and equipment in order to maintain a safe and dependable transit system.

i) Provide for the safety and security of hazardous material transportation in and through the region.

The Hazardous Materials Transportation Act of 1975 (HMTA), as amended, regulates and enforces the authority of the Secretary of Transportation to protect the nation against risks associated with the transportation of hazardous materials. In 1990 Congress enacted the Hazardous Materials Transportation Uniform Safety Act (HMTUSA) to clarify conflicting state, local, and federal regulations on the transport of hazardous materials. While it is clear that the transportation of hazardous materials is strictly regulated, it is also important to ensure that the roadways designated for the transportation of hazardous materials are appropriately designed and maintained to facilitate the movement of vehicles used for transport.

j) Improve access to driver, bicycle, and pedestrian education.

In order to improve safety for all modes, it will be important to provide comprehensive education for all users of the regional transportation system. Enhanced driver, bicycle, and pedestrian education programs can assist in improving safety by providing an overview of traffic laws and the responsibilities of each user.

k) Identify deficiencies to make major routes more suitable for non-motorized traffic and transit users.

The lack of connectivity of sidewalks and suitable shoulders for bicycle use reduce the safety of non-motorized traffic. Similarly, lack of bus shelters and adequate lighting can increase the perception that our transit system is unsafe. In order to improve these areas, a systematic inventory of the existing deficiencies is required. The PVPC routinely performs sidewalk inventories and bicycle Level of Service analyses that can help to identify these areas. A comprehensive inventory of all bus stops in the region was also completed by the PVPC. This information must be updated on a regular basis in order to have the most accurate information available for use in the development of future transportation improvement projects.

2. Strategies

Several different strategies have been developed to address the regional needs identified in the areas of Safety and Security. These strategies have been summarized in Table 14-2. Again, each strategy has been prioritized as

either Immediate, Future or Ongoing. Immediate strategies are considered a high priority and must be advanced in the short term. Future strategies are considered to be areas of a medium importance that should be considered during the development of future projects. Ongoing strategies are typically already included as part of the regional transportation planning process.

a) Develop a regional list of high crash locations.

Based on this strategy in the 2007 RTP, the PVPC published its first list of the Top 100 High Crash Intersections in the Pioneer Valley Region in March of 2008. This data was based on MassDOT crash data from 2003 - 2005. The report has since been updated in May 2013 to include crash data from 2007 – 2009. The report is critical to advancing safety improvement projects that are eligible for funding under the Highway Safety Improvement Program (HSIP) as well as planning studies to identify potential future safety improvements. This report is currently scheduled to be updated as part of the Federal Fiscal Year 2016 Unified Planning Work Program.

Table 14-2 – Summary of Safety and Security Strategies

Develop a regional list of high crash locations.	Ongoing
Work with the State and local communities to standardize the way they archive their crash records.	Ongoing
Increase the deployment of cameras and other security devices and measures.	Ongoing
Provide accommodations for pedestrians, transit users, and bicyclists in roadway and bridge design and the maintenance of existing facilities.	Ongoing
Implement communications and ITS technologies to improve public transit safety, and security.	Ongoing
Develop an inventory of critical transportation choke points, haz-mat routes, and users.	Ongoing
Work with appropriate agencies to improve the transmittal of bike and pedestrian crashes to local police departments.	Ongoing
Promote the Safe Routes to School program.	Ongoing
Promote and advance the use of roadway safety audits in the Pioneer Valley.	Ongoing
Identify and advocate for additional revenue sources to bring the regional transportation system into a state of good repair.	Immediate
Improve geometrics and upgrade traffic signal control equipment to improve safety.	Immediate
Develop appropriate educational resources to promote safety for drivers, bicyclists, transit users, and pedestrians.	Immediate
Limit opportunities to access freight rail facilities and infrastructure.	Immediate

b) Work with the State and local communities to standardize the way they archive their crash records.

The new crash report forms implemented prior to 2003 greatly improved the amount of crash data included as part of the statewide database. In the Pioneer Valley region, however, select communities only recently began to submit their crash data to MassDOT on a consistent basis. The Pioneer Valley MPO should continue to work in consultation with the MassDOT, Governor's Highway Safety Bureau and other appropriate agencies to improve the quality and consistency of local crash records for use in ongoing transportation planning activities. The development of a close relationship between the state, regional and local entities will greatly assist in the ability to continue to have access to the most up to date crash data to assist in ongoing safety planning efforts.

c) Increase the deployment of cameras and other security devices and measures.

The security of the critical elements of our regional transportation infrastructure is a daunting task. Monitoring of key locations such as bridges,

transit centers, and rail and freight yards can often be supplemented by the installation of video cameras and other ITS devices. It will be important to continue to identify sensitive areas in the region and develop appropriate plans to increase security.

d) Provide accommodations for pedestrians, transit users, and bicyclists in roadway and bridge design and the maintenance of existing facilities.

The Pioneer Valley RTP promotes a balanced transportation system. In order to achieve this system it will be important to invest in increasing the safety of bicyclists, pedestrians, and transit users. The Pioneer Valley MPO should continue to utilize the Transportation Evaluation Criteria to identify and prioritize transportation improvement projects that promote the safety of bicyclists, pedestrians, and transit riders.

e) Implement communications and ITS technologies to improve public transit safety and security.

PVTA has an ongoing ITS program which allows for vehicle monitoring and improved communications for both drivers and passengers. The Pioneer Valley MPO should continue to invest in the advancement of ITS equipment to improve operational efficiency, give passengers real time information about schedules, provide critical emergency information to first responders, and interface with other ITS infrastructure in the state and region.

f) Develop an inventory of critical transportation choke points, haz-mat routes, and users.

While it is clear that the transportation of hazardous materials is strictly regulated, it is also important to ensure that the roadways designated for the transportation of hazardous materials are inventoried on a regular basis to identify potential problems areas. This information can be collected as part of ongoing pavement management, bridge management, and congestion management programs conducted by the state and the region. It will also be important to share this information with transportation providers.

g) Work with appropriate agencies to improve the transmittal of bike and pedestrian crashes to local police departments.

The Pioneer Valley MPO in consultation with MassDOT, local police departments, and other interested agencies should develop a public awareness campaign to require bicyclist and pedestrians that are involved in crashes to fill out a crash report form. Currently, bicyclist and pedestrians that may be involved in a minor crash that did not involve an injury may not report the incident. In addition, crashes involving bicyclist and pedestrians along off-road facilities such as the Norwottuck Rail Trail are often not

reported. More outreach is required to emphasize the importance of this information in bicycle and pedestrian safety planning efforts.

h) Promote the Safe Routes to School Program

The Massachusetts Safe Routes to Schools Program is coordinated through MassRides. The Pioneer Valley MPO currently works in cooperation with MassRides to promote the Safe Routes to Schools Program and assist in identifying potential candidate communities and school districts for inclusion in the program. PVPC also seeks to include an analysis of safe routes to local schools as part of ongoing planning activities.

i) Promote and advance the use of roadway safety audits in the Pioneer Valley.

Roadway Safety Audits (RSA) are a proactive, low-cost method to improve safety. A RSA uses a large team of analysts representing a variety of interests to perform a field review of high hazard locations and identify factors that may contribute to crashes. The PVPC should continue to work with MassDOT to use the RSA process to identify and advance recommendations for high crash locations in the Pioneer Valley.

j) Identify and advocate for additional revenue sources to bring the regional transportation system into a state of good repair.

Chapter 9 of this document identifies the existing and projected future condition of the region's federal aid eligible roadways. Chapter 15 reviews a number of planning scenarios of the impact of varying funding on the regional pavement condition. Based on existing funding levels, it will be difficult to maintain the existing roadway system at acceptable levels. The PVPC should continue to work with MassDOT and other appropriate agencies to identify alternative sources of revenue to assist in the maintenance of the regional transportation system.

k) Improve geometrics and upgrade traffic signal control equipment to improve safety.

Traffic signals require routine maintenance in order to operate at maximum efficiency. Inefficient signal timing plans can lead to driver frustration which often contributes to aggressive driving, road rage, and the running of red lights. The Pioneer Valley MPO should consider developing a regional program to invest in the physical upgrade of key intersections throughout the region. Under this program, traffic signal improvements would be restricted to the installation of new equipment such as overhead mast arms and traffic signal heads to bring the intersection in compliance with the Manual on Uniform Traffic Control Devices (MUTCD) and the development of new signal timing and phasing plans. Restricting the improvements to just equipment

upgrades would allow more efficient use of funds. In addition, these improvements would be eligible to be funded as part of the Congestion Mitigation and Air Quality (CMAQ) program.

l) Develop appropriate educational resources to promote safety for drivers, bicyclists, transit users and pedestrians.

The PVPC should continue to work in coordination with MassDOT, MassBike, local schools, and other appropriate agencies to develop educational materials that promote safety for all transportation users. An emphasis should be placed on the development of new video materials that could be distributed to local schools to assist in promoting bicycle and pedestrian safety.

m) Limit opportunities to access freight rail facilities and infrastructure.

The security of the regional rail facilities and infrastructure is an important security need for the region. It will be critical to maintain a close relationship with the existing owners of active rail lines to identify their needs and assist in the development and implementation of security planning activities. Railroads already have existing relationships with local officials with regards to hazardous materials response. These relationships are the logical starting point of discussing homeland security concerns with the region's rail carriers. Locations should also be identified for the installation of security fencing to both promote security and increase safety by restricting areas in which pedestrians can access active rail lines.

B. THE MOVEMENT OF PEOPLE

Efficient movement of people remains a top priority of the regional transportation system. Congestion typically occurs when the demands on a system surpass the actual handling capacity. These types of conditions are prevalent in areas where a number of roadways converge onto a single segment, like major bridge crossings. Due to limitations in lane capacity and alternate travel routes, bridges have a tendency to bottleneck traffic. Feasible alternatives to congestion relief through increases in roadway capacity without actual lane expansion are strongly encouraged. This approach requires that vehicle users, commuters, and travelers change their travel patterns and opt for more congestion friendly alternatives such as public transportation, ridesharing, bicycling, and walking.

It is important to develop balance in the regional transportation system. Improvements in the regional transit system and provisions for pedestrians and bicyclists in transportation design can help achieve balance and reduce our reliance on the automobile. Similarly, the development of transportation

improvements that do not increase capacity will not induce more vehicle trips that can quickly develop into new areas of congestion.

The establishment and/or maintenance of adequate access to the natural, economic, social, historic, and cultural resources of the Pioneer Valley is also a key to economical vitality. The location of the crossroads of Interstates I-90 and I-91 within the Valley's boundaries makes inter-regional and interstate travel very accessible. Likewise, the region's proximity to Bradley International Airport, Northeast Corridor Amtrak service, the network of arterial and rural roads, transit systems, and bicycle and pedestrian ways ensure physical access to educational institutions, military installations, unique regional historic and cultural resources, beautiful recreational areas, and business and retail centers throughout the region.

1. Needs

A series of needs to enhance the movement of people in the Pioneer Valley region have been identified and are summarized in Table 14-3. These needs have been categorized as immediate, future and ongoing. Ongoing needs are areas that may already be considered as part of an existing program that will require to be updated as part of existing planning efforts or analyzed for inclusion as part of a transportation improvement project. Immediate needs will require attention in the short term to advance transportation planning studies and projects. Future needs are considered equally important but will be advanced over a slightly longer timeframe.

Table 14-3 – Summary of Needs to Enhance the Movement of People

Increase opportunities for non-motorized transportation use.	Ongoing
Monitor peak hour congestion in the region.	Ongoing
Incorporate traffic calming measures where appropriate.	Ongoing
Maintain and expand the regional bike network connectivity.	Ongoing
Maintain equity in providing transportation services and access throughout the region.	Ongoing
Maintain and increase access to national passenger rail service in the Pioneer Valley.	Ongoing
Increase opportunities for enhanced air passenger service in the Pioneer Valley.	Ongoing
Provide opportunities for bicycle access to other modes of transport.	Ongoing
Incorporate ITS technologies to improve traffic flow on major regional roadways.	Ongoing
Enhance Paratransit scheduling software to utilize vans more efficiently.	Immediate
Secure adequate funding for a balanced regional transportation system.	Immediate
Provide adequate curb space for dropoff/pickups when considering future construction projects.	Immediate
Increase the number of riders using transit to commute to work and school.	Immediate
Enhance opportunities for inter-city, inter-regional passenger trips.	Immediate
Identify dependable and equitable funding sources for the Pioneer Valley transit system.	Immediate
Improve coordination and notification of the review of roadway improvement projects.	Future

a) Increase opportunities for non-motorized transportation use.

All roadway improvement projects in Massachusetts are required to provide access to bicycles and pedestrians. Incorporating bicycle and pedestrian features into road reconstruction projects create environments that support bicycling and walking, increasing bicycle and pedestrian safety, and promoting bicycling and pedestrian activities as alternative transportation choices.

Community interest in the Pioneer Valley Region has strongly supported the creation of off road, multi-use trails, bike lanes, and wide curb lanes for bicyclists. These off-road and on-street projects allow for easy access into residential neighborhoods and central business districts; are suitable for making short, local trips; and promote healthy lifestyles.

Complete Streets is an approach to configuring local roads to better balance the needs of all people who use a street: motor vehicle drivers, public transit riders, pedestrians, bicyclists, people with disabilities, shoppers, school

children, and others. A “Complete Street” improves livability by improving public safety, increasing usable public space, and making it easier to share the street. It also creates a more welcoming environment for local businesses. By expanding and improving the regional transportation system to accommodate all travel modes, more people can be encouraged to consider bicycling, transit and walking in the Pioneer Valley region.

b) Monitor peak hour congestion in the region.

The Pioneer Valley Congestion Management Process (CMP) is an ongoing, systematic process designed to improve transportation in the region by providing up to date information on the location, severity and extent of congested corridors and intersections. A complete summary of the CMP for the Pioneer Valley region is provided in Chapter 8.

c) Incorporate traffic calming measures where appropriate.

Traffic calming utilizes engineering devices to force traffic to both reduce speeds and physically prevent certain traffic movements. Traffic calming is typically implemented for residential streets to assist in increasing compliance with posted speed limits. In downtown and urban areas, traffic calming devices can be used to reduce the crossing distance and increase safety for pedestrians. It is important to conduct an engineering study prior to the installation of traffic calming devices. This study should document the extent of the existing problem and develop an extensive public participation process with local officials, residents and emergency service personnel prior to the installation of traffic calming devices.

d) Maintain and expand the regional bike network connectivity.

Creating a network of safe roads and shared use paths has been a central goal of the bicycle planning effort. The concept that you can bicycle “from here to just about anywhere” has universal appeal, and residents certainly want to be able to bike or walk to their favorite destinations. The Regional Bicycle and Pedestrian Plan identifies proposed bikepaths or shared use trails, road and bridge improvements that would enhance bicycle connectivity. PVPC continues to work with MassDOT and local communities to advance projects to enhance the connectivity of the bicycle network.

e) Maintain equity in providing transportation services and access throughout the region.

It is important to provide and maintain equitable transportation services throughout the region. This requires that a thorough public participation process be developed and maintained in order to allow adequate opportunity for all parties to identify their unique needs and/or communicate any issues they may have with transportation planning and improvement projects. The

Pioneer Valley MPO has developed a process for the identification of the locations of socio-economic groups, including low-income and minority populations as covered by the Executive Order on Environmental Justice and Title VI provisions. The MPO continues to work with MassDOT and federal agencies to engage minority and low-income populations in the transportation decision making process. It also developed methods to routinely evaluate this strategy to ensure its continued effectiveness. It is the responsibility of the MPO to institutionalize a planning process for assessing the regional benefits and burdens of transportation system investments for different socio-economic groups and to develop an on-going data collection process to support the effort and identify specific actions to correct imbalances.

f) Maintain and increase access to national passenger rail service in the Pioneer Valley.

The Pioneer Valley has quite a stake in the future of national passenger rail service because of the significant service that it provides in the region and the potential opportunities for future partnerships that are being actively considered. Continued regional and state support for passenger rail services provided in the region is necessary to both retain the existing service and advance opportunities to expand service in the future.

g) Increase opportunities for enhanced air passenger service in the Pioneer Valley.

The Connecticut Department of Transportation (ConnDOT) completed a Master Plan for Bradley International Airport. This plan projected growth in operations over a 20 year horizon and developed a long range strategy to leverage the strength of the airport and the Hartford/Springfield region to satisfy the air passenger needs of the region. It will be important to support the implementation of this master plan in order to maintain safe, efficient air passenger transportation opportunities for the Pioneer Valley region.

It is also important to support the expanding needs of other regional airports such as Westfield-Barnes Municipal Airport, Westover Metropolitan Airport, and the Northampton Airport. Improvements to both existing airport infrastructure and access to the airports must be maintained in order to realize continued growth in air transportation opportunities.

h) Provide opportunities for bicycle access to other modes of transport.

The PVPC has successfully managed a regional bicycle rack program for many years. This program purchases bicycle racks via a competitive grant process and then assists in the distribution and installation of the racks at key locations in local communities. The bicycle rack program supplements other ongoing efforts, such as the Rack N' Roll (bikes on bus) program on all PVTA

routes, that link bicycles to other modes of transportation. It will be important to continue to expand upon these efforts to ensure that sufficient links exist to allow bicyclists to easily shift to other modes of transportation in the region.

i) Incorporate ITS technologies to improve traffic flow on major regional roadways.

It will be important for the MPO to advocate for additional ITS applications that could benefit local communities on major regional roadways. In addition, it will be important to identify future transportation improvement projects that could benefit from the integration of ITS technology to improve traffic flow without adding additional capacity.

j) Enhance Paratransit scheduling software to utilize van more efficiently.

Currently PVTA often has only 1 person riding in an 18 passenger van. Also there are times when more than one van is in a given area with one or two riders. With scheduling improvements these trips can be consolidated to more efficiently utilize available resources.

k) Secure adequate funding for a balanced regional transportation system.

Travel in the Pioneer Valley region is dominated by automobile travel. Work trips are characterized by a high percentage of people that choose to drive alone to work, which contributes to both congestion and air quality issues. Lack of sufficient funding for public transit and a viable regional ridesharing program contribute to people choosing to rely on the automobile. Lack of connectivity for bicycles and pedestrians require people to use their car for shorter trips that could otherwise be made by bike or on foot.

l) Provide adequate curb space for dropoff/pickups when considering future construction projects.

When considering future roadway improvement projects plan for bus cutouts to allow buses room to pull off roadway to pick up/drop off passengers without blocking traffic.

m) Increase the number of riders using transit to commute to work and school.

As living and employment patterns have changed over the past 25 years, transit systems have had difficulty reacting to the evolving needs of their passengers. The PVTA recently commissioned a comprehensive service analysis and has integrated a number of the recommend changes to existing service. A study of the feasibility of integrating bus rapid transit (BRT) along State Street in Springfield is also currently underway. The PVTA will need to

continue introduce innovative new services that complement existing service and provide competitive travel options across their service area.

n) Enhance opportunities for inter-city, inter-regional passenger trips.

It is important to maintain efficient transportation options from the Pioneer Valley region to the Boston area. Similarly, there are gaps in service options from the Springfield area to both Bradley International Airport and the City of Hartford.

o) Identify dependable and equitable funding sources for the Pioneer Valley transit system.

PVTA operating funds are provided from six sources. State Contract Assistance accounts for 51% of the operating budget. Farebox and municipal assessments each make up 17% of the budget, followed by Federal Grants that represent 12% of the budget. The final 3% is derived from advertising and from interest and insurance. Nearly all of these sources of funding are declining or capped making any service expansions challenging. PVTA recently completed a Comprehensive Service Analysis that recommended elimination of some routes and corresponding expansion of other routes. PVTA is constantly reassessing the productively of the system and reallocating the finite available funds accordingly.

In areas like the Pioneer Valley, transit is deemed more of a public service for the transportation dependant than an actual comer option. A greater commitment must be made to transit as a commute option if our goals of fewer vehicle miles traveled, lower emissions and improved environmental quality of our transportation system are to be realized.

p) Improve coordination and notification of the review of roadway improvement projects.

As roadway improvement projects advance through the MassDOT design process, it is important to coordinate all review comments with both the local design consultant and the chief locally elected official. While this process can work quite well with some communities, it will be important to expand these coordination efforts to ensure that projects advance towards design in a timely and cost-effective manner.

2. Strategies

A series of strategies were developed to address the needs that restrict the efficient movement of people in the region. These strategies are summarized in Table 14-4. A summary of each strategy follows.

Table 14-4 – Strategies to Assist in the Movement of People

Seek innovative methods to increase transit ridership, including express routes and flex vans.	Ongoing
Monitor congested areas using the regional Congestion Management Process (CMP).	Ongoing
Develop a regional list of top congested locations.	Ongoing
Promote the implementation of bicycle lanes where practical.	Ongoing
Advance and promote the principles of pavement management.	Ongoing
Conduct parking studies for downtown areas.	Ongoing
Enhance directional and guide signs to/from the regional highway system.	Ongoing
Seed to develop a TOD Investment Fund	Ongoing
Maintain equity in providing transportation services and access throughout the region.	Ongoing
Develop a comprehensive Commuter Rail network.	Immediate
Identify locations for park and ride lots and supporting express transit service.	Immediate
Work with the State and local communities to implement the recommendations of regional transportation studies.	Immediate
Identify sources of revenue for local transportation projects.	Immediate
Encourage private connections to the regional bikeway network.	Future

a) Seek innovative methods to increase transit ridership, including express routes and flex vans.

The Pioneer Valley MPO should work in consultation with local communities and the PVTA to identify future transit studies to include as part of the UPWP. These studies should identify areas that could benefit from additional or improved transit service. A combination of transit surveys, existing ridership data, the regional transportation model, and other appropriate analysis techniques should be utilized to develop recommendations to increase transit ridership.

b) Monitor congested areas using the regional Congestion Management Process (CMP).

Areas of congestion or travel conditions in the Pioneer Valley region that are no longer acceptable to the public must be identified as target areas for improvement. Improvement strategies must first consider maximizing the

efficient use of existing facilities through travel demand management, traffic operation improvements, growth management, and alternate modes of travel prior to the recommendation of expansion of the existing transportation system.

Areas of congestion will be identified through the Congestion Management Process, the regional travel demand model, and local input. Performance measures are utilized to indicate the level of severity of congestion for each area. Routine monitoring of these areas will be conducted to determine if the conditions are "re-occurring" or "intermittent". For those areas that are "re-occurring" they will be designated as a congested area or corridor. Priority attention will be given to the relief of those corridors designated as congested. Under the current TEC project priority process, projects that are designed to alleviate congested areas receive higher priority than other projects.

Regional congestion mitigation actions that improve travel flow efficiency or reduce single-occupant vehicle travel without adding new travel lanes are given priority in the TEC process. These projects include traffic signal coordination projects, high occupancy vehicle lanes, car and van pool service, and intelligent transportation systems. The objective of these activities is to reduce congestion and in turn improve air quality throughout the region.

c) Develop a regional list of top congested locations.

Continue to rank the top congested locations and bottlenecks in the Pioneer Valley Region as part of regular updates to the Regional Congestion Management Process (CMP). Utilize peak hour travel time information to identify congested corridors and intersections and develop a public participation process to assist in the prioritization of congested areas. Update the current status of ongoing studies and potential transportation improvement projects for each location. Advance new transportation planning studies as appropriate for locations with no pending improvements.

d) Promote the implementation of bicycle lanes where practical.

MassDOT's GreenDOT initiative requires that bicycle and pedestrian accommodations be included as part of all transportation improvement projects. Recommendations developed as part of transportation studies completed as part of the UPWP also seek to identify areas that could benefit from bicycle lanes. As more communities begin to develop local "Complete Streets" policies this could result in more bicycle lanes being included as part of locally fund transportation improvement projects.

e) Advance and promote the principles of pavement management.

The primary goal of any pavement management system is to provide decision-makers with a list of improvement projects that maximize the benefit

of limited maintenance dollars. PVPC staff, under the direction of the Pioneer Valley MPO, should continue to refine the maintenance project prioritization process. This process will assist in the prioritization of roadway maintenance projects that are evaluated using the regional project prioritization system.

All federal-aid eligible roadways in the region will continue to be evaluated on a regular basis. This evaluation will consist of a pavement condition survey and a future benefit-cost analysis of various maintenance scenarios. A summary report will be generated for each community in the region. The ability to view various budget and scheduling scenarios will allow the local officials to forecast the needs and conditions of their federal-aid roadway system.

f) Conduct parking studies for downtown areas.

Work with local communities to identify areas for future parking studies for inclusion in the UPWP. Identify the existing parking supply and quantify existing demand through a weekday occupancy and turnover survey. Utilize the information collected in the parking survey to develop recommendations to efficiently manage the existing parking supply and address the need for potential future parking demands.

g) Enhance directional and guide signs to/from the regional highway system.

Incorporate appropriate tasks into future transportation planning studies to inventory and analyze the effectiveness of existing directional guide signs from/to the regional highway system. Develop recommendations and maps of preferred improvements to upgrade existing signage as appropriate.

h) Seek to develop a TOD Investment fund

Participate in the development of a framework for a TOD investment Fund to provide for infrastructure and catalytic funding of TOD projects, and identify potential funding sources to capitalize the fund.

i) Maintain equity in providing transportation services and access throughout the region.

Incorporate an assessment of transportation equity as part of transportation planning studies as appropriate. Work with local communities to identify neighborhood groups and local organizations to include in ongoing public participation activities.

j) Develop a comprehensive Commuter Rail network.

Interstate 91 in Connecticut faces daily congestion backups despite significant investments in new capacity such as a dedicated High Occupancy Vehicle (HOV) lane. The Pioneer Valley MPO should continue to work with

officials from the Commonwealth of Massachusetts, the State of Connecticut, the State of Vermont, local communities, and other interested parties to advance the development of a viable Passenger Rail network. This network would provide a viable alternative to the single occupant vehicle for both commuting and trips to Bradley International Airport.

A series of studies have been completed to assess the operational and economic challenges associated with the dual use of the existing rail corridor by freight and passenger trains along the Knowledge Corridor. Additional support is necessary to continue to advance opportunities to implement incremental improvements to service and develop innovative funding strategies for continued service.

Similarly, an ongoing study to assess infrastructure (capital) needs and operating costs for passenger rail service connections between Springfield and Boston, MA must continue to be advanced. Expanded east-west service is complicated due to the ownership of railroad tracks between Springfield and Worcester by CSX and existing MBTA commuter rail service between Worcester and Boston. Studies have identified the potential for one daily run between Boston and Montreal and eight daily runs between Boston and New Haven, Connecticut that would have a stop in Springfield. Expanded passenger rail service would allow existing residents to continue to live in the Pioneer Valley and connect to job markets to the east and south of the region.

k) Identify locations for park and ride lots and supporting express transit service.

The Pioneer Valley MPO should continue to monitor usage at existing park and ride lots in the region. In addition, feasibility studies for potential new park and ride lot locations should be advanced through the UPWP. Locations for new park and ride lots should be identified through consultation with MassDOT and local officials. In addition, supporting amenities and transit service should also be studied and implemented as appropriate to promote usage of these facilities.

l) Work with the State and local communities to implement the recommendations of regional transportation studies.

Continue to transmit copies of all transportation planning studies to the members of the Pioneer Valley MPO. Utilize the comments of MPO members and local communities to finalize all studies. Provide technical assistance as appropriate to advance the preferred recommendations and alternatives of regional transportation planning studies. Assist local communities in completing Project Needs Forms and Project Initiation Forms to advance project development as detailed in the MassDOT Project Development and Design Guide.

m) Identify sources of revenue for local transportation projects.

Many local communities are dependent on the Chapter 90 Program to fund transportation improvement projects on locally maintained roadways. As demonstrated in Chapter 15 of this document, this funding is not adequate to keep locally maintained roadways operating as acceptable levels. The Pioneer Valley MPO should continue to work with MassDOT and local communities to identify an equitable source of revenue for transportation improvements projects that address local needs.

n) Encourage private connections to the regional bikeway network.

Work with local communities and interested private developers to develop incentives to enhance connections to the regional bikeway network. Review Environmental Notification Forms and Environmental Impact Reports completed as part of the Massachusetts Environmental Policy Act (MEPA) to identify areas that could benefit from enhanced bicycle connections. Provide local assistance with communities to identify incentives and potential funding sources to encourage private bikeway connections.

C. THE MOVEMENT OF GOODS

The Pioneer Valley Region is strategically located at a geographic crossroads in which more than one third of the total population of the United States can be reached by an overnight delivery. The availability of an efficient, multimodal transportation network to move goods through the region is essential to maintain economic vitality. Several modes of transportation are available in the region to facilitate the movement of goods. These modes include truck, rail, air, and pipeline. As a result, the goods movement network provides vital connections between producers and consumers within the state, nationally and internationally.

A large portion of the freight transportation system is privately owned and operated. As a result, it is critical to develop partnerships between state, regional and local agencies with the private sector to coordinate and maintain efficient freight planning and implementation.

1. Needs

A series of needs to enhance the movement of goods in the Pioneer Valley region have been identified and are summarized in Table 14-5. These needs have been categorized as immediate, future and ongoing. Ongoing needs are areas that may already be considered as part of an existing program that will require updating as part of existing planning efforts or analyzed for inclusion as part of a transportation improvement project. Immediate needs will require attention in the short term to advance transportation planning

studies and projects. Future needs are considered equally important, but will be advanced over a slightly longer timeframe.

Table 14-5 – Summary of Needs to Enhance the Movement of Goods

Support the development and maintenance of short line and regional railroads in the Pioneer Valley.	Ongoing
Improve the communication between private carriers and state and local officials.	Ongoing
Increase opportunities for air cargo in the region.	Ongoing
Improve connections between different modes and the highway network.	Immediate
Improve coordination with class one carriers serving the Pioneer Valley Region.	Immediate
Improve and coordinate the logistics of freight movement in the Pioneer Valley. including upgrades of the NECR track from Vermont to Connecticut for 286,000 pound weight capacity.	Future
Reduce the regional reliance on trucking for the primary transportation of goods.	Future
Promote the efficient use of the highway network by freight carriers.	Future

a) Support the development and maintenance of short line and regional railroads in the Pioneer Valley.

The Pioneer Valley is served by five rail carriers. The short line and regional railroads often provide the pick up and delivery of cars from the national rail system on lines that the larger carriers could not compete with efficiently. In this role these carriers are often innovative and customer focused providing businesses with what they need for transportation services. These railroads are also aggressive in developing new customers to build their business. The Pioneer Valley MPO should support the growth, development, and maintenance of the shortline and regional railroads through programs intended to promote economic development as well as reduce congestion.

Currently Massachusetts has a Rail Freight Capital Funding Program for funding the implementation of rail improvements pursuant to the general provisions of Chapter 161C of the Massachusetts General Laws. The program will fund projects that demonstrate that the proposed freight rail project will provide a sustained public benefit warranting the use of public funds. Examples of eligible projects include new construction; reactivation and/or rehabilitation of public intermodal freight facilities, safety improvements, and rights-of-way provided there is a clear public benefit to any proposal. However, the current program is limited to projects on publicly owned property rather than any rail property that meets the public benefit. As almost all of the entire national and Massachusetts rail system is owned by

private freight carriers, the number of opportunities for using the program is very limited. The Pioneer Valley MPO shall seek to expand the program to any rail improvement with a clear public benefit which would model similar programs in other states.

b) Improve the communication between private carriers and state and local officials.

There is often miscommunication between freight carriers and local and state officials charged with maintaining the road and transportation systems that the carriers depend on. The Pioneer Valley MPO and Pioneer Valley Planning Commission should seek to open a useful dialogue between freight carriers and officials on areas of common concern.

c) Increase opportunities for air cargo in the region.

Air cargo entering the Pioneer Valley travels through the nearby Bradley International Airport in Windsor Locks, Connecticut. Bradley is the primary airport for the Pioneer Valley as well as for Connecticut. Efficient air cargo operations are critical for the region's businesses as they compete in an increasingly global economy. The region should support the improvements of air cargo operations if market forces and conditions warrant it at Bradley as well as Westover and Barnes Airports in Massachusetts.

d) Improve connections between different modes and the highway network.

Often called "the last mile," the link between freight, intermodal terminals, and the regional transportation system is a very important part of the multimodal transportation supply chain. In older cities such as those in Massachusetts, this last mile is often surrounded by conflicting land uses and competing travel demands. For this reason, the Pioneer Valley Region has been working to create dedicated haul roads and multimodal freight corridors. These facilities are special, limited-use connections created to ensure a stable connection between the intermodal terminals, freight facilities, and the regional transportation network and to buffer residential neighborhoods from truck traffic.

e) Improve coordination with class one carriers serving the Pioneer Valley Region.

Class 1 carriers take their designation from revenue standards set by the Association of American Railroads. Currently there are five U.S. and two Canadian Class 1 railroads. Class 1 carriers are the only railroad that can truly provide comprehensive, competitive, and integrated services on a national and international basis. The presence of a Class 1 carrier in the Pioneer Valley is critical to providing efficient transportation services. The

Pioneer Valley should remain engaged with CSX, Pan Am Southern, and the Commonwealth to ensure the coordination of transportation improvement projects.

f) Improve and coordinate the logistics of freight movement in the Pioneer Valley. including upgrades of the NECR track from Vermont to Connecticut for 286,000 pound weight capacity.

The Pioneer Valley needs to work with businesses, state governments, and freight carriers to both improve and coordinate the logistics of freight movement. New and existing businesses need to be able to efficiently serve their markets from the Pioneer Valley. This may require investments in all types of infrastructure located both in and outside the region. Upgrades to the NECR track from 263,000 pound to 286,000 pound capacity will greatly improve movement of freight in and out of the region.

g) Reduce the regional reliance on trucking for the primary transportation of goods.

As much as 98 percent of the region's freight moves via trucks in the Knowledge Corridor which includes the Pioneer Valley. Increasing transportation alternatives for business will provide more market choices for freight as well as reduce the impacts of trucking on the region's infrastructure.

h) Promote the efficient use of the highway network by freight carriers.

As 98% of the region's freight movements take place via truck, the efficient use of the road and highway system is critical. The Pioneer Valley Region should consider the impacts to freight and trucking in making transportation investment decisions.

2. Strategies

A series of strategies were developed to address the needs that restrict the efficient movement of goods in the region. These strategies are summarized in Table 14-6. A summary of each strategy follows.

a) Improve directional signage from the national highway network to major freight centers and destinations.

The directional signage between the National Highway System and major freight hubs should be improved through increased communication with local communities and MassDOT. Often this signage is obsolete or missing entirely which can cause freight traffic to get lost on local streets as well as caught by low clearance bridges.

Table 14-6 – Strategies to Enhance the Movement of Goods

Improve directional signage from the national highway network to major freight centers and destinations.	Ongoing
Meet with class one carriers on a regular basis to enhance the regional freight rail network.	Ongoing
Incorporate appropriate design measures in roadway improvement projects to accommodate freight movements.	Ongoing
Improve the connections between the national highway network and air and rail intermodal terminals, transloading centers, freight yards, pipeline terminals and distribution centers.	Immediate
Develop incentives to encourage businesses to utilize a mix of freight transportation alternatives.	Immediate
Identify and mitigate vertical clearance issues at underpasses.	Immediate
Use the regional CMP to identify areas of freight congestion.	Future

b) Meet with class one carriers on a regular basis to enhance the regional freight rail network.

The Pioneer Valley MPO shall maintain an active relationship at all levels with the Region's Class 1 rail carriers; CSX and Pan Am Southern, where issues of singular and mutual concern are discussed and acted upon. This engagement shall include the Chair of the MPO, the Secretary of Transportation, other members, and the staff of the MPO.

c) Incorporate appropriate design measures in roadway improvement projects to accommodate freight movements.

Ensure that the unique concerns and challenges presented by freight movement are included in the design of roadway projects.

d) Improve the connections between the national highway network and air and rail intermodal terminals, transloading centers, freight yards, pipeline terminals and distribution centers.

The Pioneer Valley, through its central location in New England and with its extensive transportation infrastructure hosts a number of Intermodal hubs where goods are transferred from one mode to another. These facilities which include rail intermodal terminals, transloading centers, freight yards, and pipeline terminals need good access to national highway network. Often, it is this connection which provides the greatest challenge for these facilities. Antiquated roadways, bridges, and routes through neighborhoods negatively affect the efficiency and burden their host communities. The Pioneer Valley MPO shall seek to improve the connectivity between these intermodal hubs and the National Highway System.

e) Develop incentives to encourage businesses to utilize a mix of freight transportation alternatives.

The movement of goods in the Pioneer Valley Region is dominated by trucking, which has 98 percent of the market. In order to develop a more balanced transportation system, the Pioneer Valley MPO shall seek measures to encourage a wider mix of freight transportation by businesses.

f) Identify and mitigate vertical clearance issues at underpasses.

Low clearance underpasses restrict the efficient movement of freight in the Pioneer Valley region. The Pioneer Valley MPO should continue to identify locations with vertical clearance issues, identify appropriate truck travel routes and advance transportation improvements that enhance freight movement.

g) Use the regional CMP to identify areas of freight congestion.

The Pioneer Valley MPO shall use the regional CMP to identify specific areas which may have freight congestion. Over time, the movement of goods shall be incorporated into the CMP as a separate element to reflect the different challenges that create choke points for freight.

D. THE MOVEMENT OF INFORMATION

The movement of information consists of the ability to utilize technology to maximize the efficiency of the existing transportation system and to convey information to the traveling public. Intelligent Transportation Systems (ITS) technology can include devices that integrate with traffic signal systems, provide real-time schedule information, and electronic fare payment. In addition, information sharing between agencies can reduce duplicative data collection and assist in the completion of ongoing studies.

1. Needs

A series of needs to enhance the movement of information in the Pioneer Valley region have been identified and are summarized in Table 14-7. These needs have been categorized as immediate, future and ongoing. Ongoing needs are areas that may already be considered as part of an existing program that will require to be updated as part of existing planning efforts or analyzed for inclusion as part of a transportation improvement project. Immediate needs will require attention in the short term to advance transportation planning studies and projects. Future needs are considered equally important but will be advanced over a slightly longer timeframe.

Table 14-7 – Summary of Needs to Enhance the Movement of Information

Expansion of the existing ITS infrastructure in the region.	Ongoing
Improve distribution and access of real-time highway and transit information.	Ongoing
Coordinate efficient use of existing rights of way to house communication infrastructure.	Ongoing
Educate communities on the advantages of ITS and improve the use of ITS in the region.	Ongoing
Improve Incident Management on Major Routes.	Ongoing
Increase public and community involvement in the transportation planning process.	Ongoing
Improve the availability of high speed internet and wireless communication access in the region.	Immediate
Develop and implement policies on automated vehicles.	Immediate

a) Expansion of the existing ITS infrastructure in the region.

The Regional ITS Architecture for Western Massachusetts includes an Implementation Plan that addresses the planned components of the architecture and identifies key initiatives that are required to implement the expansion of the existing ITS infrastructure in the region. The region has realized improvements to ITS technology through the integration of PVTAs ITS improvements for all buses, the 511 Traveler Information System, and MassDOT's Event Reporting System. Improvements have also been made to allow the access of archival data such as volume and speed for use in planning studies for areas where appropriate technology exists. It will be important to continue to expand the ITS infrastructure to allow for additional archival data and real-time video feeds for the regional transportation system.

b) Improve distribution and access of real-time highway and transit information.

Modern technology continues to expand and become more affordable. As a result, the use of cell phone and in-vehicle navigation systems is becoming much more commonplace. On July 21, 2000 the Federal Communications Commission (FCC) designated 511 as the single travel information telephone number to be used across the United States. In addition, Mass511.com allows users to develop their own custom travel alerts. PVTA now provides real time passenger on the status of existing transit routes is at both the Springfield Bus Terminal and Holyoke Transportation Center. PVTA also provides real time information on each bus route through the following website: http://bustracker.pvta.com/infopoint/.

MassDOT is currently developing an Implementation Plan for Safe Work Zones which includes the opportunity for real-time data collection by portable

ITS equipment to optimize work zone safety and mobility. As technology continues to advance, information will become much more readily available. As a result, it will be extremely important to improve the exchange of information exchange between ITS users, stakeholders and providers.

c) Coordinate efficient use of existing rights of way to house communication infrastructure.

It is important to efficiently use existing rights of way along regional infrastructure such as major highways and bridges. The provision of additional conduit can facilitate the expansion of existing technology and foster the development of public/private partnerships to expand opportunities for economic development and data exchange.

d) Educate communities on the advantages of ITS and improve the use of ITS in the region.

ITS is not just the installation of cameras and message signs. The impacts of intelligent transportation system technology has a wide range of applications beyond data collection and the provision of real-time traffic information for the regional highway system. Local communities can benefit from ITS applications such as over-height vehicle detection systems to prevent large vehicles from striking low-clearance bridges and underpasses. Parking management systems can assist in the advance notification of the capacity of an existing garage. Remote weather sensing equipment can improve the efficiency of local roadway maintenance operations.

It will be important for the MPO to assist in the education on the types of ITS applications that could benefit local communities. In addition, it will be important to identify future transportation improvement projects that could benefit from the integration of ITS technology to improve the use of ITS in the region.

e) Improve Incident Management on Major Routes.

Incident management is the process of the response of multiple agencies to highway-related traffic disruptions. The development of an efficient and coordinated response to incidents reduces their adverse impacts on safety, congestion, and the regional economy. As a result of the wide range of agencies involved in emergency services, an incident management program can assist in identifying regional stakeholders, coordinating joint operations efforts and reducing overall response time to incidents. As incident response time is decreased, the likelihood of secondary incidents can also be decreased. It is not uncommon for MPO's to coordinate incident management programs as a method to assist in reducing congestion along major routes. Development and advancement of incident management in the

Pioneer Valley supports the vision and goals of the RTP to reduce congestion and increase safety.

f) Increase public and community involvement in the transportation planning process.

Public participation is critical to the advancement of transportation studies and improvement projects that meets the needs of the Pioneer Valley Region. The Pioneer Valley MPO needs to continue to refine the regional public participation process to provide ample opportunity for all to provide input.

g) Improve the availability of high speed internet and wireless communication access in the region.

High speed internet is an important tool for expanding educational and economic opportunities for consumers in remote locations as it can help to efficiently access many resources, such as library and museum data bases and collections. High speed internet may also be required to best take advantage of many distance learning opportunities, like online college or university courses and continuing or senior education programs. High speed internet is also important for small business to allow for expansion of existing services through e-commerce opportunities. More information on Western MA Connect and Last Mile Grant Program is included in Chapter 5 of the RTP.

h) Develop and implement policies on automated vehicles

Autonomous vehicle technology that automates functions in vehicles that would be typically performed by the driver are becoming more common place in our vehicles. Technology such as assisted parking technology, rear view camera systems, blind spot warning systems, and active braking systems are offered as optional accessories on many vehicles. The Google Self-driving Car began in 2009 and as of June 3, 2015 is currently averaging 10,000 autonomous miles per week on public streets[12] as part of ongoing prototype testing.

The advancement of new automated vehicle technology also raised questions on the need for additional infrastructure improvements, driver education, licensing, and regulations. While the technology has promise to improve safety and increase mobility, it will be important for the MPO to be involved in state and federal policy making to define how the integration of automated vehicle technology will occur.

[12] Google Self-Driving Car Project Monthly Report, May 2015

2. Strategies

A series of strategies were developed to address the needs that restrict the efficient movement of information in the region. These strategies are summarized in Table 14-8. A summary of each strategy follows.

Table 14-8 – Strategies to Enhance the Movement of Information

Include ITS equipment as part of transit and roadway improvement projects.	Ongoing
Support ITS projects to foster deployment of ITS technology.	Ongoing
Provide training for local communities and stakeholders to increase their understanding of various ITS technologies and equipment.	Ongoing
Ensure consistency with the ITS Regional Architecture for Western Massachusetts.	Ongoing
Monitor emerging information and communications technologies to stay current with state-of-the-art information systems.	Ongoing
Expand efforts to incorporate more feedback into the regional transportation planning process.	Ongoing
Continue to refine and improve the regional TEC project prioritization system as necessary.	Ongoing
Educate local communities on the project development process.	Ongoing
Encourage and promote telecommuting and video conferencing.	Ongoing
Expand real-time passenger and travel information systems.	Immediate
Pursue public/private partnerships to reduce costs and enhance information access.	Immediate
Identify necessary infrastructure upgrades to accommodate automated vehicles.	Immediate

a) Include ITS equipment as part of transit and roadway improvement projects.

The Pioneer Valley MPO should work in cooperation with MassDOT and local communities to identify opportunities to include ITS equipment as part of future roadway and bridge improvement projects. Opportunities to enhance potential projects could be identified when a Project Needs Form (PNF) is submitted for review. The PNF should be compared to the recommendations of the Western Massachusetts ITS Architecture to identify potential ITS equipment that could compliment the project.

b) Support ITS projects to foster deployment of ITS technology.

The Pioneer Valley MPO should encourage the development of pilot projects to identify new and innovative uses of ITS equipment. Through partnerships with local colleges and universities additional research can be conducted on the benefits of new technologies. In addition, new technology can enhance

the way data is currently collected in the region, which in turn could develop new methods to analyze and improve existing transportation problems.

c) Provide training for local communities and stakeholders to increase their understanding of various ITS technologies and equipment.

The Pioneer Valley MPO should work in cooperation with the MassDOT and other interested agencies to develop educational products and workshops to increase local awareness of the benefits of ITS technology. It will be important to identify potential local uses for ITS technology as part of recommendations developed for studies included in the UPWP. In addition, local assistance should be provided after implementation of ITS equipment to perform case studies on the effectiveness of the equipment in improving the local transportation system.

d) Ensure consistency with the ITS Regional Architecture for Western Massachusetts.

It is a federal requirement for all ITS projects to be consistent with the regional architecture. As a result, it will be critical to identify if proposed projects do in fact demonstrate consistency early in the planning and design process. This will ensure compatibility with existing and future equipment and improve the efficiency of the design process.

e) Monitor emerging information and communications technologies to stay current with state-of-the-art information systems.

Technology is constantly changing and improving. It will be important to stay current with changes in ITS technology that could be beneficial to the regional transportation system. In addition, it is also important to identify new uses for existing technology that could benefit the regional transportation system.

f) Expand efforts to incorporate more feedback into the regional transportation planning process.

Utilize and enhance the existing public participation plan to expand efforts to increase the opportunity for public participation in ongoing transportation planning efforts. Identify existing regional and local groups of interest to consult with on a regular basis to identify potential transportation issues that may require further study. Develop surveys on current planning activities to solicit public comments and feedback.

g) Continue to refine and improve the regional TEC project prioritization system as necessary.

Work with the Pioneer Valley MPO to identify enhancements to the TEC criteria adopted in 2015. Specifically, work with the JTC and MPO to evaluate the new criteria, project scoring and applicability to the various types of transportation improvements funded as part of the TIP. Utilize the information

included as part of TEC scoring to track newly defined regional performance measures to assist in meeting regional performance targets.

h) Educate local communities on the project development process.

Develop a series of educational products, particularly for newly elected local officials, to provide information on how to properly advance transportation needs into viable transportation improvement projects. Utilize input from the Pioneer Valley MPO and Joint Transportation Committee to coordinate the development and distribution of this material. Attend local meetings and convene workshops as necessary to support these products.

i) Encourage and promote tele-commuting and video conferencing.

Develop initiatives to encourage major employers to offer options for tele-commuting either via a satellite office or their home. Improvements to technology also make video conferencing much more practical and reliable. The increase in use of both tele-commuting and video conferencing could greatly reduce the rise in vehicle miles traveled in the region.

j) Expand real-time passenger and travel information systems.

As the ITS infrastructure continues to expand in the Pioneer Valley, it will be important to expand on the distribution of real-time passenger information for all modes. The Pioneer Valley MPO should assist in the coordination of future efforts to enhance the distribution of real-time travel information in the PVPC region.

k) Pursue public/private partnerships to reduce costs and enhance information access.

The development of public/private partnerships is an excellent way to expand existing ITS infrastructure in a cost-effective manner. It will be important to identify and increase opportunities to utilize public rights of way to run conduit necessary for new communication links. It is also important to identify potential partnerships in the preliminary design stages of transportation improvement projects to help reduce construction costs and avoid the need to perform repetitive and costly maintenance work at a later date.

l) Identify necessary infrastructure upgrades to accommodate automated vehicles.

Automated vehicles and automated vehicle technology rely on sophisticated sensing technology to correctly identify travel lanes and the edge of the pavement. It will be important to identify the necessary upgrades to the transportation system that will be required to support the use of automated vehicles in the future. This can include an inventory of local roadways that would not currently support existing technology; identification of areas that are prone to icing, flooding , and other extreme weather conditions that could

inhibit automated vehicles; and, protocol for the change back to manual driving when conditions such as severe weather or active construction zones are not adaptable to autonomous driving.

E. SUSTAINABILITY

By definition, sustainability is the ability to be sustained and used without being destroyed or completely consumed. Sustainable transportation considers both environmental and social costs of the transportation system. A sustainable transportation system improves access and mobility while reducing environmental impacts such as the production of greenhouse gas emissions and increased air pollution. Sustainable transportation projects also have a positive impact on society through a reduction in single occupant vehicle use, the promotion of fuel-efficiency, advancing healthy lifestyles, and supporting livable communities.

A transportation system is sustainable when it meets the current needs of people while using resources efficiently to make it more likely that future transportation systems will meet future generation's needs. The goal of PVPC's sustainable transportation system is to consistently reduce the vehicle miles traveled (VMT) per population. Efficient transportation options, especially public transportation, can maximize social equity, increase social connectivity, maximize safety, and maximize resource efficiency. Public transit and ridesharing reduce the number of vehicles on the road. Efficient transportation benefits society and reduces its impacts on the environment.

1. Needs

The RTP is a multimodal plan and thus it has to address the needs for all modes of travel. A series of needs to enhance the advancement of sustainable transportation in the Pioneer Valley region have been identified and are summarized in Table 14-9. These needs have been categorized as immediate, future and ongoing. Ongoing needs are areas that may already be considered as part of an existing program that will require to be updated as part of existing planning efforts or analyzed for inclusion as part of a transportation improvement project. Immediate needs will require attention in the short term to advance transportation planning studies and projects. Future needs are considered equally important but will be advanced over a slightly longer timeframe.

Table 14-9 – Summary of Needs to Enhance Sustainability

Improve air quality and mitigate traffic congestion in densely populated areas.	Ongoing
Protect existing natural, historical, and cultural resources.	Ongoing
Improve the efficiency of the existing transportation system.	Ongoing
Reduce vehicle miles traveled in the region to minimize impacts on air quality, greenhouse gas emissions and energy consumption.	Ongoing
Improve opportunities for bicycle and vehicle parking.	Ongoing
Raise the average vehicle occupancy rate for the region.	Ongoing
Consider the impacts of large scale development on surrounding communities.	Ongoing
Look for opportunities to integrate enhancements into transportation improvement projects.	Ongoing
Reduce stormwater runoff from roads and highways.	Ongoing
Reduce land use/development impacts of new roads and transportation facilities.	Ongoing
Promote Complete Streets.	Immediate
Promote transit oriented development and pedestrian friendly development.	Immediate
Reduce impervious surfaces, a major source of water pollution.	Immediate
Reduce visual and light pollution.	Immediate
Incorporate renewable energy.	Future
Reduce sprawl and foster investment in existing urban areas.	Future
Provide for fish and wildlife migration and passage in transportation projects.	Future
Reduce energy use of transportation facilities.	Future
Improve greenways.	Future

a) Improve air quality and mitigate traffic congestion in densely populated areas.

The quality of the air we breathe is directly affected by individuals' personal transportation choices and by the kind of transportation infrastructure we plan, design, and build. Cars - especially SUVs pollute a lot more than do bicycles, buses, or people on foot. Ozone and carbon monoxide (CO) are harmful byproducts of automobile and other motorized transportation options. The pollutants, Volatile Organic Compounds (VOC), Nitrogen Oxides (NOx), and Carbon Monoxide (CO), react together in conjunction with warm temperatures, humidity, wind speed and sunlight to produce ozone (O_3). Ozone is bad for the environment. The City of Springfield is a CO maintenance area. Air quality non-attainment classifications require Massachusetts to conduct transportation planning activities that consider air quality pollution levels and target the reduction of vehicle emissions throughout the state.

VOC emissions originate from various sources such as fuel combustion processes, on and off road mobile sources, biogenic sources, and various solvent processes. CO and nitrogen dioxide (NO_2) emissions, key components of NOx, originate from fuel combustion by on and off road mobile sources as well as stationary sources. Emissions such as VOC are transferable depending on weather conditions and geography of the land. In Western Massachusetts, emissions generated in areas to the south, such as New York City and New Jersey, are transmitted via prevailing winds. This type of emissions displacement can intensify adverse conditions within a region of relatively low emission levels. Similarly, areas to the north of Massachusetts experience the displacement of emissions generated in the Commonwealth.

It has been proven that traffic based air pollution is one of the main causes of asthma. There is a need to reduce vehicle idling and congestion as well as promote bicycling, transit and walking so as to reduce Green House Gas (GHG) emissions which cause air pollution that triggers asthma. There is an environmental justice concern that traffic based GHG air pollution has a greater burden and impact on minorities, the elderly and children. Schools, day care, and senior centers should not be located next to highly travelled roads. Efforts to mitigate traffic congestion in densely populated areas will help improve air quality by reducing air pollution.

b) Protect existing natural, historical, and cultural resources.

Sustainable development can be defined as the maintenance of development at a rate to meet existing needs while protecting the natural resources required for future generations to meet their development needs. It is important to incorporate the principles of sustainable development in regional planning to ensure that a wide range of improvement alternatives are considered prior to the construction of new roadways or the expansion of existing facilities.

The PVPC incorporates the tenets of sustainable development as part of its transportation planning process. The PVPC recently completed a Sustainable Transportation Plan improve regional mobility while promoting bicycling, transit and walking.

c) Improve the efficiency of the existing transportation system.

The current regional transportation system provides travelers with several options to choose from to meet their mobility needs. However, large differences in travel time and reliability of service may deter the majority of travelers from opting to bicycle, use transit or walk instead of driving their private automobile. An example is a trip from Chicopee to West Springfield which usually takes 8 minutes by car takes an average of one and half hours

by bus due to bus connection layovers along the way. Many of our rural communities have no access to transit.

Improving the efficiency of the current system increases connectivity between various transportation modes and enhances current service. This includes coordination between the local, intercity, and interstate bus schedules to connect people with locations beyond their hometown. Consideration should be made to connect the new passenger rail service to existing bus service. A review of local bus arrival times at or near train stations would allow travelers enough time to board departing trains. There is a need to improve connectivity to foster linking people with their activity needs. Connectivity can also be enhanced by taking advantage of additional park and ride facilities.

Development of an integrated trip planning tool would be useful to identify connection opportunities between all modes of transport. A shared payment method such as a smart travel card could also facilitate efficient mobility. All transportation facilities need to provide amenities for users arriving by bicycle or foot such as bike racks, bike lockers, bus shelters, and sidewalks. A heavily traveled corridor between major activity centers may also benefit from enhanced bus service using Bus Rapid Transit or express buses.

d) Reduce vehicle miles traveled in the region to minimize impacts on air quality, greenhouse gas emissions and energy consumption.

Vehicle Miles Traveled (VMT) was chosen in the Clean Air Act Amendments (CAAA) as the principal travel measure for air quality planning in high ozone and carbon monoxide areas. While the region is in compliance with the requirements of the CAAA, this is mostly as a result of improvements to vehicle emissions and an advanced vehicle inspection and maintenance procedure implemented in the Commonwealth. VMT in the region has steadily increased each year and is projected to continue to increase into the future. The Pioneer Valley should commit to working to a target of having VMT grow no faster than the population. This will require the development of regional strategies to encourage VMT reduction in the PVPC region.

e) Improve opportunities for bicycle and vehicle parking.

Lack of sufficient parking for both bicycles and vehicles can contribute to congestion and poor air quality as a result of illegal parking and idling. It is important to provide safe, efficient parking that is easily accessed. Parking spaces should be well marked and routinely enforced. A system should also be established to direct vehicles to designated overflow parking areas.

The region also requires more park and ride lots to encourage ridesharing and transit use. There are currently official park and ride lots in Springfield, Ludlow and Northampton. A well utilized park and ride lot in Palmer was

closed several years ago and never replaced. Identifying additional locations for park and ride lots to replace closed lots and support new transit projects such as bus rapid transit and commuter rail would be beneficial for the whole region. This could be coordinated with enhancements to existing transit service.

f) Raise the average vehicle occupancy rate for the region.

The region is becoming increasingly auto-dependent because of the sprawling land use pattern. This in turn increases the likelihood that a person will drive alone to get to work. In addition, workers are commuting longer distances to work and increasing their time of commute. It will be important to identify incentives to entice drivers to shift from single occupant vehicles to bicycling, transit and walking.

g) Consider the impacts of large scale development on surrounding communities.

Disruption to community character and loss of open space are some of the potential adverse effects of large scale development. Such development may pose additional demands on the existing water, sewer, and roadway network while increasing air pollution. It will be important to mitigate development impacts that adversely affect the region.

Form based zoning regulations could be considered to maintain community character. Traffic impact studies that incorporate the needs of pedestrians and cyclists should be required for new development. Communities are also encouraged to adopt flexible codes with regards to parking to help preserve the community character and reduce the impacts of large scale development.

h) Look for opportunities to integrate enhancements into transportation improvement projects.

Transportation improvement projects should include elements that enhance the travel experiences of all modes of transport. When space permits, standard roadway design should include bike lanes and sidewalks. Cross walks at major intersections and along business districts not only help pedestrians but also drivers who become pedestrians once they park. Street furniture and shade trees enhance the roadway for all users.

i) Reduce stormwater runoff from roads and highways.

Human activities related to the development and use of land can pollute water supplies through the intentional or accidental release or discharge of potential pollutants. Pollutants can run off the surface of the land and enter surface water supplies, lakes, streams, ponds, and rivers. Pollutants can also leach into the ground and contaminate ground water supplies. Transportation related land uses such as airports, highways, rail yards, and truck terminals

take up a large portion of the region and have a significant impact on water quality. Natural Green Infrastructure should be used whenever possible to soak up water and reduce flooding. Five concern areas related to water systems are identified and discussed in detail below.

(i) Major Roads Cross Water Supply Recharge Areas

Major roads and highways cross much of the Pioneer Valley's public water supply areas, placing these resources at risk of contamination from the salts, petroleum hydrocarbons, asbestos, solids and metals contained in highway stormwater run-off.

(ii) Transportation Support Facilities Can be a Major Source of Pollutants

Transportation facilities, including bus terminals, and government and private fleet service areas, are a potential contributor of non-point source pollution since they are similar to general service gas stations or vehicle repair service shops. Routine engine and body maintenance activities produce solid and liquid wastes, which are carried off of the paved surfaces by stormwater run-off. Leaking underground storage tanks can also cause groundwater contamination and create a safety hazard. Stormwater can be contaminated by any of these wastes that are not stored properly.

(iii) Urban Run-off and Combined Sewer Overflows

Combined sewer overflows (CSO) are stormwater discharges to bodies of water containing raw sewage from sanitary sewer lines. They are a serious problem in the lower Pioneer Valley, preventing the stretch of the Connecticut River south of the Holyoke Dam from reaching fishable/swimmable standards. They are caused when stormwater run-off from roads, parking lots, and buildings is greater than the capacity of the combined sanitary and stormwater sewer lines. Rather than have the waste water treatment plant overwhelmed and create flooding in basements and streets, combined systems have been designed to discharge this additional volume into the river.

(iv) Road Salt and Sanding Practice

Highway maintenance requires numerous operations that can impact water quality. These include salting and sanding roads, inspecting and maintaining stormwater facilities, and other "housekeeping" practices. Proper maintenance of public and private stormwater facilities (catch basins, detention basins, swales, culverts, outfalls, etc.) is necessary to insure they serve their intended function. Without adequate maintenance, sediment and other debris can quickly clog these stormwater management structures, making them essentially useless. Non-structural management options that can significantly improve water quality are street sweeping and routine maintenance and cleaning of stormwater catch basins.

(v) Gravel Roads Require Proper Design, Maintenance and Repair to Prevent Erosion and Sedimentation

Heavy storms produce rapid water velocities which increase the potential for soil erosion especially on and around gravel roads. Pollutants such as oil and grease can also be washed from gravel roads along with exposed soil, and fine sands and silts. These roads, by nature of their topography and design, can, if not properly managed, contribute heavily to this significant water pollution problem. These sediments and pollutants are then carried away into nearby streams and ponds. Sediment loading is a major cause of water quality problems in both lakes and streams.

j) Reduce land use/development impacts of new roads and transportation facilities.

Minimizing curb cuts is an important part of new development to reduce disruption to traffic flow and increase safety. Preserving existing trees and replanting those removed during the construction process is desired as a strategy to protect, preserve and enhance woodland and urban tree coverage. Transportation projects should use trees and vegetation to assist in filtering out particulates and provide a buffer between sidewalks and existing buildings to reduce visual, noise and air pollution. The use green walls in the vicinity of highways can also reduce the impacts of vehicular emissions.

k) Promote Complete Streets.

Complete streets are those designed to accommodate every mode of transport and cater to the needs of users of all ages and physical abilities. Complete streets provide amenities needed for all modes of travel to facilitate the movement of people regardless of their age, ability, or travel mode choice. Active transportation modes such as walking and biking offer people the added benefit of reducing the spread of chronic diseases related to inactivity and help those with chronic illnesses manage their illness by becoming more active. To successfully change people's behavior youth programs which promote healthy behaviors and active travel modes need to be funded. Examples are programs that help elementary school students walk and bike to school. Roadway improvement projects need to incorporate elements that improve safety, accessibility, and ease of use to enhance livability in the Pioneer Valley region. The adoption of local complete street policies will also require the integration of bicycle, pedestrian, and transit amenities as part of ongoing transportation improvement projects.

l) Promote transit oriented development and pedestrian friendly development.

Transit oriented and pedestrian friendly development is defined as a mixed use development with convenient access to public transit and non-motorized transportation to promote reduced automobile use and encourage transit ridership. The neighborhood has a center with a transit station surrounded by high-density development that transitions to lower-density uses. These neighborhoods are located with one-half mile of the nearest transit station. The following features are also commonly included as part of a transit and pedestrian friendly development project.

- Bicycle and pedestrian amenities should be included in the design of the neighborhood.
- Streets are well connected to the regional transportation system and can include traffic calming features to control vehicle traffic speeds.
- Neighborhood development consists of a mix of housing types and prices and should be combined with appropriate retail uses and other public services.
- An emphasis should be placed on reducing the amount of land devoted to parking to promote decreased automobile use.

m) Reduce impervious surfaces, which are a major source of water pollution.

Motor vehicles are the most widespread and difficult to manage non-point sources of pollution. The emissions from the internal combustion engine, at first absorbed into the atmosphere, are released through atmospheric deposition onto land and water surfaces. Fluids, used to lubricate and cool moving parts, leak out during the lifetime of a vehicle and are deposited on land surfaces. Other vehicle components such as brakes and tires wear away through friction, scattering hydrocarbon and metal elements across our region's highways and parking lots. The parking lot, road, and highway infrastructure required for automobiles increases the amount of impervious surface in a watershed, and contributes to increased storm water run-off. All of these vehicle related pollutants deposited on impervious surfaces may be deposited into the region's streams, lakes and rivers during storm events. Therefore, reducing concrete and asphalt surfaces by using permeable materials where possible would help reduce water pollution.

n) Reduce visual and light pollution.

Light pollution is an adverse effect of artificial light. It includes sky glow, glare, light trespass, light clutter, decreased visibility at night, and energy waste. It damages the environment by disrupting ecosystems and health such as

impacting visibility at night and changing natural sleep cycles. Care should be taken to identify opportunities to reduce the use of high power lighting, utilize less polluting sources of light, and buffer existing lighting when practical.

o) Incorporate renewable energy.

It is important to identify renewable energy sources to reduce the existing demand on fossil fuels. Solar powered street lights and alternatively fueled vehicles for transit, school, and local government fleets should be considered when practical.

p) Reduce sprawl and foster investment in existing urban areas.

The relationship between transportation and land use is one that shapes both the visual character and the function of communities and regions. The development and use of land is linked to its accessibility and resources. In general, better access increases the desirability of the land and enhances its development potential. Likewise, the use of land affects the transportation system. Land use and transportation planners in the Pioneer Valley and throughout the Commonwealth have accepted the interconnection of land use and transportation planning. MassDOT has also supported this perspective with transportation funds to implement projects designed to facilitate smart growth and encourage a diverse transportation system in the Pioneer Valley. This regional transportation plan update must be in sync with the region's land use plan, Valley Vision 4, which when updated must be in sync with this and subsequent versions of the region's RTP.

Just as transportation facilities can encourage and perhaps even create land uses of varying efficiencies, so can land uses create or require different kinds of transportation facilities. Compact land uses encourage pedestrian, bicycling and transit traffic, thereby stimulating a need for different kinds of transportation facilities such as bike paths, sidewalks, bus stops.

q) Provide for fish and wildlife migration and passage in transportation projects.

The design and location of a transportation improvement project can impact people, wildlife, water, and habitat. Inadequate river crossings can cause washouts of the road during flood conditions, as well as impede the movement of wildlife. Well-designed crossings can provide safe passage for water and wildlife including large mammals, keeping all safely off the road.

r) Reduce energy use of transportation facilities.

Transportation facilities use a significant amount of energy. The region should identify opportunities to include alternative and clean energy options in the redesign and construction of transportation facilities.

s) Improve greenways.

Identify gaps in urban forest connectivity and establish local tree stewardship programs and shade tree committees. Separate sewage from grey water collection to be reused in watering green buffers along roadways.

2. Strategies

A series of strategies were developed to address the needs that restrict the advancement of sustainable transportation in the region. These strategies are summarized in Table 14-10. A summary of each strategy follows.

a) Properly mitigate the adverse impact of sprawl by promoting development through the use of permitting and zoning measures.

The following strategies were developed to promote development while reducing sprawl in the region.

- Control sprawl outside existing town centers and growth centers by creating disincentives for development beyond centers. Establish lower land use zoning intensities and restrict uses which are not appropriate for rural areas. Commercial development should be located in centers, not in auto-dependent, stand-alone buildings. Establish policies restricting extensions of public sewer, water and other infrastructure.
- Adopt commercial center zoning regulations to provide for intimate Main Street shopping districts, with stores lined up along sidewalks and parking to the rear and along the curb.
- Encourage mixed-use projects, which combine residential, retail, office, and public institutional uses in compact, pedestrian-friendly villages or clusters. Mixed-use projects provide opportunities for people to live in close proximity to work, and to walk from the office to shops or restaurants.
- Create use-based zoning incentives to encourage uses such as institutions, museums, schools, public buildings, and elderly and handicapped congregate housing to locate in growth centers rather than in outlying areas.
- Facilitate the redevelopment of Brownfield sites, and other underutilized urban lands, throughout the region. Brownfields are formerly useful industrial lands, which sit neglected out of the industrial land market because of contamination and high clean-up costs, liability concerns, and lack of site information.
- Market Brownfield sites and other underutilized urban lands suitable for redevelopment, by making an inventory of sites available to potential developers.
- Consider reduced parking requirements to encourage business to locate in downtown areas.

Table 14-10 – Strategies that Enhance Sustainability

Properly mitigate the adverse impact of sprawl by promoting development through the use of permitting and zoning measures.	Ongoing
Create incentives for downtown revitalization.	Ongoing
Divert highway runoff to stormwater Best Management Practices, such as rain gardens and dry swales.	Ongoing
Restore or maintain connected habitats that allow for movement of fish, water, and wildlife.	Ongoing
Expand use of permeable pavements on sidewalks, paths, car-parks, and minor roads.	Ongoing
Encourage use of materials such as pervious concrete, porous asphalt, paving stone, brick, tile, and gravel where appropriate and reduce use of concrete and other impervious pavement materials.	Ongoing
Utilize narrower road widths for local roads where appropriate.	Ongoing
Develop transportation facilities to support and promote smart growth in and around existing city and town centers.	Ongoing
Designate wild and scenic corridors along highways and streams of historic and natural significance.	Ongoing
Implement the Regional Clean Energy Plan.	Ongoing
Encourage local fleets to use clean fuel alternatives.	Ongoing
Promote energy efficient travel modes.	Ongoing
Implement the Hazard Mitigation Plan.	Ongoing
Invest in the repair and maintenance of existing transportation infrastructure.	Immediate
Advance and promote the use of alternatively fueled vehicles.	Immediate
Work with major employers to develop incentives to decrease single occupant vehicle use.	Immediate
Mitigate the impacts of roadway salt and chemical usage during snow season.	Immediate
Refer new projects to the Pioneer Valley Sustainability Toolkit.	Immediate
Support urban forestry initiatives.	Immediate
Utilize energy efficient lighting and solar panels in new facilities.	Immediate
Enforce idling reduction programs in major activity centers.	Immediate
Identify hazardous locations due to drought under major roadways.	Immediate
Identify potential flooding locations along major highways and rerouting alternatives.	Immediate
Develop ordinances and bylaws that encourage mixed use and high density forms of development where appropriate.	Future
Construct roads without curbing where practical to enable sheet flow.	Future
Screen lighting on highways.	Future
Prohibit billboards along highways.	Future
Explore energy generation through solar paving slabs for new sidewalk projects.	Future

b) Create incentives for downtown revitalization.

The following strategies were developed to assist communities in the revitalization of downtown areas.

- Streamline or update antiquated zoning regulations to promote mixed uses and infill development in downtown areas. Allow greater density downtown compared to density in surrounding areas.
- Revise zoning to promote downtown residential uses. Permit residential use of upper floors above street-level commercial uses. Provide density bonuses for downtown residential uses, or set aside downtown land for residential use only.
- Create public-private partnerships of civic leaders and property owners, such as Business Improvement Districts and downtown associations, to manage and market downtowns and to maintain or provide amenities. Identify businesses and industries that would make a good fit with the community and actively market the downtown to these companies.
- Work to restore downtowns through Economic Target Areas or Main Street programs or other public-private community development organizations which can obtain seed money from banks and corporations to make loans, provide gap financing, purchase properties for resale and development, and finance predevelopment market studies.
- Revise zoning to incorporate design, landscape, and streetscape standards to maintain community identity and historic character.
- Exploit opportunities for specialty retail and service businesses targeted toward underserved urban markets by providing grant assistance and tax incentives to businesses.
- Invest in upgrading physical infrastructure (i.e. transit shelters and stations, parking, sewer, water) and improving downtown access.
- Invest in creating and improving urban greenspace, such as parks, pedestrian walkways, plazas and commons, and amenities.
- Create zoning and tax incentives to rehabilitate and recycle all previously-developed, available, vacant or underutilized city land before promoting use of greenfields (undeveloped open land).
- Restructure zoning to channel commercial growth, especially offices, into downtowns, rather than into highway strip developments, by allowing certain uses only in downtowns. Require retail use of ground level floors of downtown buildings, including parking garages.
- Encourage government and private institutions, such as colleges, post offices, and museums, to retain or expand downtown offices and facilities.
- Promote revitalization of and public access to urban riverfronts. Promote sensitively designed riverfront development that is focused

toward the river. Develop a network of riverfront walkways, trails and promenades.

c) Divert highway runoff to stormwater Best Management Practices, such as rain gardens and dry swales.

Rain gardens and dry swales help filter pollutants before water reaches underground aquifer. A multi-level filtration system can be applied with use of pebbles, aggregate, soil, and vegetation. Planters with dense, grassy vegetation that help absorb water can be placed near water collection areas to buffer crosswalks and sop up areas that tend to flood. An example of roadway design that facilitates water drainage includes no curb sidewalks bordered by green space.

d) Restore or maintain connected habitats that allow for movement of fish, water, and wildlife.

In an effort to determine where transportation projects can have the biggest positive or negative impact on the movement of wildlife and connectivity of habitat, the University of Massachusetts, The Nature Conservancy, and other partners have developed maps and data that may be useful for transportation planners. Three resources are identified below:

- Points where roads cross a river using the Stream Continuity Database are available at: http://streamcontinuity.org/ A number of road-stream crossings have been surveyed for this database. In parts of the PVPC geography, there are assessments of what types of wildlife, if any, can pass through each road-stream crossing.
- Stream crossings standards and where to go for technical assistance listing by the Army Corps of Engineers. http://www.nae.usace.army.mil/Missions/Regulatory/StreamandRiverContinuity.aspx
- Locations where road improvements that allow for wildlife passage would provide the maximum benefits is available from the UMass Critical Linkages analysis. The Conservation Assessment and Prioritization System (CAPS) offers GIS data, maps, and other data available at: http://www.umasscaps.org/index.html. The Critical Linkages Project Phase I identifies road-stream crossings that should be upgraded and Phase II identifies opportunities to promote landscape connectivity for terrestrial wildlife. Descriptions and project reports are available via the web links below.
- http://umasscaps.org/applications/critical-linkages.html
- http://umasscaps.org/pdf/Critical-Linkages-Phase-1-Report-Final.pdf

A recent scientific journal article and technical report quantify the multiple benefits to communities, especially the economic benefits, of right-sized

stream crossings. The interconnectedness of different parts of a stream or watershed is essential to animals. The combined effects of dams and poorly designed bridges and culvers impact wildlife by limiting access to coldwater habitat, access to feeding areas, access to breeding and spawning areas, and natural dispersal. It is important to identify and remediate locations that currently pose barriers to the movement of fish and riparian animals such as amphibians and reptiles. Replacement of culverts may be necessary to meet current stream crossing guidelines in core habitat areas. Permitting assistance and potential funding assistance is available from a range of groups working to re-connect stretches of river and other habitat.

Examples of effective crossings include bridges, open bottom arches, and culverts that are sunk into the stream bed. Optimum standards provide for fish passage, stream continuity, and wildlife passage using large enough culverts to allow deer and moose crossings. A good crossing spans the stream and banks, does not change water velocity, has a natural stream bed, and creates no noticeable change in the river. In many cases, transportation improvements that benefit wildlife also benefit people by reducing road washouts and animal-vehicle collisions. It is also important to design sustainable culverts and underpasses in light of rising storm water and floods.

The Pioneer Valley Regional Greenways Plan seeks to create a linked network of protected open spaces across the region to preserve special places such as the Upper Westfield River, the Upper Connecticut River Valley, the Holyoke Range, the Metacomet-Monadnock Trail, the Manhan River, the Mount Hitchcock area and the Scantic River. The plan establishes regional agreement on land conservation priorities, provides an analysis tool, fosters cooperative land protection efforts, preserves viable habitat areas and corridors for wildlife, provides recreational opportunity and spiritual sustenance for people, and maintains healthy waterways and water resources.

e) Expand use of permeable pavements on sidewalks, paths, car-parks, minor roads.

To help replenish the underground water reserves, surface material that allows precipitation to percolate through the surface and infiltrate storm water into the soil below is an important link in the life cycle of local clean water supplies. In addition, permeable pavements help reduce water volume carried through the sewage system making them more efficient. Although they should not replace existing storm water management techniques, they play a viable part in an overall storm water site management design. Using permeable paving materials on roadways decreases incidents of flooding and overflow often caused by sudden high volume of water from storms. On

sidewalks, they reduce the occurrence of tree root damage that often happens when trees seek access to water and air.

f) Encourage use of materials such as pervious concrete, porous asphalt, paving stone, brick, tile, and gravel where appropriate and reduce use of concrete and other impervious pavement materials.

Using a variety of materials is useful to both users and the environment as it provides visual interest, creates a distinguished character, and reduces the heat island effect generated by large asphalt surfaces. Parking lot design that incorporates landscaping with shade trees reduces the heat island effect that can raise the atmospheric temperature by as much as 9 degrees Fahrenheit.

g) Utilize narrower road widths for local roads where appropriate.

A road diet can have a calming effect that encourages reduced vehicular speeds. This in turn can also reduce noise and air pollution while improving safety and livability. Reducing the crossing distance, also makes walking safer for pedestrians of all ages and abilities.

h) Develop transportation facilities to support and promote smart growth in and around existing city and town centers.

Transportation hubs and multimodal centers that provide services such as showers, lockers, bike shelters, and information centers attract both residents and customers of surrounding neighborhoods. They can assist in increasing the viability of high density development initiatives for town centers.

i) Designate wild and scenic corridors along highways and streams of historic and natural significance.

Designation serves to protect significant corridors from development and signage encroachment and preserve their natural beauty and historic character. As a regional resource, it attracts visitors and supports the local economy through tourism. It also protects wildlife by maintaining habitat connectivity. An example is the Connecticut River national designation as an American Heritage River. It is the Pioneer Valley's most prominent natural asset and a source of regional identity and pride.

j) Implement the Regional Clean Energy Plan.

The Pioneer Valley Clean Energy Plan, first produced in 2008 and updated in 2014, sets the following goals:

- Reduce regional energy use 15% by 2020 (over the 2000 baseline year) through improved energy efficiency.
- Replace non-renewable energy with clean and renewable energy that is generated locally, including sources such as wind, solar, landfill gas co-generation, hydropower, solar electric photovoltaic, solar hot water, biomass and biofuels.

- Increase the installed capacity of renewable energy production in the region to a total 754 million kWh/year by 2020; as of 2012, installed renewable capacity in the region was 281 million kWh per year, or 28% of the way toward the goal).
- Create local jobs in the clean and renewable energy sector.

The Massachusetts Global Warming Solutions Act of 2008 created statewide green house gas (GHG) emission reduction requirements of 25% by 2020 and 80% by 2050 from the 1990 baseline year. To achieve its "fair share" proportional GHG reductions to be consistent with this statewide goal, the Pioneer Valley plan identifies reductions in various sectors of energy use. In our region, transportation sources account for 31.8% of all GHG emissions (total 9.2 million tons of carbon dioxide equivalent). This means that reductions to come from the transportation sector through reduced driving, use of lighter-weight vehicles with improved aerodynamics and more energy efficient propulsion systems, as well as greater use of public transit.

k) Encourage local fleets to use clean fuel alternatives.

Fleets of local government, schools, businesses, transit, and the service industry would benefit from converting fleets to use clean energy and become less dependent on petro chemicals. Several benefits result from conversion such as fuel cost benefits, reduction in maintenance needs, and health improvements to operators with reduced exposure to volatile organic compounds associated with the use of gas and diesel.

l) Promote energy efficient travel modes.

In addition to walking, biking and transit, promoting energy efficient travel modes such as the use of hybrid electric vehicles, carpooling, and car sharing would help in reducing fuel consumption in the region.

m) Implement the Hazard Mitigation Plan.

The Pioneer Valley Regional Natural Hazard Mitigation Plan assesses risk and vulnerability and creates an action plan for adoption, implementation, and monitoring. Among the hazards identified are dam failures, flooding, severe snow/ice storms, tornado, hurricane, wildfires, drought, and earthquakes. Vulnerable sites include transportation networks, regional economy, and critical resources such as emergency operations centers, emergency shelters, hospitals, and hazardous materials sites. The main goal of the plan is to reduce the loss of or damage to life, property, infrastructure, and natural, cultural, and economic resources from natural disasters. The action plan objectives include improving communications between the State, the region, and the local governments in pre-disaster planning and continuous hazard mitigation implementation.

n) Invest in the repair and maintenance of existing transportation infrastructure.

Utilize the pavement management plan to identify roads in need of repair before reaching critical conditions that would require full reconstruction that is much more costly and disruptive to users. Maintaining a state of good repair on our roadways and bridges will result in more cost effective transportation improvement projects while enhancing the safety and efficiency of all transportation modes.

o) Advance and promote the use of alternatively fueled vehicles.

It will be important to reduce the reliance of the region on vehicles fueled with fossil fuels. The Pioneer Valley MPO should advance measures to promote alternatively fueled vehicles when appropriate as part of studies developed in the UPWP. Assistance should also be provided to local communities and other interested parties in the conversion of vehicle fleets to alternative fuel sources. Promote alternatively fueled vehicles with efforts such as identifying electric vehicle charging locations throughout the region and providing incentives for hybrid vehicles, such as free designated parking at major activity centers.

p) Work with major employers to develop incentives to decrease single occupant vehicle use.

Ridesharing services are provided in the Commonwealth of Massachusetts through MassRides. The University of Massachusetts Amherst also employs a ride share coordinator. The Pioneer Valley MPO should continue to work with MassRides to reduce the percentage of single occupant vehicles that commute to work. These strategies should also be incorporated into ongoing transportation planning studies completed as part of the UPWP.

q) Mitigate the impacts of roadway salt and chemical usage during snow season.

Road salt contaminates drinking water supplies as a result of poor storage, highway runoff, and snow removal. In turn this has adverse effects on human health. It also adversely impacts aquatic life in our rivers and streams by changing the ecosystem and survival potential for native species. Remediation measures have included highway drainage changes, reduction of salt use near water supplies, delivery of bottled water, and the connection of existing well users to public water systems. The use of salt substitutes such as sand and deicer premix may introduce other harmful chemicals to humans and the environment. High levels of salt also impacts food production in the region and the availability of local produce that may not tolerate high levels of salt in the soil.

r) Refer new projects to the Pioneer Valley Sustainability Toolkit.

The Pioneer Valley Sustainability Toolkit has several goals:

- To assist communities, by providing technical assistance and resources, to help them in adopting strategies to take action on climate change, promote use of clean energy sources, grow smarter, protect their environments, promote food security, and encourage use of green infrastructure.
- To promote the implementation of the region's key plan: Our Next Future: An Action Plan for Building a Smart, Sustainable and Resilient Pioneer Valley;
- To encourage sustainability in all aspects of life in the Pioneer Valley region.

The Pioneer Valley Sustainability Toolkit includes a total of 130 fact sheets, plus 52 model bylaws and strategies. It can be downloaded at: http://www.pvpc.org/sustainability-toolkit.

s) Support urban forestry initiatives.

Promote a larger, healthier urban forest as part of the urban ecosystem through community planting, maintenance, and education. Encourage planting of shade trees in the urban center and along pedestrian paths to improve air quality and modulate extreme weather conditions. An urban forestry initiative would help protect existing trees and open space. It can work to reclaim abandoned space for use as community gardens and recreational space. An example of a local urban forestry initiative is the Amherst Public Shade Tree Committee that has created an inventory of existing trees for the town center. A map records trees removed due to disease or construction and identifies locations for replanting to recover lost shade trees.

t) Utilize energy efficient lighting and solar panels in new facilities.

Energy efficient lighting can be installed both in indoor and outdoor facilities along roadways and in parking lots using solar panels for electricity. Motion activated lights are useful along sidewalks in urban residential neighborhoods.

u) Enforce idling reduction programs in major activity centers.

Enforcement of idling reduction programs are most beneficial at transportation hubs and bus terminals as well as in any facility that operates a fleet of vehicles. It may be more difficult to enforce in the business district when users do not have regular travel patterns. Nevertheless an educational campaign about the adverse effects of idling to air quality is important for changing traveler behavior.

v) Identify hazardous locations due to drought under major roadways.

A deficiency in precipitation over an extended period of time causes drought. An inventory of soil conditions and the water table under major highways is a first step to identifying potential hazards caused by drought under major roadways. It is not unheard of to experience sinking holes and surface cracking during severe cases of drought. Severe drought occurred in Massachusetts in 1999. During this period the Massachusetts Emergency Management Agency developed the Massachusetts Drought Management Plan. The plan includes data on ground water, surface water, reservoir, precipitation, stream flow conditions and a report on fire danger and agricultural conditions.

w) Identify potential flooding locations along major highways and rerouting alternatives.

The 100 and 500 year flood zone maps help identify locations of potential impact to major highways during a flood incident. Local flood evacuation studies can be conducted to identify potential hazard sites, vulnerable receptors, impacted roads, and traffic flow patterns when certain roads become impassable. An example of such a study is the recent Springfield Flood Evacuation Study that also included a suggested sign message plan for traffic rerouting during an evacuation. Three flood scenarios were identified by the local emergency preparedness team as priority locations for analysis.

x) Develop ordinances and bylaws that encourage mixed use and high density forms of development where appropriate.

The following strategies were developed to assist communities in promoting mixed-use and high density development.

- Develop zoning regulations to promote cluster development, such as major residential development ordinances or open space community development ordinances, as an alternative to standard large-lot subdivisions.
- Incorporate limited mixed use development options into open space community bylaws, such as limited business or office uses.
- Seek state legislation to allow by-right cluster development.
- Provide incentives for urban infill, clustered residential and mixed-use villages within or immediately surrounding town centers or designated community growth areas.
- Create density-based zoning incentives to encourage development in growth centers, such as smaller lot sizes and setbacks (or no minimum lot size or frontage requirements), and increased heights.
- Retrofit suburban shopping centers to become community centers, by adopting zoning which requires new buildings at the street line.

- Adopt inclusionary zoning regulations to provide opportunities for development of a mix of housing types, including affordable housing, within neighborhoods. Typically, inclusionary housing bylaws promote private market development of affordable housing by offering developers residential density bonuses in return for some affordable dwelling units. The developer must set aside a percentage of affordable housing units, usually 10-25%, in the development for low and moderate-income residents.
- Adopt zoning for elderly and handicapped congregate housing. Congregate housing provides a range of housing opportunities for elderly and handicapped persons, including senior apartments for independent living, life care facilities allowing the progression from independent living to nursing home care, and congregate dwellings with support services for residents.
- Improve the quality of compact neighborhoods with the strategic placement of public amenities. Community centers, recreation facilities, schools, and libraries can all generate shared civic life, provide neighborhood meeting areas, and spur neighborhood investment.
- Provide accessible open space close to homes in compact neighborhoods. Open space, such as bikepaths, parks, play spaces, and commons, enhances the quality of life in neighborhoods, provides recreational opportunities, and improves community safety and desirability.
- Take advantage of existing state and federal programs which provide incentives for Brownfields redevelopment.
- Create Transit Oriented Development (TOD) zones within walking distance, about 2,000 feet, of major bus transit lines in urbanized areas, which allow for higher density and mixed use. Each TOD should have a mixed use core commercial area located adjacent to the transit stop. Surrounding the core commercial area should be a mix of residential housing types, including small lot single-family, townhouse, condominiums, and apartments at a density of 10-26 dwelling units per acre. TODs should also include public uses, such as parks, plazas, greens, public buildings and public services.

y) Construct roads without curbing where practical to enable sheet flow.

On low-traffic speed streets without curbs pedestrians are given equal importance to drivers, providing for a pedestrian friendly environment by forcing drivers to become more conscious of other users of the roadway facility. This design is also inviting to cyclists as it reduces the potential of losing balance from a tire accidently striking the curb and reduces the accumulation of debris that often pose a safety hazard to cyclists driving on

the right side of the road. It aids roadway drainage and eliminates puddles at curb's edge by allowing sheet flow of rain water onto a green buffer or permeable sidewalk.

z) Screen lighting on highways.

Light pollution from highway lighting impacts both humans and wildlife. Screening of highway lighting helps protect all species living within its proximity. Screening can be accomplished using indirect lighting fixtures or standard barriers such as fencing or dense foliage from trees. Use of *full cutoff* lighting fixtures when practical and appropriate spacing exists can assist in maximizing the efficiency of street lights.

aa) Prohibit billboards along highways.

Eliminating billboards on highways would reduce driving distraction as well as light pollution and visual clutter. It preserves community character and protects the natural scenery of our region. Visual clutter and the overpowering scale of billboards add to a driver's stress level.

bb) Explore energy generation through solar paving slabs for new sidewalk projects.

Identify prototype projects and partner with local communities to implement new strategies to save energy and power public spaces through solar paving slabs on sidewalks. The stones are made from renewable, durable materials (e.g., recycled glass or recycled rubber), in which are embedded high-efficiency solar panels.

F. PROJECTS

Projects for the 2016 Update to the Regional Transportation Plan for the Pioneer Valley Metropolitan Planning Organization were selected in part based on the transportation needs and strategies that were previously identified in this chapter. Past versions of the RTP and the results from the public participation component of the plan development were also instrumental in the selection of future transportation improvement projects. Do to the need for fiscal constraint, the 2016 RTP programmed only MassDOT approved projects or those "High" priority projects that are highly likely to be built in the next 4 years and have an identified source of funding. Each of the projects has been categorized based on the five emphasis areas. In addition, all projects have been prioritized as being of "High," "Medium," or "Low" importance. Projects of "Low" importance are still considered to be important for the region, but are considered a lower priority in comparison to other necessary transportation improvements.

All projects included as part of the FY2015 – FY2018 Transportation Improvement Program (TIP) were prioritized based on the evaluation criteria developed by PVPC in coordination with MassDOT. Each project was jointly evaluated by a committee comprised of members of the MassDOT, MassDOT Highway Division District 1 and 2 offices, and the Pioneer Valley Planning Commission. Projects are given numerical scores ranging from 0 to100 and include a variety of categories. Longer range projects and strategies included as part of this RTP update were initially developed and evaluated by the transportation staff of the Pioneer Valley Planning Commission. After the initial evaluation and ranking by PVPC staff, the list of projects was distributed to the MassDOT, MassDOT Highway Division District 1 and 2 offices, Pioneer Valley Joint Transportation Committee members. Input received from all of these sources was used to update the priority of each project.

The effects of future transportation improvement projects have been analyzed using the Pioneer Valley regional transportation model where applicable. Improvement alternatives with the proposed project in place were compared to existing conditions to identify the impact of the improvement on existing traffic volumes and travel times. Increases in traffic on the regional transportation model are often an indication of improved traffic flow and reduced travel times.

Information is provided for all High Priority projects included as part of the RTP. Additional information is provided for all regionally significant or "Non-Exempt" projects regardless of their priority. "Non-Exempt" projects add capacity to the existing transportation system and must be included as part of the air quality conformity determination for the RTP. These transportation

projects are on facilities which serve regional transportation needs. Examples of “Non-Exempt” projects include the construction of new principal roadways, fixed guideway transit facilities that offer an alternative to regional highway travel, and projects that are expected to widen roadways for the purpose of providing additional travel lanes.

1. FY2015 – FY20118 TIP

Transportation improvement projects included as part of the FY2015 – FY2018 TIP for the Pioneer Valley Metropolitan Planning Organization must come from a conforming regional transportation plan. Projects included in the FY2015 – FY2018 TIP conform to the 2012 Update the RTP and are presented in this plan for informational purposes. A summary of these projects is presented in Table 14-11 and Figure 14-1. Each project has been given a number for cross reference between the table and figure.

Table 14-11 – FY2015 – FY2018 Transportation Improvement Program

Map Key	Project ID	Municipality Project Description	Funding	Total Funds	TIP Year
1	607207	PELHAM- RECONSTRUCTION OF AMHERST ROAD, FROM 800 FEET EAST OF ENFIELD ROAD TO ROUTE 202 (2.5 MILES - PHASE II)	STP	$ 4,200,000	2015
2	605222	SPRINGFIELD- NORTH END & BRIGHTWOOD INFRASTRUCTURE IMPROVEMENTS, FROM OSGOOD STREET TO THE CHICOPEE CITY LINE (NORTHERLY SEGMENT)	STP	$ 3,827,589	2015
3	607869	WILBRAHAM- RECONSTRUCTION OF BOSTON ROAD (ROUTE 20) FROM DUDLEY STREET TO 400FT. EAST OF DUMAINE STREET (0.28MILES)	STP	$ 1,903,482	2015
4	606417	CUMMINGTON- RETAINING WALL REPLACEMENT ON ROUTE 9 ADJACENT TO C-21-023 OVER WESTFIELD BROOK	STP	$ 1,500,000	2015
6	604035	HADLEY- SIGNAL & INTERSECTION IMPROVEMENTS AT ROUTE 9 (RUSSELL STREET) & ROUTE 47 (MIDDLE STREET)	STP	$ 1,201,102	2015
6	604035	HADLEY- SIGNAL & INTERSECTION IMPROVEMENTS AT ROUTE 9 (RUSSELL STREET) & ROUTE 47 (MIDDLE STREET)	CMAQ	$ 1,836,958	2015
2	605222	SPRINGFIELD- NORTH END & BRIGHTWOOD INFRASTRUCTURE IMPROVEMENTS, FROM OSGOOD STREET TO THE CHICOPEE CITY LINE (NORTHERLY SEGMENT)	CMAQ	$ 1,900,792	2015
7		SPRINGFIELD - UNION STATION REDEVELOPMENT	CMAQ	$ 315,970	2015
2	605222	SPRINGFIELD- NORTH END & BRIGHTWOOD INFRASTRUCTURE IMPROVEMENTS, FROM OSGOOD STREET TO THE CHICOPEE CITY LINE (NORTHERLY SEGMENT)	TAP	$ 473,939	2015
8	607515	DISTRICT 2- SYSTEMATIC BRIDGE MAINTENANCE AT VARIOUS LOCATIONS	BR-SP	$ 1,849,536	2015
9	607731	SPRINGFIELD- VIADUCT DECK REPLACEMENT OF S-24-061 ON I-91 (EARLY ACTION)	NHPP	$ 149,006,250	2015
10	607453	SOUTHAMPTON - SOUTHAMPTON SAFE ROUTES TO SCHOOL - NORRIS ELEMENTARY SCHOOL	Statewide TAP	$800,000	2015
11	605066	NORTHAMPTON- INTERSECTION IMPROVEMENTS AT ROUTE 5 (PLEASANT STREET) AND CONZ STREET - Roundabout	Statewide CMAQ	$ 1,592,248	2015
12	605833	BERNARDSTON - WEST SPRINGFIELD - TRAFFIC SIGN REPLACEMENT ON INTERSTATE 91	A/C	$4,064,580	2015
13	603730	WEST SPRINGFIELD- CONNECTICUT RIVERWALK & BIKEWAY EXTENSION, FROM ELM STREET TO DOTY CIRCLE, INCLUDES PEDESTRIAN BRIDGE W-21-020	Statewide TAP	$ 1,640,736	2015
14	605011	LUDLOW- RECONSTRUCTION OF CENTER STREET (ROUTE 21) - FROM 35' WEST OF BEACHSIDE DRIVE WESTERLY TO GAS LINE BESIDE MTA OVERPASS (3,500 FEET)	STP	$ 4,918,051	2016
15	180525	NORTHAMPTON- RECONSTRUCTION OF DAMON ROAD, FROM ROUTE 9 INTERSECTION TO ROUTE 5 INTERSECTION (1.1 MILES)	STP	$ 2,273,050	2016
16	604446	WESTFIELD- RECONSTRUCTION OF ROUTE 187 (LITTLE RIVER ROAD) AND SHAKER ROAD	STP	$ 5,724,561	2016
17	605385	SPRINGFIELD- SIGNAL & INTERSECTION IMPROVEMENTS @ ROOSEVELT AVENUE & ISLAND POND ROAD, ROOSEVELT AVENUE & ALDEN STREET	STP	$ 686,921	2016
15	180525	NORTHAMPTON- RECONSTRUCTION OF DAMON ROAD, FROM ROUTE 9 INTERSECTION TO ROUTE 5 INTERSECTION (1.1 MILES)	HSIP	$ 1,080,992	2016
15	180525	NORTHAMPTON- RECONSTRUCTION OF DAMON ROAD, FROM ROUTE 9 INTERSECTION TO ROUTE 5 INTERSECTION (1.1 MILES)	CMAQ	$ 1,036,217	2016
17	605385	SPRINGFIELD- SIGNAL & INTERSECTION IMPROVEMENTS @ ROOSEVELT AVENUE & ISLAND POND ROAD, ROOSEVELT AVENUE & ALDEN STREET	CMAQ	$ 1,289,079	2016
18	604968	WESTFIELD- COLUMBIA GREENWAY RAIL TRAIL CONSTRUCTION, NORTH SECTION - FROM COWLES COURT ACCESS RAMPS TO THE WESTFIELD RIVER BRIDGE INCLUDES REHAB OF W-25-036 (WESTFIELD RIVER CROSSING)	CMAQ	$ 300,000	2016
7		SPRINGFIELD - UNION STATION REDEVELOPMENT	CMAQ	$ 750,873	2016
15	180525	NORTHAMPTON- RECONSTRUCTION OF DAMON ROAD, FROM ROUTE 9 INTERSECTION TO ROUTE 5 INTERSECTION (1.1 MILES)	TAP	$ 809,741	2016

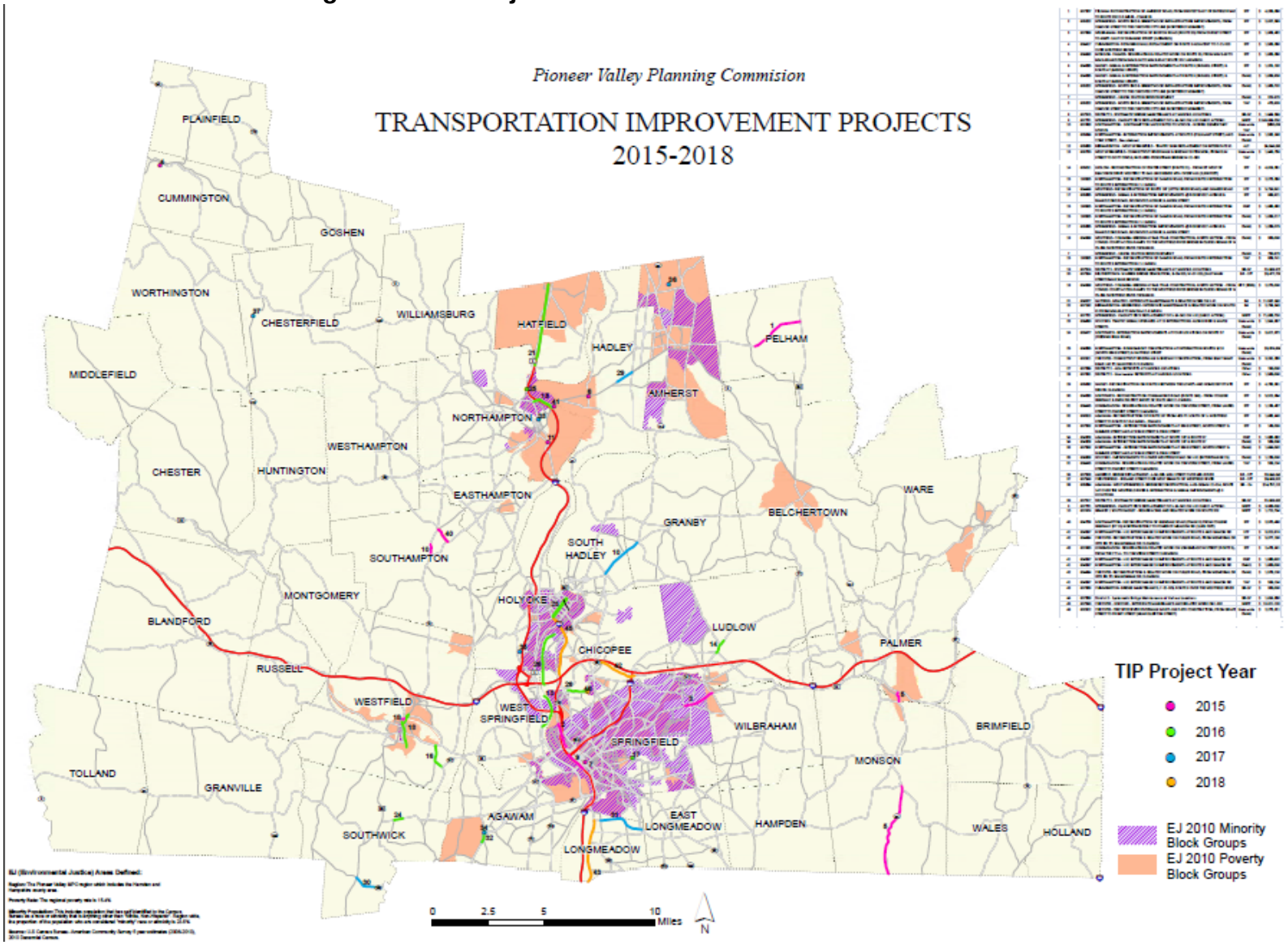
Table 14-11 – FY2015 – FY2018 Transportation Improvement Program (Continued)

Map Key	Project ID	Municipality Project Description	Funding	Total Funds	TIP Year
19	607516	DISTRICT 2- SYSTEMATIC BRIDGE MAINTENANCE AT VARIOUS LOCATIONS	BR-SP	$1,849,978	2016
20	607524	BELCHERTOWN- WARREN BRIDGE DEMOLITION, B-05-023, W-07-012,(EAST MAIN STREET/NAULTAUG BROOK)	BR - Off	$2,477,738	2016
18	604968	WESTFIELD- COLUMBIA GREENWAY RAIL TRAIL CONSTRUCTION, NORTH SECTION - FROM COWLES COURT ACCESS RAMPS TO THE WESTFIELD RIVER BRIDGE INCLUDES REHAB OF W-25-036 (WESTFIELD RIVER CROSSING)	HPP (2005)	$ 2,275,000	2016
21	606577	HATFIELD- WHATELY- INTERSTATE MAINTENANCE & RELATED WORK ON I-91	IM	$ 11,597,040	2016
22	607182	BERNARDSTON- GREENFIELD- INTERSTATE MAINTENANCE & RELATED WORK ON ROUTE I-91 FROM MM 48.6 TO MM 50.4 (1.8 MILES)	IM	$ 2,796,543	2016
9	607731	SPRINGFIELD- VIADUCT DECK REPLACEMENT OF S-24-061 ON I-91 (EARLY ACTION)	NHPP	$ 71,993,750	2016
23	606450	HOLYOKE- TRAFFIC SIGNAL UPGRADES AT 15 INTERSECTIONS ALONG HIGH & MAPLE STREETS	Statewide CMAQ	$ 1,564,867	2016
24	603477	SOUTHWICK- INTERSECTION IMPROVEMENTS AT FOUR LOCATIONS ON ROUTE 57 (FEEDING HILLS ROAD)	Statewide CMAQ	$ 3,617,872	2016
25	606555	NORTHAMPTON- ROUNDABOUT CONSTRUCTION AT INTERSECTION ROUTES 5/10 (NORTH KING STREET) & HATFIELD STREET	Statewide CMAQ	$2,874,896	2016
26	602911	CHICOPEE- CONNECTICUT RIVERWALK & BIKEWAY CONSTRUCTION, FROM BOAT RAMP NEAR I-90 TO NASH FIELD (2.5 MILES)	Statewide CMAQ	$ 3,261,288	2016
27	607036	DISTRICT 2 - ADA RETROFITS AT VARIOUS LOCATIONS	Other	$ 740,000	2016
28	607001	DISTRICT 2 - Stormwater RETROFITS AT VARIOUS LOCATIONS	Other	$ 1,500,000	2016
29	605032	HADLEY- RECONSTRUCTION ON ROUTE 9 BETWEEN THE LOWE'S AND HOME DEPOT SITE DRIVES (0.6 MILES)	STP	$ 4,782,361	2017
30	604033	SOUTHWICK- RECONSTRUCTION CONGAMOND ROAD (ROUTE 168) - FROM COLLEGE HIGHWAY & ENDS 250 FEET SHORT OF STATE LINE (1.2 MILES)	STP	$ 5,512,964	2017
31	606445	LONGMEADOW- RESURFACING & RELATED WORK ON CONVERSE STREET, FROM LAUREL STREET TO DWIGHT STREET (2.04 MILES)	STP	$ 1,186,487	2017
32	600513	AGAWAM- RECONSTRUCTION OF ROUTE 187 FROM 425 FT. SOUTH OF S. WESTFIELD STREET TO ROUTE 57 (0.3 MILES - PHASE I)	STP	$ 1,682,640	2017
33	607502	NORTHAMPTON - INTERSECTION IMPROVEMENTS AT KING STREET, NORTH STREET & SUMMER STREET AND AT KING STREET & FINN STREET	STP	$ 145,036	2017
34	604203	AGAWAM- INTERSECTION IMPROVEMENTS AT ROUTE 187 & ROUTE 57	HSIP	$ 1,080,992	2017
34	604203	AGAWAM- INTERSECTION IMPROVEMENTS AT ROUTE 187 & ROUTE 57	CMAQ	$ 539,008	2017
33	607502	NORTHAMPTON - INTERSECTION IMPROVEMENTS AT KING STREET, NORTH STREET & SUMMER STREET AND AT KING STREET & FINN STREET	CMAQ	$ 1,684,092	2017
35	606903	HOLYOKE - IMPROVEMENTS TO LOWER WESTFIELD ROAD ON I-91 (INTERCHANGE 15)	CMAQ	$ 1,155,000	2017
31	606445	LONGMEADOW- RESURFACING & RELATED WORK ON CONVERSE STREET, FROM LAUREL STREET TO DWIGHT STREET (2.04 MILES)	TAP	$ 526,134	2017
36	607528	AMHERST- BRIDGE REPLACEMENT, A-08-008, MILL STREET OVER MILL RIVER	BR - Off	$2,644,040	2017
37	607549	CHESTERFIELD - IRELAND STREET OVER WEST BRANCH OF WESTFIELD RIVER	BR - Off	$3,649,520	2017
38	605384	AGAWAM- WEST SPRINGFIELD- BRIDGE RECONSTRUCTION, A-05-002=W-21-014, ROUTE 147 OVER THE WESTFIELD RIVER & INTERSECTION & SIGNAL IMPROVEMENTS @ 3 LOCATIONS	BR - On	$14,757,120	2017
39	607517	DISTRICT 2- SYSTEMATIC BRIDGE MAINTENANCE AT VARIOUS LOCATIONS	BR-SP	$1,849,693	2017
9	607731	SPRINGFIELD- VIADUCT DECK REPLACEMENT OF S-24-061 ON I-91 (EARLY ACTION)	NHPP	$ 9,000,000	2017
10	607474	GRANBY / SOUTH HADLEY - RESURFACING AND RELATED WORK ON ROUTE 202	NHPP	$ 1,712,794	2017

Table 14-11 – FY2015 – FY2018 Transportation Improvement Program (Continued)

Map Key	Project ID	Municipality Project Description	Funding	Total Funds	TIP Year
40	604738	SOUTHAMPTON- RECONSTRUCTION OF GLENDALE ROAD (PHASE II) FROM COLLEGE HIGHWAY (RT 10) NORTHWESTERLY TO POMEROY MEADOW RD (3,801 FEET)	STP	$ 2,570,400	2018
41	604597	NORTHAMPTON- I-91 INTERCHANGE 19 IMPROVEMENTS AT ROUTE 9 AND DAMON RD	STP	$ 3,312,874	2018
42	604434	CHICOPEE- RECONSTRUCTION & RELATED WORK ON FULLER ROAD, FROM MEMORIAL DR (RTE 33) TO SHAWINIGAN DR (2.0 MILES)	STP	$ 5,377,100	2018
43	607430	LONGMEADOW- RESURFACING & RELATED WORK ON LONGMEADOW STREET (ROUTE 5), FROM THE CT S.L. TO CONVERSE STREET (2.88 MILES)	STP	$ 2,478,941	2018
41	604597	NORTHAMPTON- I-91 INTERCHANGE 19 IMPROVEMENTS AT ROUTE 9 AND DAMON RD	HSIP	$ 1,080,992	2018
41	604597	NORTHAMPTON- I-91 INTERCHANGE 19 IMPROVEMENTS AT ROUTE 9 AND DAMON RD	CMAQ	$ 1,800,000	2018
42	604434	CHICOPEE- RECONSTRUCTION & RELATED WORK ON FULLER ROAD, FROM MEMORIAL DR (RTE 33) TO SHAWINIGAN DR (2.0 MILES)	CMAQ	$ 1,578,100	2018
41	604597	NORTHAMPTON- I-91 INTERCHANGE 19 IMPROVEMENTS AT ROUTE 9 AND DAMON RD	TAP	$ 526,134	2018
43	607939	CUMMINGTON- BRIDGE MAINTENANCE, C-21-025, ROUTE 9 OVER THE WESTFIELD RIVER	BR-SP	$ 300,000	2018
44	607959	District 2 - Systematic Bridge Maintenance at Various Locations	BR-SP	$ 1,624,800	2018
45	607560	CHICOPEE - HOLYOKE - INTERSTATE MAINENANCE AND RELATED WORK ON I-391	NHPP	$ 10,911,130	2018
46	602912	CHICOPEE- CHICOPEE RIVER RIVERWALK MULTI-USE PATH CONSTRUCTION, FROM GRAPE STREET TO FRONT STREET (NEAR ELLERTON STREET)	Statewide CMAQ	$ 2,273,911	2018
			Total All years	**$ 387,273,901**	

Figure 14-1 – Projects Included in the FY2015 – FY2018 TIP



2. High Priority Projects

A summary of the high priority transportation improvement projects is presented in Table 14-12 and Figure 14-2. Projects have been cross referenced between the Table and Figure via a numbering system when applicable. Projects designated as being "regionwide" in scope are often not able to be clearly mapped. As a result this information may not appear as part of Figure 14-2. A description of each of the high priority projects is also included as part of this section.

Table 14-12 – High Priority Projects

Map Key	Project Name	Project Description	Community	SID	Area of Emphasis	Air Quality Conformity	Total Cost
11	Route 187/ 57 Intersection Improvements	Route 187/ 57 Intersection Improvements	Agawam	604203	Safety and Security	Exempt	$1,664,000
93	Bridge Reconstruction	Route 147 over Westfield River and intersection improvements at 3 locations	Agawam / West Springfield	605384	Safety and Security	Exempt	$13,869,440
60	Resurfacing and Related work	Improvements and Related Work on Route 9 and 116 from University Drive to South Pleasant Street (0.8 miles)	Amherst	608084	The Movement of People	Exempt	$1,412,447
22	Fuller Rd. Corridor Improvements	Reconstruction: From Rte. 33 to Shawinigan Drive	Chicopee	604434	The Movement of People	Exempt	$6,716,736
65	Signal Upgrades on Route 33	SIGNAL & INTERSECTION IMPROVEMENTS AT 11 INTERSECTIONS ALONG ROUTE 33 (MEMORIAL DRIVE), FROM FULLER ROAD TO BRITTON STREET	Chicopee	607736	The Movement of People	Exempt	$4,518,556
97	Bridge Betterment	Route 9 and Route 112 over the Westfield River	Cummington	605452	Safety and Security	Exempt	$4,094,505
62	Route 202 Intersection Improvments - 2 locations	Route 202 Intersection Improvements 2 Locations @ 5 Corners and @ School Street	Granby	606895	afety and Securi	Exempt	$1,068,621
42	Route 9 Roadway Reconstruction Phase 1	RECONSTRUCTION ON ROUTE 9 Phase 1 Middle Street to East Street	Hadley	605032	The Movement of People	Non Exempt	$5,697,211
64	Route 9 reconstruction Phase 2	RECONSTRUCTION ON ROUTE 9 Phase 2 East Street to Lowe's Site Drive	Hadley	605881	The Movement of People	Non Exempt	$12,790,857
128	Route 9 reconstruction Phase 3	Reconstruction form East of Lowe's Site Drive to South Maple Street, inluding the South Maple Street intersection	Hadley	XXXXX	The Movement of People	Non Exempt	$19,391,200
100	Bridge Replacement	BRIDGE REPLACEMENTS, H-21-014, ROUTE 141 (APPLETON STREET) OVER SECOND LEVEL CANAL & H-21-020 OVER FIRST LEVEL CANAL	Holyoke	600935	Safety and Security	Exempt	$11,612,952
58	I-91 exit 17 at Route 141 intersection improvements	I-91 exit 17 at Route 141 intersection improvements	Holyoke	606156	Safety and Security	Exempt	$2,924,646
3	Intersection Improvements I-91 Exit 15	IMPROVEMENTS TO LOWER WESTFIELD ROAD ON I-91 (INTERCHANGE 15)	Holyoke	606903	The Movement of People	Non Exempt	$1,072,500
104	Bridge Reconstruction/Rehab	HOLYOKE- WEST SPRINGFIELD- SUPERSTRUCTURE REPLACEMENT ON I-91: H-21-058=W-21-039 (SB), W-21-037 (NB), W-21-038 (SB) & W-21-042 & BRIDGE PRESERVATION OF W-21-040	Holyoke / West Springfield	606467	Safety and Security	Exempt	$43,916,998
59	Route 5 Reconstruction from Ashley Ave.	REHABILITATION OF ROUTE 5 (RIVERDALE ROAD), FROM I-91 (INTERCHANGE 13) TO MAIN STREET IN HOLYOKE & FROM ELM STREET TO NORTH ELM STREET IN WEST SPRINGFIELD (3.2 MILES)	Holyoke/West Springfield	604209	The Movement of People	Non Exempt	$3,239,608
37	Center Street (Route 21) reconstruction	Center street reconstruction	Ludlow	605011	The Movement of People	Exempt	$5,114,773
107	Bridge Rehabilitation	Route 21 (Center Street) over Chicopee River (Putts Bridge)	Ludlow/Springfield	601156	Safety and Security	Non Exempt	$30,128,664
39	Damon Rd. Safety Improvement	Reconstruction: Rte. 9 to King St. (Rte. 5)	Northampton	180525	The Movement of People	Exempt	$5,200,000
2	I-91 Ramps at Exit 19	This study is reviewing alternatives to relieve congestion and improve safety in the transportation network near Interchange 19	Northampton	604597	The Movement of People	Exempt	$5,972,015
112	Bridge Reconstruction/Rehab	NORTHAMPTON- BRIDGE RECONSTRUCTION, N-19-059, I-91 OVER US 5/BMRR & N-19-060, I-91 OVER HOCKANUM ROAD	Northampton	606552	Safety and Security	Exempt	$58,494,084

Table 14-12 – High Priority Projects (Cont.)

Map Key	Project Name	Project Description	Community	SID	Area of Emphasis	Air Quality Conformity	Total Cost
10	Hatfield Street @ Route 5 and 10	Intersection Improvements (Round about or Signalization	Northampton	606555	The Movement of People	Exempt	$3,033,680
4	King Street Intersection Improvements	INTERSECTION IMPROVEMENTS AT KING STREET, NORTH STREET & SUMMER STREET AND AT KING STREET & FINN STREET	Northampton	607502	The Movement of People	Exempt	$1,766,415
57	Main Street (Route 9) New South (Route 10), State, and West Street (Route 66)	NORTHAMPTON- INTERSECTION IMPROVEMENTS @ ELM STREET, MAIN STREET, WEST STREET, STATE STREET & NEW SOUTH STREET	Northampton	607893	The Movement of People	Exempt	$1,574,810
129	Springfield Bus Maintenance and Storage facility	Multi-phase, multi-facility project to upgrade outdated Springfield area bus facility	Regionwide		Movemeent of People	Exempt	$74,000,000
Not Mapped	PVTA Fleet Renewal	Replacement of buses, vans and support vehicles that have reached the end of their rated lifespan	Regionwide		Movemeent of People	Exempt	$271,780,466
Not Mapped	Vehicle maintenance	Necessary on-going maintenance of all PVTA-owned vehicles	Regionwide		Movemeent of People	Exempt	$253,686,861
Not Mapped	PVTA Facility maintenance	Necessary on-going maintenance and rehabilitation of PVTA-owned facilities	Regionwide		Movemeent of People	Exempt	$75,408,864
Not Mapped	Bus shelters	Replacement, maintenance and new installations of bus shelters	Regionwide		Movemeent of People	Exempt	$7,867,754
Not Mapped	Intelligent fareboxes	Replace outdated fareboxes with industry standard 'smart card' fare system	Regionwide		Movemeent of People	Exempt	$6,320,547
135	Northampton garage rehabilitation	Rehabilitate 1970s-era bus garage, add space for transit-related uses, add parking for paratransit	Regionwide		Movemeent of People	Exempt	$5,000,000
Not Mapped	Community Transit Grant Program	Assistance to area councils on aging and other community transportation providers for vans	Regionwide		Movemeent of People	Exempt	Further Study
16	I-91 Viaduct Deck Replacement, S-24-061 (Early Action) (funding 2014 to 2017) $231,625,000	Replacement of deteriorated deck sections of the I-91 Viaduct through Springfield. Minor associated steel superstrucutre repairs and painting is also proposed.	Regionwide	607731	The Movement of People	Exempt	222,625,000
Not Mapped	Freight Congestion	Freight congestion improvements	Regionwide		The Movement of Goods	Exempt	Further Study
Not Mapped	Commuter Rail	Commuter Rail - Springfield to New Haven - Capital	Regionwide		The Movement of People	Exempt	$30,000,000
Not Mapped	Commuter Rail	Commuter Rail - Springfield to Greenfield - Capital	Regionwide		The Movement of People	Exempt	$10,000,000
70	Intersection Improvements	SOUTH HADLEY- SIGNAL & INTERSECTION IMPROVEMENTS AT ROUTE 202 (GRANBY ROAD) & ROUTE 33 (LYMAN STREET)	South Hadley	607735	Movement of Pe	Exempt	$584,929
33	Route 57 Reconstruction	Reconstruction Rt. 57 (Feeding Hills Road) from Route 10/202 to Powder Mill Road	Southwick	603477	Safety and Security	Exempt	$4,366,128
9	Roosevelt Ave. @ Island Pond Rd and Roosevelt Ave @ Alden Street	Realign Island Pond Road and Roosevelt Avenue to create a three way signalized intersection signal upgrade	Springfield	605385	The Movement of People	Exempt	$2,389,267
127	Pedestrian Bridge	SPRINGFIELD- NORTH END PEDESTRIAN PATH CONSTRUCTION (UNDER PAN-AM RAILROAD), BETWEEN PLAINFIELD STREET AND BIRNIE AVENUE	Springfield	607589	The Movement of People	Exempt	$438,697
Not Mapped	State Street Bus Rapid Transit	State Street Bus Rapid Transit	Springfield		Movemeent of People	Exempt	Further Study
116	Bridge Reconstruction/Rehab	SPRINGFIELD- WEST SPRINGFIELD- BRIDGE PRESERVATION ON I-91 CORRIDOR: S-24-042, S-24-079, S-24-085, S-24-087, W-21-037, W-21-042	Springfield / West Springfield	605417	Sustainabilty	Exempt	$11,558,385
119	Bridge Replacement	Route 9 (East Street) over the Ware River	Ware	604212	Safety and Security	Exempt	$2,098,726

Table 14-12 – High Priority Projects (Cont.)

Map Key	Project Name	Project Description	Community	SID	Area of Emphasis	Air Quality Conformity	Total Cost
61	Intersection Improvments Ware Center	WARE- INTERSECTION IMPROVEMENTS @ MAIN STREET, WEST STREET, NORTH STREET, SOUTH STREET & CHURCH STREET	Ware	607987	Movement of Pe	Exempt	$2,193,485
112	Bridge Reconstruction/Rehab	WEST SPRINGFIELD- BRIDGE REHABILITATION, BRIDGE W-21- 27, ROUTE 20 (PARK AVENUE) OVER ROUTE 5	West Springfield	607443	Safety and Security	Exempt	$4,706,025
Not Mapped	Memorial Avenue - Complete Streets	Memorial Avenue Complete Streets Project from River Street to Route 5 Rotary	West Springfield		The Movement of People	Exempt	$17,547,878
123	Bridge Replacement	Route 10/202 Southwick Street over Little River	Westfield	400103	Safety and Security	Non Exempt	$10,528,727
Not Mapped	Westfield Intermodal Center	Design and construct intermodal facility in downtown Westfield	Westfield		Movemeent of People	Exempt	$8,000,000
47	Boston Rd Reconstruction (Route 20)	Reconstruction of Boston Rd and other infrastructure improvements	Wilbraham	607869	Safety and Security	Non Exempt	$1,292,428
						48 High Priority Projects	$1,267,668,886

a) Intersection Improvements Agawam Route 187 at Route 57

This intersection improvement project consists of the upgrade of existing traffic signal equipment and geometric improvements to improve safety and reduce congestion. Located in the Feeding Hills section of the Town of Agawam, this four-way signalized intersection experiences severe peak hour congestion as it serves two local schools, many retail establishments on the Springfield Street corridor, and provides access to the limited access portion of Route 57.

Intersection of Route 57 with Route 187 in Agawam, MA

b) Bridge Reconstruction Route 147 over Westfield River West Springfield / Agawam

A functional design report was completed in 2012 for this bridge over the Westfield River connecting West Springfield and Agawam. The purpose of this project is to reconstruct and widen the bridge and upgrade three intersections in its immediate vicinity. Traffic control equipment will be upgraded at the three signalized intersections: Route 147 (Springfield Street) at Walnut Street with Walnut Street Extension; Route 147 (Springfield Street / Memorial Avenue) at Route 75 (Suffield Street) and Route 159 (Main Street); and, Route 147 (Memorial Avenue) at River Street. The bridge will be widened from four to five lanes to provide an exclusive left turn lane in both directions.

Morgan-Sullivan Bridge (Route 147) in Agawam/West Springfield, MA

c) Resurfacing and Related Work Amherst on Route 9 and Route 116

This is a complete streets project that will improve accommodations for all users. The roadway will be resurfaced and widened for improved bicycle use with marked bicycle lanes. New and reconstructed sidewalks with new wheelchair ramps and crosswalks for improved pedestrian access will be installed.

d) Fuller Road Corridor Improvements Chicopee

The Fuller Road corridor will be improved from Memorial Drive (Route 33) to Shawinigan Drive, for a distance of 2.0 miles. The project consists of pavement rehabilitation with traffic operations improvements at the existing signals at Sheridan Street and I-291. Signals are proposed to have closed loop coordination, and will need to be reviewed as part of the Western MA ITS Architecture. Bicycle and pedestrian accommodation will also be improved.

e) Memorial Ave (Route 33) signal upgrades Chicopee/South Hadley

Memorial Drive experiences heavy traffic, especially during peak hours travel periods. Under this improvement project 11 existing traffic signals along Route 33 from Abbey Street to Fuller Road will be upgraded. These upgrades are anticipated to reduce congestion while increasing safety along the corridor.

f) Bridge Betterment Cummington Route 9 and 112 over Westfield River

The work for the bridge carrying Routes 9 & 112 over the Westfield River in Cummington shall consist of reconstructing the bridge sidewalk; replacing the reinforced concrete deck slab; and reconstructing the approach wearing surface. Additional refurbishments will be made to the bridge railings and the structural steel will be stripped and repainted.

g) Route 202 Intersection Improvements at 2 Locations Granby

The proposed work consists of intersection improvements at 2 separate intersections in Granby. The first intersection is Route 202 with Pleasant Street and Amherst Street, commonly referred to as the "Five Corners." The second location is the intersection of Route 202 with School Street. The work at the Five Corners intersection will include the re-aligning of Amherst Street, signal upgrades, new lane configurations and sidewalks. New left turn lanes will be installed on Route 202 at the School Street intersection. Both improvements will improve the safety at the existing intersections.

h) Route 9 Roadway Reconstruction Hadley

The widening of Route 9 in Hadley has been an ongoing effort for over a decade, starting with the reconstruction and widening of the Calvin Coolidge Bridge in the early 2000's. Several additional projects have been completed to widen Route 9 to accommodate current demand.

MassDOT has recently re-scoped the 2 current Route 9 widening projects into 3 phases, which now include the Route 9 at South Maple Street intersection. A separate study will explore options to enhance bicycling, transit and walking and analyze the feasibility of different improvement alternatives. The 3 proposed project phases are:

- Phase 1 – Route 9 from Middle Street to East Street.
- Phase 2 – Route 9 from East Street to Lowe's Site Drive.
- Phase 3 – Route 9 from east of Lowe's Site Drive to South Maple Street including the South Maple Street Intersection.

i) Bridge Replacement Route 141 Holyoke

This project involves replacing two bridges on Route 141 (Appleton Street) where the bridges cross over the First Level and Second Level Canals. The new bridges will be two-span concrete bridges supported by abutments that will be constructed behind the existing canal walls. The existing roadway and sidewalk widths will be maintained. A decorative bridge rail will be installed that is compatible with the proposed Holyoke Canalwalk and the historic character of the area.

j) I-91 Exit 17 at Route 141 Intersection Improvements

Work will consist of traffic circulation modifications achieved through minor geometric alterations, traffic signal modifications and new pavement markings. The project will also eliminate left turns from Easthampton Road onto Interstate Route I-91 southbound.

k) I-91 Exit 15 Intersection Improvements

A roadway safety audit for this location proposed roadway widening to accommodate additional left turn lanes from Lower Westfield Road to I-91 in both

the northbound and southbound directions. Other improvements may include new pavement markings and signage, signal timing and equipment upgrades and a new sidewalk connection.

l) Bridge Reconstruction/Rehabilitation I-91 West Springfield and Holyoke

The work to be done under this project consists of superstructure replacements, along with other incidental items of the work, at five Interstate 91 bridges in West Springfield and Holyoke. The work will be between I-91 Mile Markers 10.8 and 15.0 and will include the following bridges:

- I-91 northbound over I-90 (W-21-037)
- I-91 southbound over Prospect Avenue (W-21-038)
- I-90 & I-91 connector ramps over ramp F to I-90 (W-21-042)
- I-91 southbound over ramp A to I-90 (H-21-058=W-21-039)
- I-91 southbound over Route 202 Cherry Street (H-21-049)

m) Rehabilitation of Route 5 (Riverdale Road) in Holyoke and West Springfield

The project consists of rehabilitating a section of concrete pavement on Route 5 in Holyoke and West Springfield. The current project limit begins in West Springfield immediately to the north of the I-91 Exit 13 Interchange and extends northerly to the intersection with Main Street in Holyoke. The project also includes modification to the intersection with Ashley Avenue to add a dedicated left turn lane. Other work includes traffic signal updates at several locations, drainage system improvements, guardrail improvements, and sidewalk improvements.

n) Reconstruction of Center Street in Ludlow

The Center Street (Route 21) project consists of roadway reconstruction from Sewall Street to Beachside Drive. The project addresses traffic congestion, circulation and safety for vehicles, bicycles and pedestrians. Road improvements consist of the creation of a center left turn lane, road widening, and geometry modifications at intersections to improve turning radii and right and left turn lanes.

o) Bridge Rehabilitation Route 21 over Chicopee River Ludlow and Springfield

The existing Putts Bridge on Route 21 Center Street over the Chicopee River between Ludlow and Springfield will be rehabilitated to improve traffic flow and reduce congestion. The work consists of replacing of the deck, new bridge rails/ approach rails, replacement of the existing bearings, and other miscellaneous work that is required. Construction of a temporary bridge will be necessary to decrease the impacts of construction on existing traffic.

p) Damon Road Safety Improvements Northampton

Damon Road in Northampton connects traffic from Route 9 to King Street. The King Street intersection with Damon Road serves as access to traffic from downtown

Northampton to points north of the city, retail uses along King Street, and residential neighborhoods to the west. Traffic queues with significant delays occur in all directions. At the I–91/Route 9 interchange with Damon Road recent improvements include the construction of additional exclusive turn lanes and upgrades to the existing traffic signals.

The project consists of safety and transportation improvements along 1.1 miles of Damon Road, between Route 9 and Routes 5 &10 intersections in Northampton. Widening and resurfacing is proposed for Damon Road to accommodate additional dedicated turning lanes along the roadway and at the intersection with King Street. The signal at this intersection would be re-timed to reduce congestion on all approaches. This project will also include full depth pavement widening, new sidewalks, a multi-use path, and restoration of an eroded bank of the Connecticut River west of the Norwottuck Rail Trail.

q) Interstate 91 Exit 19 Improvements Northampton

I-91 Exit 19 Concept 13A (source MassDOT June 2014 Functional Design Report)

This project evolved from the "Connecticut River Crossing Transportation Study," in which the transportation needs of a regional study area from Holyoke to Sunderland were determined, including the potential need for an additional bridge over the Connecticut River. One of the long-term recommendations from that study was to improve the traffic operations at the I-91 Interchange 19. A subsequent study was undertaken to refine the concept at the specific project location. The final recommendation of this study was the construction of a two lane roundabout at the Damon Road, I-91 northbound off ramp and Route 9 intersection, and the widening of the I-91 southbound on ramp to two lanes to allow for the installation of two left turn lanes from Route 9 onto I-91.

r) Bridge Reconstruction / Rehabilitation I-91 over US Route 5, BMRR, and Hockanum Road Northampton

The proposed project will include complete removal and replacement of the existing bridge structures. The new superstructures will accommodate two lanes of traffic in their respective directions but will not include sidewalks.

s) Hatfield Street at Route 5 and 10 Northampton

The proposed project will improve safety and operations at the intersection of Routes 5&10 and Hatfield Street by constructing a modern roundabout. This will enhance existing intersection geometry and reduce excessive delays currently experienced on Hatfield Street.

t) King Street Intersection Improvements Northampton

This project will include intersection improvements at the intersections of King Street and North/Summer Streets and King Street and Finn Street. Improvements will include additional turn lanes on North Street and Finn Street to King Street, reduction of King Street from 4 lanes to 2 lanes with turn pockets, on street parking improvements, and traffic signal upgrades. Work will also include improvements to provide bicycle and pedestrian accommodations, new signage and pavement markings.

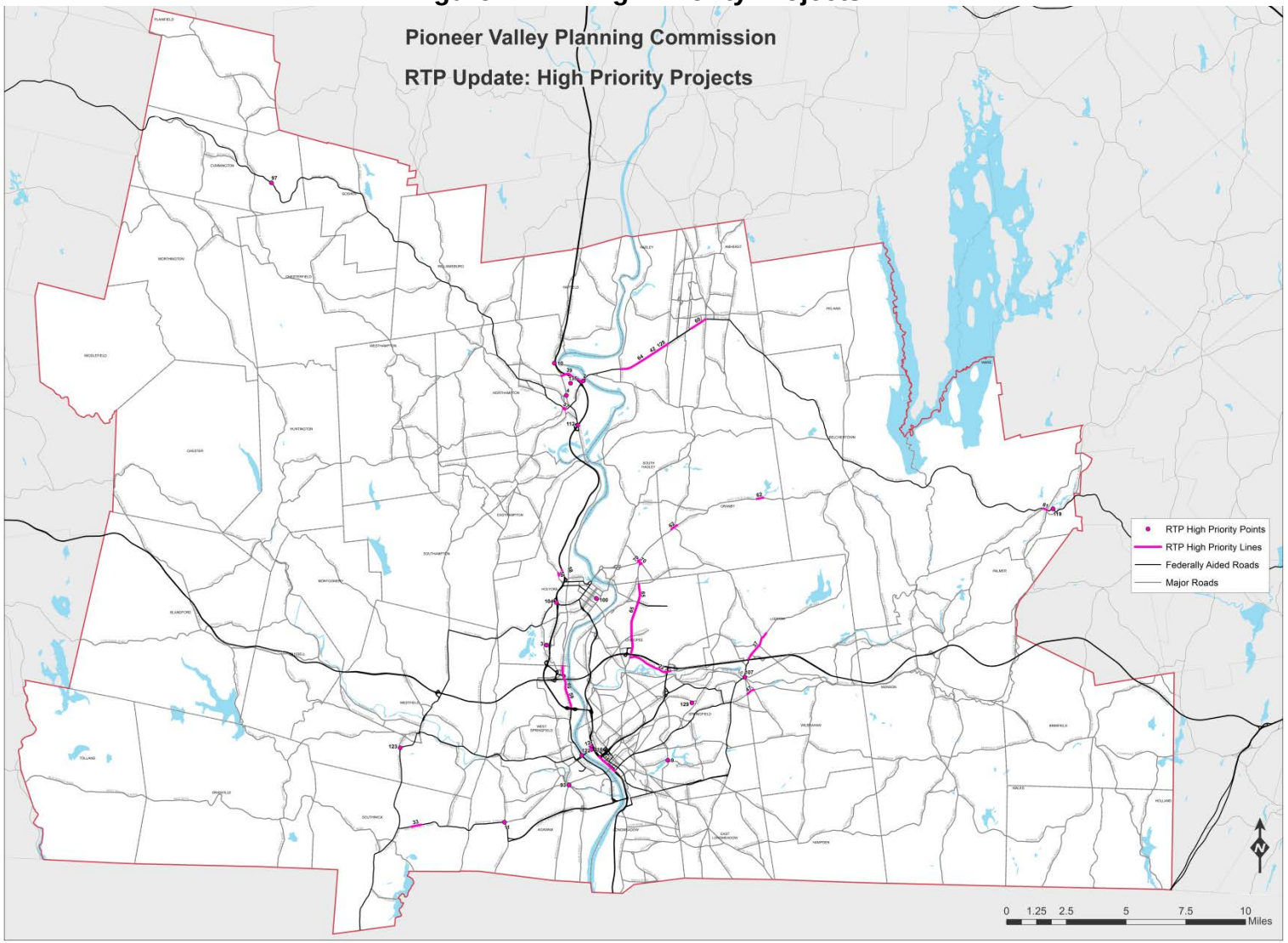
u) Main Street (Route 9), New South Street (Route 10), State Street, and West Street (Route 66) Northampton

This proposed project will improve safety and operations at this compound isolated intersection. Poor geometry and excessive delays in all directions will be addressed by realigning lanes within the curb line of the existing streets, adding and modifying existing traffic islands, and reducing the number of through travel lanes.

v) Springfield Operations and Maintenance Facility

PVTA's existing Springfield area bus storage and maintenance facility at 2840 Main Street is nearly 100 years old and originally designed for Springfield's street railway system. The property is too small for PVTA's current fleet. The site lacks sufficient storage areas for the 110 buses that are based there; does not have adequate employee parking; is not well configured for fleet maintenance; and cannot be expanded. PVTA is in the process of designing a new 308,840-square-foot facility storage and Level I maintenance facility at 665 Cottage Street in Springfield. The existing Main Street facility would be rehabilitated to provide an appropriately sized storage area and Level II maintenance facility.

Figure 14-2 – High Priority Projects



w) PVTA Fleet Replacement Program

PVTA's Fleet Replacement Program is an ongoing effort to ensure that the authority's vehicles are safe, in good repair, and using the most energy-efficient and GHG-limiting propulsion technologies. PVTA recently purchased four diesel/electric 60-foot articulated buses with higher passenger capacity for heavily used routes. PVTA is currently exploring the possibility of adding electric-powered buses to its fleets. PVTA also owns 12 mini-buses with 18-passenger capacity that are operated on shuttle routes; these are replaced at the rate of 2 vehicles per year. PVTA has 144 vans for paratransit service, replaced at the rate of 12-15 vehicle per year. PVTA's support vehicles include maintenance vehicles and supervisor cruisers are replaced at the rate of 3 vehicles per year.

x) Vehicle Maintenance

This is PVTA's program to maintain all vehicles in its fleet, from routine preventative maintenance to major overhauls and vehicle repairs from accidents and unplanned events.

y) PVTA Facility Maintenance

This is PVTA's program to maintain the buildings owned by the authority, which include the Springfield and Northampton garages and Administration Building.

z) Bus Shelter

PVTA owns 135 bus shelters systemwide. This program provides funds to maintain and replace these shelters as vandalism and routine wear-and-tear require. PVTA is also prioritizing installation locations for new shelters on high passenger volume routes, pending available funds.

aa) Intelligent Fare boxes

PVTA is now replacing fare boxes on all Springfield and Northampton buses with more reliable equipment that will be able to read the newer generation of "smart cards" that are now typically being used for fare payment on larger transit systems. This will eventually allow interoperability with other regional transit systems. Greater customer convenience will be achieved with online fare purchase and card re-loading. Additional revenue options may be realized through related marketing.

bb) Northampton Garage Rehabilitation

Built in 1978, PVTA's Northampton Garage will soon be in need of major rehabilitation. The facility is not able to accommodate all standard buses, mini-buses and paratransit vans that must be based there. Some maintenance facilities at the garage are inadequate. The facility also include a

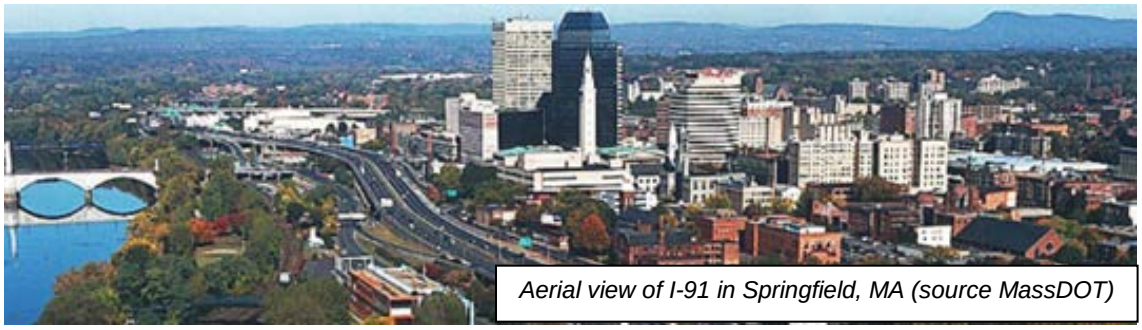
transit-related use (day care) that needs to expand. PVTA is now developing a plan to rehabilitate the garage to meet the expected needs of the future.

cc) Community Transit Grant Program

The Community Transit Grant Program provides capital assistance for purchase of vehicles for transportation for the elderly, persons with disabilities, and families transitioning from public assistance to employment. Funds are distributed on a competitive grant basis regional transit authorities serving the region (PVTA and FRTA) as well as municipal councils on aging.

dd) I-91 Viaduct Long Range Alternatives

Currently under study, this project consists of the long range replacement of the viaduct or elevated portion of Interstate I-91 in downtown Springfield. The I-91 Viaduct deck replacement project began in 2015 to replace the existing deck of the bridge using accelerated bridge construction techniques from I-291 to just south of State Street. While this project is critical to reducing annual maintenance costs and increasing the safety and accessibility of this busy interstate, it is only estimated to have a useful service life of 20 years.



Aerial view of I-91 in Springfield, MA (source MassDOT)

MassDOT initiated the I-91 Viaduct Study to identify existing issues and evaluate alternative alignments for the viaduct section. These may include examination of at-grade and below-grade alternatives, which may be less disruptive to the urban environment and provide a regional highway connection that is more environmentally and financially sustainable in the long-term than the existing configuration. The study will also identify ways to strengthen both the multi-modal accommodations within Springfield and the connections between downtown Springfield and the waterfront.

ee) Freight Congestion

Additional data collection is necessary to incorporate freight congestion into the regional CMP. The Pioneer Valley MPO will continue to work with local freight providers to identify specific areas that may have freight congestion. Appropriate improvements should be incorporated into the design on ongoing transportation improvement projects to address the specific needs surrounding freight congestion in the region.

ff) Commuter Rail Capital Cost – Springfield to New Haven

Since 1999, the Pioneer Valley Region and Connecticut have been working toward the implementation of passenger rail service between Springfield, Hartford, and New Haven. The project is included in the 2017 analysis year of the RTP. The service would operate on the existing 62 mile Amtrak owned Springfield Line connecting the three cities.

Intercity Rail service is expected to have a significant impact on the 13 railroad station areas serving the 17 communities along the rail corridor. The service will connect the third, fourth and fifth largest metropolitan areas in New England and provide a connection to both Amtrak and Metro North Service into the New York Region. When the project is complete, service could expand from the existing six trips daily between New Haven and Springfield, to as many as 25 trips per day.

Current Passenger Rail Service in the vicinity of the Basketball Hall of Fame in Springfield, MA

gg) Commuter Rail Capital Cost – Springfield to Greenfield

The Vermont Department of Transportation provides one train a day service through Massachusetts. In order to increase the frequency of this service, Massachusetts would be responsible for funding their portion of the additional trips. PVPC anticipates an increase in the frequency of Passenger Rail Service from Northampton to Connecticut starting in 2016.

hh) Intersection Improvements South Hadley

This project will upgrade the existing signal equipment and improve traffic signal timing and phasing at the intersection to allow for better traffic flow. Other improvements will include new pavement markings, signage and improved pedestrian access.

ii) Route 57 Reconstruction Southwick

The project involves roadway rehabilitation of town-owned portion of Feeding Hills Road (Route 57) in the Town of Southwick. The work will include full-depth roadway reconstruction, drainage improvements, box widening for turning and bike lanes, ADA-compliant sidewalks, traffic signals (as warranted), hot mix asphalt paving, and other incidental work. The length of the project is approximately 0.5 miles, beginning at the intersection of Powder Mill Road and extending east to Hudson Drive (Industrial Park. The project also includes the intersection of Route 57 with North Longyard Road and Foster Road.

jj) Roosevelt Ave at Island Pond Road and Roosevelt Ave at Alden Street Springfield

Roosevelt Avenue serves as a major commuter route that provides a connection from a primarily residential portion of Springfield to other major commuter routes and retail districts within the City. Roosevelt Avenue also serves as the only crossing of Watershops Pond, which extends approximately 2.5 miles from east to west, via the three lane General Edwards Bridge. The Island Pond Road and Alden Street intersections, located on opposite sides of Watershops Pond, both experience high traffic volumes and congestion during peak conditions. The pedestrian facilities in this area are inadequate with poor connectivity and no protected crossings. The improvement plan realigns Island Pond Road with Roosevelt Avenue to create a three way signalized intersection consolidating all vehicle conflicts at one intersection. The plan also provides signal timing adjustments and new signal equipment at the intersection of Roosevelt Avenue with Alden Street.

kk) Pedestrian Bridge Springfield

MassDOT has been working for some time with the City of Springfield to improve pedestrian connections between the Brightwood and North End neighborhoods, which are divided by existing railroad tracks and Interstate I-91. This project will construct a pedestrian route under the Pan-Am

Aerial concept of pedestrian link (source Google Maps)

railroad in order to provide a safe pedestrian connection between the Brightwood and North End neighborhoods and provide a connection between the Chestnut Middle School area in Brightwood and the Birnie Avenue/Main Street area in the North End.

ll) State Street Bus Rapid Transit

The PVTA is currently interested in implementing Bus Rapid Transit in the Pioneer Valley. AECOMM is performing a study on behalf of the PVTA along the State Street corridor in Springfield, Massachusetts. This project is in a data collection and analysis stage to determine what characteristics of a typical BRT would be best suited for the region. If implemented successfully, it will be the first true Bus Rapid Transit system in the state of Massachusetts and the first ever BRT operated in a Massachusetts Regional Transit Authority.

PVTA transit service on State Street in Springfield, MA (source PVTA)

mm) Bridge Preservation I-91 Springfield and West Springfield

Project consists of the preservation of 6 bridges (S-24-042, S-24-079, S-24-085, S-24-087, W-21-037, and W-21-042) on I-91 in Springfield and West Springfield.

nn) Bridge Replacement Ware

The proposed project consists of the rehabilitation of the Route 9 over the Ware River bridge to improve the existing stone masonry arch with possible replacement of the arch spandrel walls. Repair and replacement options are to be evaluated for the approach spans before proceeding with a final design.

oo) Intersection Improvements Ware Center

This project will improve vehicular, bicycle and pedestrian safety and reduce vehicular queues at the intersections of Main Street and West Street and Main Street and South Street. Work will include resurfacing of the intersection approaches, improved pedestrian and bicycle accommodations and access, new signage and pavement markings. A traffic signal will be installed at the Main Street and West Street intersection, which will be coordinated with the existing signals.

Main Street - Ware, MA

pp) Bridge Reconstruction / Rehabilitation West Springfield

The scope of the project includes a feasibility study of possible rehabilitation options for the existing Route 5 tunnel (Bridge No. W-21-027) carrying Route 20 (Park Avenue) over Route 5. The existing structure was built in 1952.

qq) Memorial Avenue Complete Streets West Springfield

This project entails the rehabilitation of the Memorial Avenue (Route 147) corridor from the Route 5/Memorial Avenue Rotary to the Route 147 Bridge over the Westfield River connecting with the Town of Agawam. “Complete Streets” elements of the project will help to tie together regional projects such as the Memorial Avenue Rotary Replacement project, the Route 147 Bridge between Agawam and West Springfield, the replacement of the CSX Railroad Bridge over Union Street and the rehabilitation of Union Street Extension.

rr) Bridge Replacement Westfield

The proposed project consists of the bridge replacement of Routes 10 and Route 202 over the Little River. Sidewalks will be constructed on each side of the bridge. New traffic signals will be installed at the Southwick Road/Mill Street Intersection.

ss) Westfield Transportation Center

PVTA and the City of Westfield are collaborating on the development of an intermodal transportation center to be located on Elm Street between Church and Arnold Streets in downtown Westfield. The facility will include bus berths for local and intercity buses, bicycle facilities and a connection to the Columbia Greenway Rail Trail, as well as space for shops and transit-related uses inside. The project will support additional transit ridership that is expected to accompany the growth of Westfield State University's downtown campus and student housing. It will also help anchor new urban and commercial redevelopment in the vicinity.

Conceptual Drawing of Westfield Transportation Center from the Westfield Urban Renewal Plan

tt) Boston Road Reconstruction Wilbraham

Route 20 will be reconstructed from the Springfield City Line to Dumaine Street in Wilbraham for a total of 0.28 miles. The Project was originally part of a large 1.3 mile Springfield Project which extended west to Pasco Road. Springfield identified separate funding for their portion of the project. The remaining section of the project will consist of full depth reconstruction and the widening of the roadway to provide two lanes in each direction. New bus bays and shelters will be constructed where needed.

3. Medium Priority Projects

This section provides a summary of the "Medium" priority projects included in the RTP. A complete summary of all "Medium" priority projects is included in Table 14-13 and Figure 14-3. Where applicable, projects have been cross referenced between the table and figure through a numbering system. Description of all regionally significant "Non-Exempt" projects are also included as part of this section.

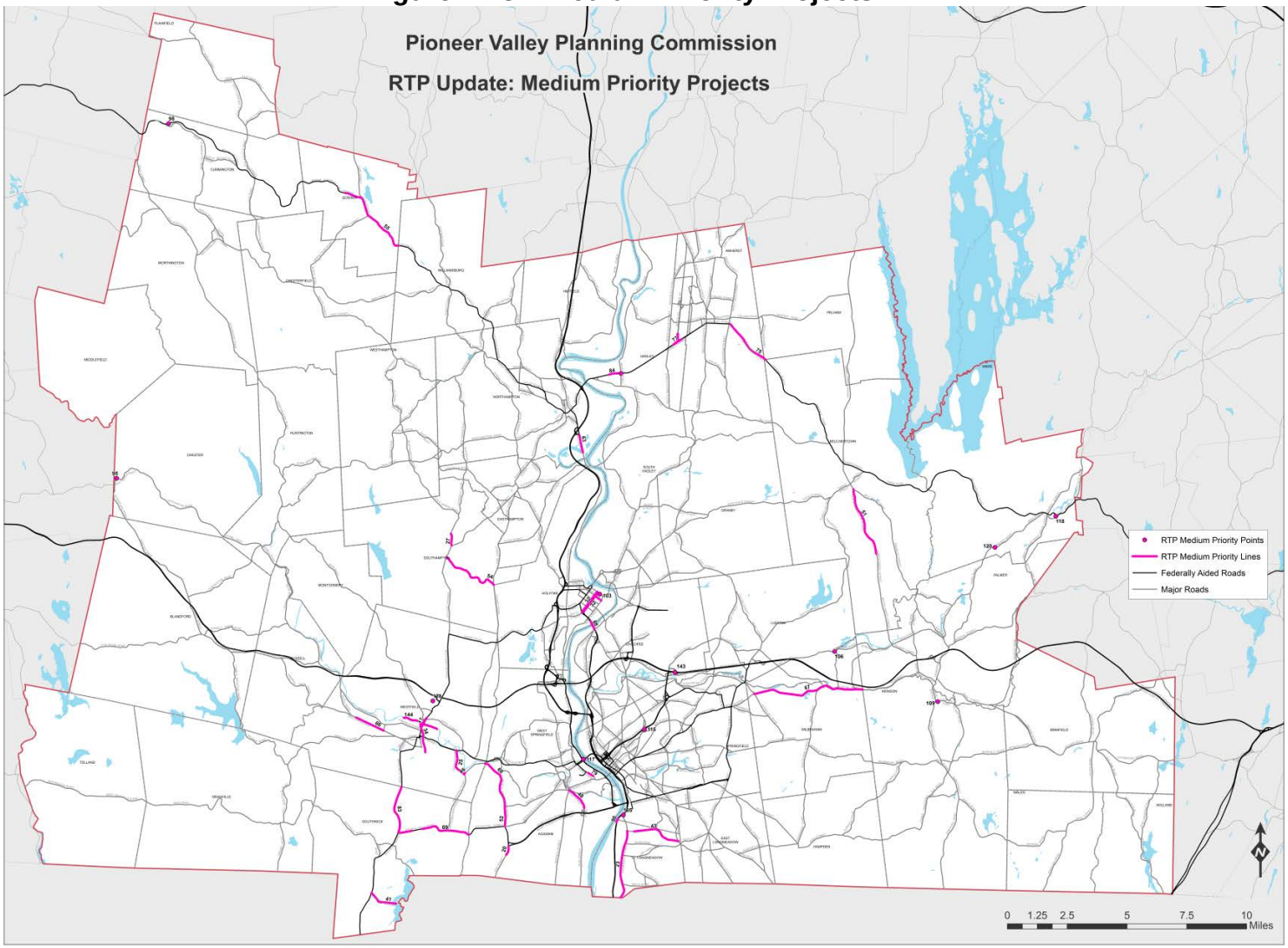
Table 14-13 – Medium Priority Projects

Map Key	Project Name	Project Description	Community	SID	Area of Emphasis	Air Quality Conformity	Total Cost
20	N. Westfield St. / S. Westfield St. (Rte. 187)	Reconstruction: Pine Street to Westfield TL	Agawam	600513	The Movement of People	Exempt	$1,752,628
52	Roadway Reconstruction	RECONSTRUCTION OF ROUTE 187, FROM SOUTHWICK/SPRINGFIELD STREET TO ALLISON LANE (1.29 MILES - PHASE II)	Agawam	607316	The Movement of People	Exempt	$7,320,015
68	Roadway Reconstruction	Route 187 Reconstruction from Allison Ln to Westfield City Line, 1.69 miles(Phase III)	Agawam	607317	The Movement of People	Exempt	$10,802,464
48	Resurfacing and Related work	AGAWAM- RESURFACING & RELATED WORK ON ROUTE 159, FROM MEADOW STREET TO 150 FT. SOUTH OF SUFFIELD STREET (1.1 MILES)	Agawam	607626	The Movement of People	Exempt	$1,696,295
75	Resurfacing Route 9	RESURFACING & RELATED WORK ON ROUTE 9 FROM SOUTHEAST ST IN AMHERST THROUGH PELHAM TO THE BELCHERTOWN T.L. (2.2 MILES)	Amherst / Pelham	606230	The Movement of People	Exempt	$2,368,677
Not Mapped	Route 9 BRT additional enhancements	Add selected features of bus rapid transit to complement signal priority capability	Amherst-Hadley-Northampton		The Movement of People	Exempt	$20,000,000
51	N. Washington Street Reconstruction	Reconstruction: S. Main St. to North Liberty Street	Belchertown	604692	The Movement of People	Exempt	$4,550,805
95	Bridge Reconstruction/Rehab	CHESTER- BRIDGE BETTERMENT, C-11-033, ROUTE 20 OVER WALKER BROOK,	Chester	605207	Safety and Security	Exempt	$326,975
143	Traffic Signals I-90 @ Exit 6	CHICOPEE- TRAFFIC SIGNAL IMPROVEMENTS & RAMP RESURFACING @ I-90 (INTERCHANGE 6)	Chicopee	606599	The Movement of people	Exempt	$2,917,060
88	I-391 Slope Protection	SLOPE PROTECTION IMPROVEMENTS AT I-391 BRIDGE OVER THE CONNECTICUT RIVER	Chicopee	606892	Safety and Security	Exempt	330,661
98	Structures Maintenance	CUMMINGTON- BRIDGE MAINTENANCE, C-21-025, ROUTE 9 OVER THE WESTFIELD RIVER	Cummington	607939	Sustainabilty	Exempt	$324,480
55	Route 9 reconstruction	Resurface: Rte. 112 to Williamsburg TL	Goshen	602888	The Movement of People	Exempt	$9,489,893
84	Route 9 Pedestrian Signals	PEDESTRIAN SIGNAL INSTALLATION AT 2 LOCATIONS ALONG ROUTE 9 NEAR WEST ST	Hadley	606547	The Movement of People	Exempt	$157,463
77	Route 9 @ Route 116 Pedestrian and Bicycle Improvements	INTERSECTION, BICYCLE AND PEDESTRIAN IMPROVEMENTS @ ROUTES 9, 116 & WESTGATE CENTER DRIVE	Hadley	608089	Safety and Security	Exempt	$1,807,104
103	Bridge Replacement	Lyman Street over First Level Canal	Holyoke	600936	Safety and Security	Exempt	$3,132,881
32	High and Maple Street Intersection Improvements	TRAFFIC SIGNAL UPGRADES AT 15 INTERSECTIONS ALONG HIGH & MAPLE STREETS	Holyoke	606450	The Movement of People	Exempt	$1,627,462
49	Resurfacing Dwight, Front, and Heritage Street	RESURFACING & RELATED WORK ON HERITAGE STREET, FRONT STREET & DWIGHT STREET FROM MAPLE ST TO THE 1ST LEVEL CANAL (.54 MILES)	Holyoke	607256	The Movement of People	Exempt	$3,213,317
43	Resurfacing Converse Street	RESURFACING & RELATED WORK ON CONVERSE STREET, FROM LAUREL STREET TO DWIGHT STREET (2.04 MILES)	Longmeadow	606445	The Movement of People	Exempt	$2,851,730
23	Resurfacing Longmeadow Street (Route 5)	RESURFACING & RELATED WORK ON LONGMEADOW STREET (ROUTE 5), FROM THE CT S.L. TO CONVERSE STREET (2.88 MILES)	Longmeadow	607430	The Movement of People	Exempt	$2,961,204
90	I-91 Retaining wall	RETAINING WALL REPLACEMENT/REHABILITATION ON I-91 (SB)	Longmeadow / Springfield	606469	Safety and Security	Exempt	$7,474,811
105	Painting - Structural	LONGMEADOW-SPRINGFIELD- STRUCTURAL STEEL GIRDER PAINTING, S-24-042, S-24-043, A-05-001=S-24-005 & L-14-001, US 5 OVER I-91, RAMP C OVER RAMP A & I-91, US 5 OVER CONNECTICUT RIVER & AMTRAK & I-91 OVER EMERSON ROAD	Longmeadow / Springfield	607644	Sustainabilty	Exempt	$3,115,373
106	Bridge Rehabilitation	East Street over Chicopee River	Ludlow / Wilbraham	605618	The Movement of People	Exempt	$1,000,000
109	Bridge Replacement	Hospital Hill Road over Quaboag Street	Monson	602178	The Movement of People	Exempt	$1,760,403
108	Bridge Reconstruction/Rehab	MONSON- BRIDGE REHABILITATION, M-27-022, BRIMFIELD ROAD (US 20) OVER THE QUABOAG RIVER	Monson	607688	Sustainabilty	Exempt	$4,132,392

Table 14-13 – Medium Priority Projects (Cont.)

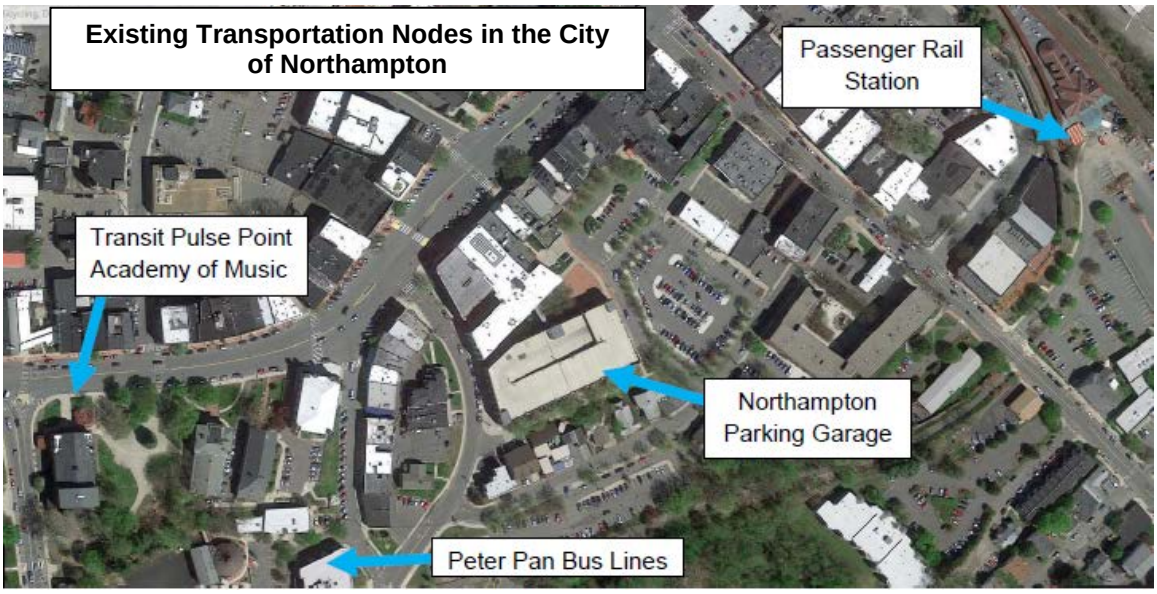
Map Key	Project Name	Project Description	Community	SID	Area of Emphasis	Air Quality Conformity	Total Cost
63	Mountain Rd (Route 5) improvements	Improvements to Mt. Tom Rd	Northampton	605048	The Movement of People	Exempt	$1,460,120
Not Mapped	Northampton Intermodal Center	Downtown bus, rail, intermodal station	Northampton		The Movement of People		$14,000,000
Not Mapped	Pioneer Valley Regional Bike Share	Pioneer Valley Regional Bike Share	Northampton, Amherst, Holyoke, Springfield		The Movement of People	Exempt	$584,929
Not Mapped	Track Expansion	Track Expansion Palmer Ind Park	Palmer		The Movement of Goods	Exempt	$570,000
Not Mapped	Other BRT routes/enhancements	Add selected features of bus rapid transit on selected high-volume PVTA bus routes	Regionwide		The Movement of People	Exempt	$20,000,000
Not Mapped	Transfer facilities and canopies	Improve waiting areas at high-volume transfer points with shelters and customer information services	Regionwide		The Movement of People	Exempt	$5,000,000
Not Mapped	High Speed Rail	East/West high speed rail Capital entire system - Boston to Springfield to Vermont/Canada Line	Regionwide		The Movement of People	Exempt	$785,000,000
54	East St. Roadway Rehabilition	Reconstruction: Rte. 10 to Holyoke TL	Southampton	604653	The Movement of People	Exempt	$6,873,227
27	Safe Routes to School	SOUTHAMPTON- SAFE ROUTES TO SCHOOL (WILLIAM E. NORRIS ELEMENTARY)	Southampton	607453	The Movement of People	Exempt	$827,064
41	Congamond Rd. (Rte. 168) Reconstruction	Roadway reconstruction: From Route 202 to 250 ft before state line (before culvert)	Southwick	604033	The Movement of People	Exempt	$5,798,520
81	Routes 10/202 resurfacing (southerly)	Routes 10/202 resurfacing (southerly)	Southwick	604153	Safety and Security	Exempt	$3,848,635
83	Routes 10/202 resurfacing (northerly)	Routes 10/202 resurfacing (northerly)	Southwick	604155	Safety and Security	Exempt	$1,894,942
69	Highway Reconstruction	FEEDING HILLS ROAD (ROUTE 57) FROM COLLEGE HIGHWAY TO THE AGAWAM TOWN LINE	Southwick	606141	The Movement of People	Exempt	$5,807,112
115	Painting - Structural	SPRINGFIELD- STRUCTURAL STEEL GIRDER PAINTING, PAINT REMOVAL & REPAIR ON S-24-070, S-24-071 & S-24-072, TAPLEY STREET, ST. JAMES AVENUE & RAMP P OVER I-291	Springfield	607643	Sustainabilty	Exempt	$6,106,065
117	Bridge Betterment/Structures Maintenance	SCOUR COUNTERMEASURES, S-24-003=W-21-002, ROUTE 20 (PARK AVENUE) OVER CT RIVER	Springfield / West Springfield	603278	Safety and Security	Exempt	$9,574,173
118	Bridge Replacement	Mass Central RR over Route 9/32 East Main Street	Ware	601701	Safety and Security	Exempt	$12,813,788
120	Deck Replacement	Route 32 (Palmer Road) over the Ware River	Ware	605126	Safety and Security	Exempt	$4,679,529
79	Union Street Underpass	BRIDGE REPLACEMENT, W-21-006, CSX RAILROAD OVER UNION STREET	West Springfield	604746	The Movement of People	Non Exempt	$21,800,061
66	Improvements Court Street and Western Ave (Phase II)	ROUTE 20 ACCESS IMPROVEMENTS ON COURT STREET & WESTERN AVENUE, FROM LLEWELLYN DRIVE EASTERLY TO LLOYDS HILL ROAD (PHASE I) HPP $2,503,688	Westfield	603449	The Movement of People	Exempt	$3,040,359
34	Columbia Greenway Rail trail and River Walk Phase I (Middle)	1.25 miles in length and extends from the Columbia Manufacturing Company to the Cowles Court and Sibley Ave access paths in the north and includes replacement of 5 bridges, rehab of a 6th	Westfield	603783	The Movement of People	Exempt	$5,091,077
46	Route 187 - Sherman's Mill Bridge reconstruction	Reconstruct Route 187 from 260ft north of Bridge to 800ft east of Pontoosic rd.	Westfield	604445	Safety and Security	Exempt	$10,252,483
25	Route 187 - Little River Road reconstruction	Reconstruct Route 187 from 300 ft south of Route 20 to 260 ft North of Sherman Bridge	Westfield	604446	Safety and Security	Exempt	$6,206,561
17	Columbia Greenway Rail Trail Phase III (North)	Construction of the North Section - Cowles Court to Westfield River Bridge TFPC for project is $2,696,193	Westfield	604968	The Movement of People	Exempt	$300,000
124	Bridge Reconstruction/Rehab	WESTFIELD- SUPERSTRUCTURE REPLACEMENT, W-25-021, LOCKHOUSE ROAD OVER PVRR	Westfield	607646	The Movement of Goods	Exempt	$2,182,675
50	Improvements Court Street and Western Ave (Phase II)	WESTFIELD- IMPROVEMENTS & RELATED WORK ON ROUTE 20, COURT STEET & WESTERN AVENUE, LLOYDS HILL ROAD TO HIGH STREET/MILL STREET INTERSECTION (PHASE II) Eastern Section	Westfield	607773	The Movement of People	Exempt	$5,723,234
144	Westfield River Levee Multi use Path	WESTFIELD RIVER LEVEE MULTI-USE PATH CONSTRUCTION, FROM CONGRESS ST TO WILLIAMS RIDING WAY (NEAR MEADOW ST) (2MILES)	Westfield	608073	The Movement of People	Exempt	$7,107,733
Not Mapped	Westfield Industrial Park Track Expansion	Track Expansion Westfield Ind Park	Westfield		The Movement of Goods	Exempt	$3,025,070
67	Resurfacing Route 20	RESURFACING & RELATED WORK ON ROUTE 20, FROM STONY HILL ROAD TO THE PALMER TOWN LINE (4.8 MILES)	Wilbraham	607990	The Movement of People	Exempt	$8,111,938
					53 Total Medium Priority Projects		**$1,052,793,390**

Figure 14-3 – Medium Priority Projects



a) Northampton Intermodal Center

The City of Northampton is served by fixed route transit service that pulses out of a bus stop located in front of the Academy of Music. Passenger rail service returned to the City of Northampton in 2014 at their Union Station site. Intercity bus services are provided by Peter Pan Bus Lines near the city's Roundhouse parking lot. There is limited coordination between the passenger rail and transit service and all three modes are located in different sections of the downtown.



The city has discussed the need to move its existing transit pulse point at the Academy of Music further east along Main Street. The relocation of this pulse point or the creation of a secondary pulse point closer to the heart of the city could assist in enhancing transit ridership and future connections to passenger rail service at Union Station. As a long term downtown improvement, the City of Northampton has discussed the need to evaluate locations for a multi-modal facility near the railroad tracks which could include an indoor train station, bus connections, and commuter parking. Additional analysis is necessary prior to the advancement and implementation of changes to existing transportation service in downtown Northampton. The identification of an appropriate site for an intermodal transportation center in the City of Northampton would improve the efficiency of existing transportation services and provide opportunities to enhance the local economy through transit oriented development.

b) Route 9 Bus Rapid Transit Enhancements

Transit stakeholders in the Northampton/Hadley/Amherst corridor have regularly expressed support for higher capacity bus service between downtown Northampton and Amherst/UMass. Implementing some or all the

elements of a bus rapid transit (BRT) system have frequently been mentioned as a long range goal. In 2011, MassDOT activated signal priority equipment at 10 intersections on Route 9 between University Drive and Exit 19, which PVTA buses are able to use to reduce waiting times at traffic signals. Additional BRT enhancements that could be added include queue jump lanes, simplified routing, and level boarding platforms.

c) Additional Bus Rapid Transit

As a long term goal in addition to BRT in the Route 9 corridor discussed above, PVTA is interested in improving passenger carrying capacity in other high-volume corridors in the region. These could include routes between Holyoke and Springfield on which existing express bus services are popular.

d) Improvements to the Union Street Railroad Underpass

The CSX railroad tracks currently restrict truck traffic from travelling through West Springfield in the north/south direction due to low bridge clearances. There are three bridges located on Main Street, Union Street and River Street that can only accommodate vehicles measuring less than 12 feet in height. This requires all truck traffic to travel on Route 5 and exit at either the North End rotary or the Memorial Avenue rotary to reach a final destination. The existing Union Street underpass will be improved to provide adequate vertical clearance for large vehicles. The City of West Springfield has worked in cooperation with MassDOT and CSX to identify a possible design alternative for increasing the vertical clearance at this location. While several possible design alternatives have been developed, a final design has not yet been accepted by all parties. Recently, CSX responded to MassDOT's latest design proposal with two suggested alternatives that may provide a solution that is agreeable to all parties. The proposed alternatives are currently under review by MassDOT.

e) Transfer Facilities

As part of its shelter improvement program, PVTA is seeking to improve conditions for customers waiting at high-volume bus transfer locations in the region. This would include higher quality and larger shelters, electronic customer information displays, and canopies for shelter.

f) East / West Rail

In a 2005 transportation appropriation Congress designated the Boston – Springfield to New Haven, CT as well as the Springfield to Albany, NY corridors as part of the Northern New England High Speed Rail Corridor. Congress further provided funds to study the feasibility of High Speed Rail Service in the Boston – Springfield - New Haven Corridor.

This ongoing study to assess infrastructure (capital) needs and operating costs for passenger rail service connections between Springfield and Boston, MA must continue to be advanced. Expanded east-west service is complicated due to the ownership of railroad tracks between Springfield and Worcester by CSX and existing MBTA commuter rail service between Worcester and Boston. Studies have identified the potential for one daily run between Boston and Montreal and eight daily runs between Boston and New Haven, Connecticut that would have a stop in Springfield. Expanded passenger rail service would allow existing residents to continue to live in the Pioneer Valley and connect to job markets to the east and south of the region.

4. Low Priority Projects

This section provides a summary of the "Low" priority projects included in the RTP. A complete summary of all "Low" priority projects is included in Table 14-14 and Figure 14-4. Where applicable, projects have been cross referenced between the table and figure through a numbering system. Description of all regionally significant "Non-Exempt" projects are also included as part of this section.

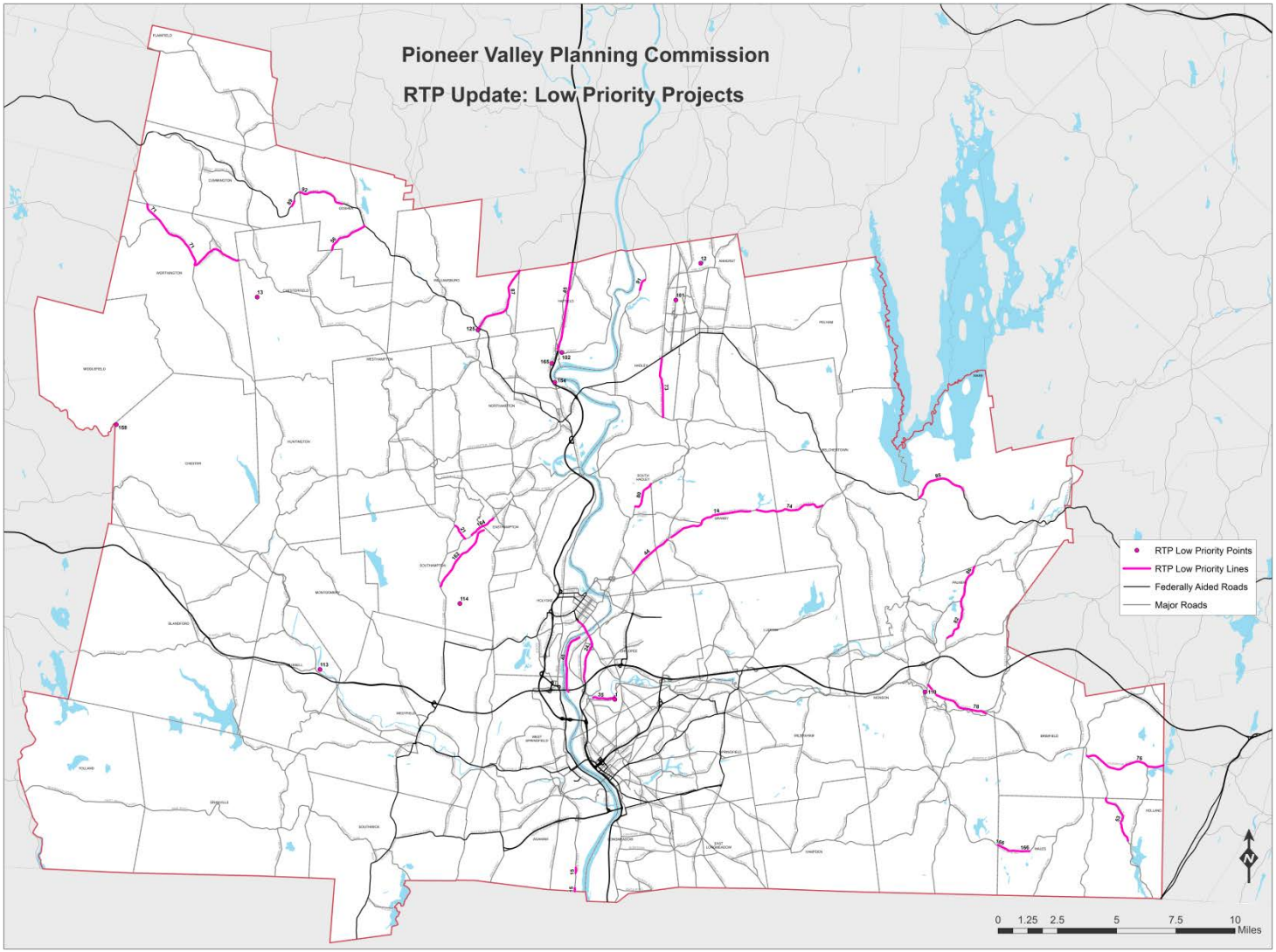
Table 14-14 – Low Priority Projects

Map Key	Project Name	Project Description	Community	SID	Area of Emphasis	Air Quality Conformity	Total Cost
15	Sidewalk Construction	Sidewalk Construction on Route 159 From CT Line to Woodcliff Ave and From South St to River Road	Agawam	607876	The Movement of People	Exempt	$592,518
2	Bridge Reconstruction/Rehab	AMHERST- BRIDGE REPLACEMENT, A-08-008, MILL STREET OVER MILL RIVER	Amherst	607528	The Movement of People	Exempt	$2,158,416
Not Mapped	Bridge Demolition	BELCHERTOWN- WARREN BRIDGE DEMOLITION, B-05-023, W-07-012,(EAST MAIN STREET/NAULTAUG BROOK)	Belchertown	607524	Sustainabilty	Exempt	$2,477,738
74	Route 202 Resurfacing	Resurfacing and related work on Route 202	Belchertown / Granby	604819	The Movement of People	Exempt	$6,415,167
76	Resurfacing and Related work	Resurfacing and Related work on Route 20 from W. Old Sturbridge Road (MM 88.3) to Old Streeter Road (MM92.1)	Brimfield / Sturbridge	608022	The Movement of People	Exempt	$4,094,505
158	Keystone Arch Bridge Project	Restoration of two historic Keystone Arch Bridges to a condition for public access	Chester	607210	The Movement of People	Exempt	$1,762,579
3	Bridge Replacement	CHESTERFIELD- BRIDGE REPLACEMENT, C-12-009, IRELAND STREET OVER WEST BRANCH BRONSON BROOK	Chesterfield	607549	The Movement of People	Exempt	$3,474,682
40	Connecticut Riverwalk	Construction: Plainfield St. to Nash Fld.	Chicopee	602911	The Movement of People	Exempt	$3,743,004
35	Chicopee Riverwalk	Construction: From Chicopee Center, 2.5 mi.	Chicopee	602912	The Movement of People	Exempt	$3,902,850
24	INTERSTATE MAINTENANCE & RELATED WORK ON I-390	INTERSTATE MAINTENANCE & RELATED WORK ON I-391	Chicopee/Holyoke	607560	The Movement of People	Exempt	12,273,537
89	Route 9 Retaining Wall	Route 9 Retaining Wall	Cummington	606797	The Movement of People	Exempt	$1,941,965
Not Mapped	Structures Maintenance	DISTRICT 2- SCOUR COUNTERMEASURES & SUBSTRUCTURE MAINTENANCE OF D-06-002=G-12-003, M-27-022=P-01-033, P-01-013, W-19-005, W-39-007	District 2	603935	Sustainabilty	Exempt	$5,027,687
Not Mapped	Structures Maintenance	SYSTEMATIC BRIDGE MAINTENANCE AT VARIOUS LOCATIONS (2016) Project consists of systematic maintenance on various bridges in District Two.	District 2	607516	Sustainabilty	Exempt	$1,712,942
Not Mapped	Structures Maintenance	SYSTEMATIC BRIDGE MAINTENANCE AT VARIOUS LOCATIONS (2017) Project consists of systematic maintenance on various bridges in District Two.	District 2	607517	Sustainabilty	Exempt	$1,923,977
Not Mapped	Structures Maintenance	SYSTEMATIC BRIDGE MAINTENANCE AT VARIOUS LOCATIONS (2018) Project consists of systematic maintenance on various bridges in District Two.	District 2	607959	Sustainabilty	Exempt	$1,776,852
164	Sidewalks on Route 10	SIDEWALK CONSTRUCTION & RELATED WORK ON ROUTE 10, FROM MM 19.9 NORTHERLY TO MM 20.9 (600' SOUTH OF SOUTH STREET)	Easthampton / Southampton	608026	The Movement of People	Exempt	$676,444
56	West Street Reclamation	Resurfacing and related work on West Street from South Maple Street to Chesterfield TL 1.8 miles	Goshen	605150	The Movement of People	Exempt	$3,542,893
92	Route 9 Resurfacing	GOSHEN- RESURFACING AND RELATED WORK ON ROUTE 9 FROM CUMMINGTON T.L. TO ROUTE 112 (CAPE STREET)	Goshen	608126	The Movement of People	Exempt	$4,094,505
44	Resurfacing Route 202	GRANBY- SOUTH HADLEY- RESURFACING & RELATED WORK ON ROUTE 202, FROM LYMAN STREET SOUTH HADLEY TO PLEASANT STREET GRANBY (2 MILES)	Granby / South Hadley	607474	The Movement of People	Exempt	1,466,400
73	South Maple Street	Reconstruction: South of Rte. 9 to Bay Rd.	Hadley	602796	The Movement of People	Exempt	$7,401,221
101	Bridge Preservation	BRIDGE REPLACEMENT, H-01-017, NORTH HADLEY	Hadley	604049	The Movement of People	Exempt	$4,701,147
91	Route 47 Resurfacing and Culvert	RESURFACING AND RELATED WORK ON ROUTE 47 FROM COMINS DRIVE TO OLD RIVER DRIVE, INCLUDES CULVERT REPLACEMENT AT RUSSELVILLE BROOK	Hadley	607886	Sustainability	Exempt	$1,094,988
102	Bridge Replacement	BRIDGE REPLACEMENT, H-11-025, ELM STREET OVER THE B&M R.R.	Hatfield	603608	The Movement of People	Exempt	$766,075

Table 14-14 – Low Priority Projects (Cont.)

Map Key	Project Name	Project Description	Community	SID	Area of Emphasis	Air Quality Conformity	Total Cost
45	Resurfacing I-91	HATFIELD- NORTHAMPTON- WHATELY- INTERSTATE MAINTENANCE & RELATED WORK ON I-91, FROM MM 26.9 TO MM 34.4 (7.5 MILES)	Hatfield	606577	The Movement of People	Exempt	$10,335,146
53	Brimfield Road improvements	Resurfacing and related work from Brimfield Town Line to Stafford Road	Holland	604962	The Movement of People	Exempt	$1,824,979
Not Maped	Resurfacing I-90	LUDLOW- PALMER- WILBRAHAM- RESURFACING, GUARDRAIL & RELATED WORK ON I-90 (MM 55 TO MM 60)	Ludlow / Palmer	606595	The Movement of People	Exempt	$6,716,736
110	Bridge Replacement	State Avenue over the Quaboag River	Monson / Palmer	604136	The Movement of People	Exempt	$6,427,779
154	Structures Maintenance	NORTHAMPTON- CULVERT REPAIR UNDER I-91, ROUTE 5 AND BMRR AT STA 245	Northampton	605617	The Movement of People	Exempt	$1,879,729
165	Retaining Wall Replacement North King Street	NORTHAMPTON- RETAINING WALL REPLACEMENT AT CULVERT UNDER NORTH KING STREET (ROUTE 5&10), 300 FEET SOUTH OF COLES MEADOW ROAD (MM 25.4)	Northampton	608161	Sustainability	Exempt	$1,751,980
82	Rte. 32 (Ware Road) Reconstruction Phase I	RECONSTRUCTION OF ROUTE 32, FROM 765 FT. SOUTH OF STIMSON STREET TO 1/2 MILES SOUTH OF RIVER STREET (PHASE I) (1.63 MILES)	Palmer	601504	Safety and Security	Exempt	$8,394,912
78	Route 20 improvements	RESURFACING & RELATED WORK ON ROUTE 20 - FROM EAST OF RTE 32 INTERSECTION EASTERLY TO MM 81.7 (2.0 MILES)	Palmer	603873	The Movement of People	Exempt	$1,642,283
Not Mapped	Resurfacing	PALMER- RESURFACING & RELATED WORK ON I-90 (MM 60 TO MM 66)	Palmer	606610	The Movement of People	Exempt	$7,722,754
86	Rte. 32 (Ware Road) Reconstruction Phase II	PALMER- RECONSTRUCTION OF ROUTE 32, FROM 1/2 MILE SOUTH OF RIVER STREET TO THE WARE T.L. (PHASE II) (2.1 MILES)	Palmer	607372	The Movement of People	Exempt	$14,114,445
113	Bridge Rehabilitation	Bridge Street over Westfield River	Russell	606499	The Movement of People	Exempt	$15,200,840
80	Route 116 Resurfacing	RESURFACING & RELATED WORK ON ROUTE 116 (AMHERST ROAD), FROM WOODBRIDGE STREET TO PEARL STREET	South Hadley	606452	The Movement of People	Exempt	$2,062,559
114	Bridge Replacement	Valley Road over Moose Brook	Southampton	603024	The Movement of People	Exempt	$2,251,845
21	Glendale Rd. (Phase II)	Reconstruction: Pomeroy Meadow Road to Route 10.	Southampton	604738	The Movement of People	Exempt	$2,764,702
162	Rail Trail Construction	GREENWAY RAIL TRAIL CONSTRUCTION, FROM COLEMAN RD TO ROUTE 10 (3.5 MILES)	Southampton	607823	The Movement of People	Exempt	$7,694,053
Not Mapped	Sidewalk improvements	Sidewalk reconstruction and resurfacing at various locations on Route 119	Wales	605669	The Movement of People	Exempt	$500,323
166	Reconstruction Monson Road	WALES- RECONSTRUCTION & IMPROVEMENTS ON MONSON ROAD, FROM THE MONSON T.L. TO REED HILL ROAD (1.5 MILES)	Wales	608163	The Movement of People	Exempt	$5,314,811
85	Resurfacing Route 9	RESURFACING & RELATED WORK ON ROUTE 9, FROM .1 MILE WEST OF THE WARE T.L. EASTERLY TO MM 64.7 IN WARE (2.1 MILES)	Ware	603874	The Movement of People	Exempt	$1,742,387
121	Bridge Reconstruction/Rehab	WEST SPRINGFIELD- BRIDGE RECONSTRUCTION, W-21-011, PROSPECT AVENUE OVER PVRR	West Springfield	607526	The Movement of People	Exempt	$1,143,989
87	Resurfacing High and Mount	Reconstruction of High Street and Mountain Street	Williamsburg	607231	The Movement of People	Exempt	$5,542,035
125	Bridge Replacement	WILLIAMSBURG- BRIDGE REPLACEMENT, W-36-011, BRIDGE STREET OVER THE MILL RIVER	Williamsburg	607675	The Movement of People	Exempt	$9,371,261
71	Resconstruction Route 143	Route 143 Reconstruction and Related Work	Worthington	606912	The Movement of People	Exempt	$19,243,176
						45 Total Low Priority Prjects	**$210,664,816**

Figure 14-4 – Low Priority Projects



5. Project Status

The 2012 RTP included 168 highway projects with a combined estimated cost of $824,816,026 (including inflation). As can be seen in Table 14-15, the 2016 RTP has reduced the total number of project by 44 projects, but the total estimated cost has gone up by approximately $100,000,000 (including inflation). The project reduction was due mostly to the results of MassDOT deactivating projects that had not advanced beyond pre 25% design for a number of years, and PVPC staff removing any project that was never issued a MassDOT approved State Identification Number (SID). The removal of unapproved projects (no SID) was done by PVPC staff to ensure that the 2016 RTP could be fiscally constrained. Table 14-15 also shows that 53 project were constructed since the 2012 RTP, while 52 new projects where added to the 2016 RTP.

Table 14-15 – Project Status

2016 RTP Project Status	# Projects	Cost
Project Proposed to be Removed from RTP	60	$205,397,568
Project Constructed	52	$181,677,481
Projects to be Added	51	$228,304,798
All Projects in RTP	124	$923,919,653

6. Visionary Projects

Visionary Projects are defined as projects that would likely result in an improvement to the regional transportation system but do not have an identified source of construction funding. Visionary projects are not included as part of the Financial or Air Quality Conformity components of the RTP. The RTP will need to be amended to include any identified visionary projects as funding becomes available in order to demonstrate financial constraint and conformance with the requirements of the Clean Air Act Amendments.

a) South End Bridge Improvements, Connector, Route 5 to Route 57 (over Route 5/57 rotary), South End Bridge Pedestrian Link

The South End Bridge (Julia Buxton Bridge) connects the communities of Agawam and Springfield and serves as the fundamental link between Route 5, Route 57 and I-91. The traffic along these main corridors has increased dramatically, causing congestion along the bridge and highway. In the vicinity of the bridge, Interstate 91 reduces from three lanes of travel in each direction to two. A number of difficult weaving movements also exist in this area, which when combined with the high traffic volumes contribute to congestion and safety problems in this area. MassDOT installed new pavement markings and warning signs along the approaches and weaving section of the Agawam Route 5/Route 57 rotary in August 2012.

Previous studies conducted and commissioned by MassDOT recommended the elimination of the rotary and construction of a new slip ramp off of the bridge to create direct access from the bridge to Route 57 westbound. Additional improvement alternatives to the slip ramp were studied in an attempt to reduce construction costs. One alternative considered the conversion of the existing rotary to a diverging diamond interchange.

Improvements for this location are currently on hold pending the outcome of MassDOT's ongoing I-91 Viaduct study. An important component of this study will be to identify the need for additional capacity on I-91, the South End Bridge, and the ability to provide a pedestrian connection between the existing Agawam and Springfield Riverwalks.

b) Expanded Passenger Rail Service on the Vermonter Line to Springfield.

The Massachusetts State Rail Plan identifies expanded passenger rail service along the Connecticut River line as a cost-effective improvement. Seven additional daily round-trips are forecast for the newly realigned Vermonter service in the Knowledge Corridor, one additional round-trip between St. Albans, Vermont, and Springfield, Massachusetts, and six round trips between Greenfield and Springfield are recommended.

Expanded passenger rail service results in increased ridership, a travel time savings for existing users based recently completed infrastructure improvements, a reduction in emissions, the potential for reduced highway maintenance costs, and improved highway safety. The Pioneer Valley MPO will continue to work with MassDOT to identify operational funding to provide expanded passenger rail service along this line.

c) East / West Rail

Studies have identified the potential for one daily run between Boston and Montreal and eight daily runs between Boston and New Haven, Connecticut that would have a stop in Springfield. Expanded east/west passenger rail service would allow existing residents to continue to live in the Pioneer Valley and connect to job markets to the east and south of the region.

d) Upgrade Track on the New England Central Rail Line to 286,000 pound capacity

The Massachusetts State Rail Plan identifies this upgrade of the NECR track from the Vermont state line to the Connecticut state line as a high priority. Increasing the capacity of the track from 263,000 pounds to 286,000 pounds will bring the line up to modern rail industry standards. New heavier continuous welded rail will allow for increased train speeds which will benefit both shippers and receivers of freight commodities.

e) Passenger Rail Service on the Central Corridor

The Central Corridor has the potential to link state universities in Vermont, Massachusetts, and Connecticut. Further study of this line would address the feasibility of advancing improvements to accommodate passenger rail service in the future. Any study should include an estimate of the cost to upgrade and operate the line to meet passenger rail service requirements, identify the location of potential stations, and determine the feasibility of expanding passenger rail service to this line.

7. Projects Removed from the RTP.

The following projects were included as part of the 2012 Regional Transportation Plan but have not been included in the 2016 RTP. The following sections provide a table of all removed projects (not including projects that were removed due to construction) as well as more information on major project.

a) Route 57 Phase II - Route 187 to Southwick Town Line

Route 57 currently runs from the South End Bridge in Springfield to the west, providing access to and from Springfield for many southwestern communities. The roadway is a limited access highway from the Route 5/57 rotary to its interchange with Route 187 in Agawam. Originally proposed to be constructed in two phases, phase one of the project included the relocation of Route 57 from Mill Street to Route 187 (South Westfield Street) and was completed in 1996. The second phase proposed the extension of the new Route 57 from Route 187 west to the Agawam/Southwick line reconnecting to the original roadway. Phase two is no longer actively under design and has been removed from the RTP as the estimated cost of construction cannot be accommodated as part of the RTP Financial Plan.

Table 14-16 – Projects Removed from the 2016 RTP

Removed by	Project Name	Project Description	Community	SID	Base Cost
PVPC	Bikeway Loop	Main Street to Robinson State Park Via Water works ROW	Agawam	X00003	$635,000
PVPC	Route 57 Phase II	Extension of Route 57 from Route 187 to Southwick Town Line	Agawam/Springfield	600586	$80,000,000
PVPC	Truck Access Improvements	Rt 5 to Merrick Neighborhood Access improvements	Agawam/West Springfield		
PVPC	Truck Access Improvements	Rt 5 to Merrick Neighborhood Access improvements	Agawam/West Springfield		
MassDOT	Bridge Replacement	Route 20 over Cushman Brook and Walker Brook	Becket / Chester	605440	$2,555,300
MassDOT	Bay Road Improvements	Resurfacing and related work on section of Bay Rd	Belchertown	605676	$700,000
MassDOT	Landscape/Roadside Development	Wildflower Bed Establishment	Bernardston/Deerfield/ Hatfield/Northampton/ Holyoke	604491	$1,064,437
MassDOT	Resurfacing and Related Work	I-90 (MM 60 to MM 69.6)	Brimfield/Palmer/Warren	606013	$24,930,148
MassDOT	Resurfacing and Related Work	I-90 (MM 50 to MM 60)	Chicopee/Ludlow/Palmer/Wilbraham	606012	$15,000,000
MassDOT	Rte. 112	Rehabilitation: Worthington TL north 1.5 miles	Cummington	600301	$600,000
MassDOT	Elm Street Reconstruction	Reconstruction: Springfield CL to Center Sq.	East Longmeadow	601350	$3,500,000
PVPC	Bridge Replacment	Glendale Street over Manhan River BR#E-05-005	Easthampton	X00045	$750,000
PVPC	Intersection Improvements	Reconstruct and signalized intersection of Main and South Street	Easthampton	X00046	$250,000
PVPC	Roadway Reconstruction	Pomeroy Meadow Road Southampton TL to Loudville Road	Easthampton	X00050	$1,010,291
PVPC	Mountain Rd (Route 141)	Automated closure of Mountain Rd - Easthampton	Easthampton		$540,800
PVPC	Intersection Improvements	Reconstruct intersection of Northampton Street and O'Neill Street	Easthampton 2011??	X00047	$250,000
MassDOT	Amherst Street improvements	Resurfacing and related work	Granby	605682	$1,300,000
PVPC	Resurfacing Route 57	Resurface 8 miles from Sodum Street to Tolland TL	Granville	X00006	$1,600,000
MassDOT	Bikeway/Bike path Construction	Canalwalk, Phase 3 (from Dwight St to Lyman St)	Holyoke	603264	$2,800,000
MassDOT	Superstructure Replacement	Cabot Street/2nd Level Canal	Holyoke	606257	$5,000,000
PVPC	Intersection Improvements	Linden Street improvements to 5 intersections signal coordination	Holyoke	X00072	$400,000
PVPC	Cabot Street Reconstruction	Reconstruct from Main Street to South Canal Street	Holyoke	X00073	$320,000
PVPC	Northampton Street Rehabilitation	Northampton Street Rehabilitation	Holyoke	X00075	$2,000,000
PVPC	Route 5 Traffic Improvements	Route 5 Traffic Signal Improvements	Longmeadow		$4,605,761
MassDOT	Lower Hampden Rd Phase 2	Reconstruction from 3/4 miles south of Ely Road easterly to the intersection of Elm Street and Bridge Street	Monson	605687	$4,750,000
MassDOT	Bridge Rehabilitation	Clement Street over Mill River	Northampton	15350	$0
MassDOT	Route 66 (West St.) at Earle Street intersection improvements	Intersection improvement: installation of Signal to mitigate peak hour congestion	Northampton	604452	$150,000
MassDOT	Landscape/Roadside Development	Drainage Repairs & Slope Stabilization at Old Water Street	Northampton	605143	$515,000
MassDOT	Bridge	WATER ST OVER ROBERTS MEADOW BRK	Northampton	605320	$763,948
PVPC	Glendale Raod Reconstruction	From Route 66 to Easthampton TL	Northampton	X00088	$1,000,000
PVPC	Ryan Road Reconstruction	From West Farms Road to Brookside Circle	Northampton	X00089	$1,100,000
PVPC	Route 9 @ Old Ferry Road and Day Ave	Intersection Improvements and Signalization	Northampton		$1,800,000
PVPC	King Street Reconstruction and Related Improvements	Improvements: Damond At King, King at Summer and North, and North and King at Finn	Northampton		$9,000,000

Table 14-16 – Projects Removed from the 2016 RTP (Continued)

Removed by	Project Name	Project Description	Community	SID	Base Cost
PVPC	Traffic Signal Coordination	Traffic signal coordination projects	Regionwide		Further Study
PVPC	At Grade Rail Crossing Improvements	Regional Railroad Grade crossing improvements	Regionwide		Further Study
PVPC	Park and Ride	Regional Park and Ride Lot improvements	Regionwide		$1,124,864
PVPC	Massachusetts Turnpike Off Ramp Congestion Project	Massachusetts Turnpike off ramp congestion improvements	Regionwide		
PVPC	I&M Projects	Other Interstate Maintenance Projects	Regionwide		
PVPC	I-291 congestion improvements	I-291 congestion improvements	Regionwide		Further Study
MassDOT	Main St, Front, Route 141 Improvements (Indian Orchard)	Traffic signal and related work Main Street, Front Street., Myrtle Street (Route 141) Indian Orchard	Springfield	604448	$785,000
MassDOT	Bridge	S-24-016, HWY ARMORY ST OVER RR CSX	Springfield	605339	$2,709,592
MassDOT	Bridge	S-24-028, HWY ST JAMES AVE OVER RR CONRAIL (ABANDNED)	Springfield	605340	$3,681,260
MassDOT	Bridge	S-24-043, I 91 RAMP C OVER I 91 & RMP A TO US 5 NB	Springfield	605341	$9,206,612
MassDOT	Plumtree Rd improvements	Resurfacing and related work from Allen St to Wilbraham Rd	Springfield	605683	$2,000,000
PVPC	Intersection Improvements	Allen Street and Cooley Street intersection improvements	Springfield		$1,081,600
PVPC	Connecticut Riverwalk	CT Riverwalk pedestrian access improvements	Springfield		$1,912,269
PVPC	Intersection Improvements	Bay St @ Berkshire Ave intersection improvements	Springfield		$912,490
PVPC	Intersection Improvements	Central Street at Hancock Street intersection improvements	Springfield		$584,929
PVPC	Intersection Improvements	St James @ St James blvd intersection improvements	Springfield		$1,423,312
PVPC	Resurfacing Route 57	From Granville TL to Sandisfield TL	Tolland	X00005	$0
MassDOT	Ware River Valley Preservation Project	Ware River Valley Greenway Trail & Covered Bridge Preservation Project	Ware	603454	$1,400,000
MassDOT	Full Deck Replacement/Full Steel Painting	Route 32 (Palmer Road) over the Ware River	Ware	606256	$2,000,000
PVPC	Intersection Improvements	Morgan Road at Piper Cross Intersection Improvements	West Springfield		$657,966
PVPC	Intersection Improvements	Intersection improvements - Amostown Road at Dewey Street	West Springfield		$912,490
PVPC	At Grade Rail Crossing Improvements	Improvements to 1st and 2nd St/Bridge St Railroad crossing	West Springfield		$416,000
MassDOT	Safe Routes to School	Paper Mill School	Westfield	606046	$375,500
MassDOT	Southampton Rd.	Reconstruction: Rte. 66 to Stage Rd	Westhampton	602386	$1,400,000
MassDOT	Chesterfield Rd.	Reconstruction: Northampton TL to Chesterfield TL	Westhampton	602387	$2,400,000
MassDOT	Kings Highway and Reservoir Rd	Reconstruction: Kings Highway from Perryhill Road to Reservoir Rd, and Reservoir Rd from Kings Highway to Pine Island Lake Dam	Westhampton	602822	$1,360,000
MassDOT	Bridge Replacement	Geer Hill Road over Meekin Brook	Williamsburg	602176	$163,000
			Project Proposed to be Removed from RTP	**60**	**$205,397,568**
			Roadway/Bikepaths	**51**	**$104,331,804**
			Bridge/Walls	**9**	**$101,065,764**

CHAPTER 15

FINANCIAL ELEMENT

Title 23 CFR Section 450.322 and 310 CMR 60.03(9) requires the RTP to be financially constrained. The financial element must demonstrate which projects can be implemented using current revenue sources and which are to be implemented using proposed revenue sources while the existing transportation system is being adequately operated and maintained. Projects can only be programmed up to the congressionally authorized spending amounts in any individual fiscal year.

The estimate of revenue for the region will be highly dependent upon the funding allocated to Massachusetts as part of future transportation bills. Estimates of the projected revenue sources for highway and transit projects have been made based on past historical trends and information available from the estimated apportionment of the federal authorizations contained in the Moving Ahead for Progress in the 21 Century (MAP-21) Act. Financial constraint will be maintained in the 2016 RTP Update.

A. REVENUE

The overall RTP, and each fiscal year contained herein, is financially constrained to the annual federal apportionment and projections of state resources reasonably expected to be available during the appropriate time-frame. Projections of federal resources are based upon the estimated apportionment of the federal authorizations contained in MAP-21, as allocated to the region by the State or as allocated among the various MPOs according to federal formulae or MPO agreement. Estimates used to develop the highway component of the financial plan were developed by MassDOT. A summary of the projected highway revenue from 2016 – 2040 is presented in Table 15-1.

Table 15-1 – Projected Highway Revenue 2016 - 2040

Total Avialable for Programming in the Pioneer Valley RTP	2016-2020 Total	2021-2025 Total	2026-2030 Total	2031-2035 Total	2036-2040 Total	GRAND TOTAL Total
	$ 420,177,748	**$ 426,618,217**	**$ 520,221,270**	**$ 582,504,200**	**$ 623,968,064**	**$ 2,573,489,499**
Statewide Interstate Maintenance	$ 29,750,182	$ 28,157,124	$ 35,185,257	$ 39,841,190	$ 42,920,276	**$ 175,854,029**
Statewide NHS	$ 19,572,131	$ 18,955,373	$ 23,686,712	$ 26,821,085	$ 28,893,926	**$ 117,929,227**
Statewide Bridge	$ 105,433,448	$ 102,111,025	$ 127,598,354	$ 144,482,963	$ 155,649,185	**$ 635,274,975**
Statewide Infrastructure	$ 4,219,341	$ 4,086,381	$ 5,106,359	$ 5,782,064	$ 6,228,925	**$ 25,423,070**
Remaining Statewide Programs	$ 96,040,886	$ 101,493,887	$ 126,827,176	$ 143,609,738	$ 154,708,473	**$ 622,680,160**
NFA Bridge Preservation	$ 54,049,500	$ 54,860,243	$ 55,670,985	$ 56,481,728	$ 57,292,470	**$ 278,354,926**
Regional Discretionary Funding	$ 111,112,260	$ 116,954,184	$ 146,146,427	$ 165,485,432	$ 178,274,809	**$ 717,973,112**

- Federal and state matching funds for the period of 2016 to 2020 reflect current allocations and are inflated 1.5% per year thereafter, beginning in 2021.
- Deductions for statewide items that cannot be allocated individually to the MPOs - Central Artery GANs repayment, Planning, and Extra Work Orders/Cost Adjustments, and the Accelerated Bridge Program - are taken from total available funding, leaving an amount for the available federal funding to be allocated in the regional plans.
- Statewide Bridges, Statewide Interstate Maintenance, and Statewide National Highway System funding are attributed to each region based upon formula such as the region's % of the total number of bridges or a region's % of the total lanes miles of IM/NHS.
- In FFY2026 it is assumed that GANs payments for the Central Artery and Accelerated Bridge Program are complete. The additional revenue was equally split between statewide line items (Bridge, NHS/IM, Statewide Maintenance) and Regional Discretionary funds beginning in 2027.
- Funding availability for bridges is based upon the Commonwealth's commitment to a Statewide Bridge Program. The bridge program has two components: federal aid and non-federal aid.
- Estimated funding for Statewide Infrastructure, Remaining Statewide Programs, NFA Bridge Preservation, and Regional Discretionary Funding is allocated among the MPOs based upon the existing MARPA TIP targets.
- After 2026 the GANS repayment of the Central Artery and Accelerated Bridge Program is anticipated to be complete. This results in an increase in available transportation revenue. The MassDOT and MARPA agreed to allocate this additional revenue equally between statewide needs and regional discretionary funds.

The estimates of available transit revenue shown in this RTP were provided by MassDOT on April of 2015. Information on anticipated farebox and local revenue was developed using the funding total from the most recent data and based on historical data from the PVTA, then aggregated through the life of the RTP. A summary of estimated transit revenue during the 2016-2040 period is presented in Table 15-2.

Table 15-2 – Estimated Transit Revenue 2016 - 2040

Estimated Transit Operating Revenues 2016 - 2040						
	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	Grand Total
State Contract Assistance	$ 125,723,298	$ 145,747,760	$ 168,961,600	$ 195,872,803	$ 227,070,262	$ 863,375,723
Local Assessments	$ 43,637,997	$ 49,372,389	$ 55,860,326	$ 63,200,831	$ 71,505,940	$ 283,577,483
5307 Federal Urbanized Area Fromula **	$ 53,120,529	$ 57,917,522	$ 62,393,619	$ 67,215,646	$ 72,410,341	$ 313,057,657
5339 Federal **	$ 3,614,988	$ 3,937,914	$ 4,242,253	$ 4,570,110	$ 4,923,307	$ 21,288,572
5310 Federal Ederly & Disabled	$ 2,704,105	$ 2,913,090	$ 3,138,225	$ 3,380,759	$ 3,642,038	$ 15,778,217
Farebox	$ 41,119,964	$ 45,399,763	$ 50,125,006	$ 55,342,057	$ 61,102,103	$ 253,088,893
Advertising, other revenue	$ 2,948,172	$ 3,255,020	$ 3,593,805	$ 3,967,851	$ 4,380,829	$ 18,145,677
Available for Programming in Pioneer Valley RTP	**$ 272,869,053**	**$ 308,543,458**	**$ 348,314,834**	**$ 393,550,057**	**$ 445,034,820**	**$ 1,768,312,222**
Estimated Capital Revenues						
	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	Grand Total
RTACAP	$ 20,285,825	$ 22,314,408	$ 24,545,848	$ 27,000,433	$ 29,700,476	$ 123,846,990
ITC Cap Program	$ 1,145,277	$ 1,259,805	$ 1,385,785	$ 1,524,364	$ 1,676,800	$ 6,992,031
Federal Matching grants	$ 63,410,806	$ 69,751,887	$ 76,727,075	$ 84,399,783	$ 92,839,761	$ 387,129,311
Total Transit Capital Funds for Programming in PV RTP	**$ 84,841,908**	**$ 93,326,099**	**$ 102,658,709**	**$ 112,924,579**	**$ 124,217,037**	**$ 517,968,332**
Grand Total of Revenue	**$ 357,710,961**	**$ 401,869,557**	**$ 450,973,543**	**$ 506,474,636**	**$ 569,251,857**	**$ 2,286,280,554**

- 5307 and 5339 have been reduced by 14% to account for Connecticut Transit's current portion of this funding.
- State Contract Assistance per MassDOT estimate provided April 2015 is increased 3% annually.
- Local assessments escalated 2.5% annually as allowed by statute.
- Federal grant program contributions (5307, 5339, and 5310) escalated 1.5% annually per MassDOT forecast provided April 2015.
- Farebox revenue estimate based on actual FY15 amount of $7.9 million and escalated 2% annually.
- Advertising and other revenue assumed to be $566,516 per year in FY16 and escalated 2% annually per PVTA.
- Actual RTACAP contracted (and FY16 contracted numbers are known) were arrived at and entered
- 2021-2040 used 10% escalation based on previous RTP.

The estimated revenue from both highway and transit sources is summarized in Table 15-3.

Table 15-3 – Total Estimated Revenue

Total Estimated Highway	$2,573,489,499
Total Estimated Transit Capital	$517,968,332
Total Estimated Transit Operating	$1,768,312,223
Grand Total	**$4,859,770,054**

B. NEEDS

1. Operating and Maintenance

a) Highway Needs

The PVPC reviewed historic spending by project type to assist in identifying future regional transportation needs. This information is summarized in Table 15-4.

Table 15-4 – Summary of Highway Spending by Project Type 2006 - 2015

Type	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average	Average Per Year	Total 2016-2040
Congestion	0%	3%	0%	0%	4%	0%	0%	7%	14%	30%	6%	$1,336,712	$55,668,585
Maintenance	65%	39%	20%	83%	70%	32%	21%	34%	61%	27%	45%	$11,649,342	$485,147,441
*CMAQ	0%	0%	9%	6%	5%	0%	0%	3%	0%	0%	2%	$640,387	$26,669,486
Safety	6%	4%	0%	11%	3%	2%	35%	14%	10%	21%	11%	$2,502,401	$104,214,758
Bike	18%	10%	7%	0%	5%	0%	1%	0%	0%	0%	4%	$975,280	$40,616,438
Transit	0%	5%	0%	0%	0%	0%	0%	0%	6%	0%	1%	$265,337	$11,050,192
Bridge	11%	39%	63%	0%	14%	66%	43%	42%	9%	22%	31%	$9,574,064	$398,720,575
	89%	**61%**	**37%**	**100%**	**86%**	**34%**	**57%**	**58%**	**91%**	**78%**	**100%**	**$ 26,943,523**	**$ 1,122,087,475**

- Values based on passed 10 year regional discretionary and bridge expenditures in the PV Region.
- *CMAQ funding does not include funds which were allocated to Bike, Congestion, Safety, or Transit projects under the CMAQ funding category.
- Average per year expenditure is based on actual discretionary and bridge funding spent in PV Region over the past 10 years.
- Total from 2016-2040 is a projection of the total investment required over the life of the RTP based on average per year expenditures a plus 4% per year inflation factor.

Over the last 10 years on average the region has spent less than 50% (down from 56% in the 2012 RTP) of its transportation improvement dollars on roadway maintenance projects. The average historic spending per year values were used to estimate the highway needs over the life of the RTP. These values were inflated by 4% per year to remain consist with other assumptions made as part of the Financial Plan. The estimated highway needs were summarized in five year increments and are shown in Table 15-5.

Table 15-5 – Summary of Estimated Highway Needs over the Life of the RTP

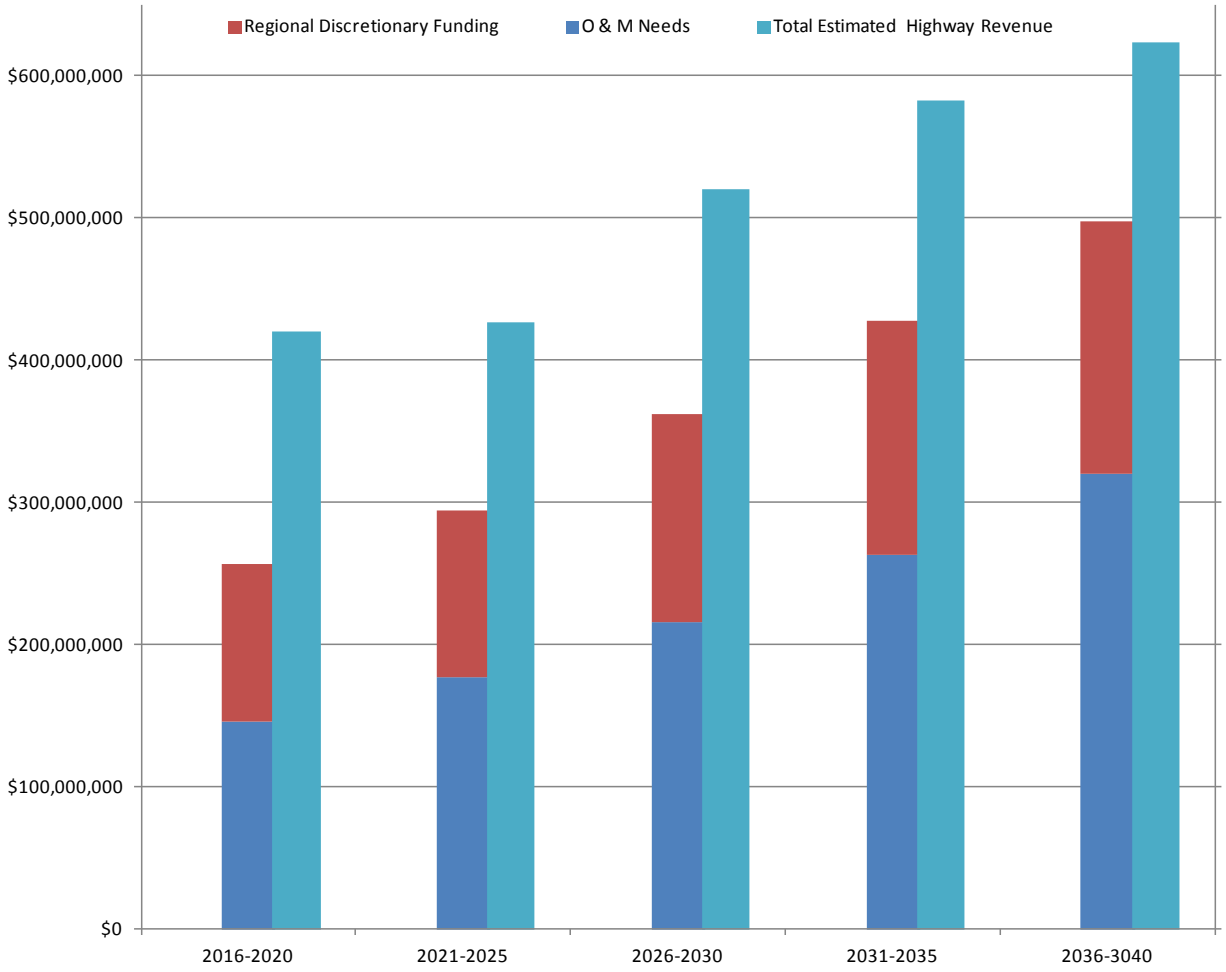
Type	2016-2020	2021-2025	2026-2030	2031-2035	2036-3040	Total
Congestion	$7,240,063	$8,808,644	$10,717,062	$13,038,945	$15,863,870	**$55,668,585**
Maintenance	$63,096,596	$76,766,656	$93,398,375	$113,633,404	$138,252,411	**$485,147,441**
*CMAQ	$3,468,541	$4,220,010	$5,134,288	$6,246,646	$7,600,000	**$26,669,486**
Safety	$13,553,810	$16,490,283	$20,062,950	$24,409,647	$29,698,068	**$104,214,758**
Bike	$5,282,433	$6,426,888	$7,819,292	$9,513,364	$11,574,462	**$40,616,438**
Transit	$1,437,150	$1,748,512	$2,127,333	$2,588,225	$3,148,972	**$11,050,192**
Bridge	$51,856,217	$63,091,017	$76,759,868	$93,390,117	$113,623,356	**$398,720,575**
Total	**$145,934,810**	**$177,552,010**	**$216,019,168**	**$262,820,348**	**$319,761,139**	**$1,122,087,475**

- *CMAQ funding does not include funds which were allocated to Bike, Congestion, Safety, or Transit projects under the CMAQ funding category.
- The total investment required over the life of the RTP based on average per year expenditures a plus 4% per year inflation factor.

For the purposes of operations and maintenance, the financial plan shall estimate the costs that are reasonably expected to be needed to maintain the federal aid highways and public transportation system (23 CFR 450.324(7)(h)). In an attempt to comply with this requirement, the total estimated needs from Table 15-5 were added to the estimated regional discretionary funding from Table 15-1 and compared to the total estimated highway revenue from Table 15-1. This information is presented in Figure 15-1.

As can be seen from the figure the estimated highway revenue exceeds the estimated highway needs plus regional discretionary funding over the life of the RTP. This analysis is an indication that sufficient revenue is available to fund highway needs at a minimum at the average of historic spending levels while continuing to fund transportation improvements through the TIP using regional discretionary funding. It should be noted that while Figure 15-1 indicates available funding to support needs based on historic spending, there is still a large need for additional funding to keep the transportation system in a state of good repair over the long term as described in Chapter 1, Problem Statement a).

Figure 15-1 – Comparison of Estimated Highway Needs to Estimated Highway Revenue



b) Transit Need

Secure funding for transit operations and projects in the region is a key concern. In 2014 Massachusetts Legislation approved forward funding for the Regional Transit Authorities (RTA's). Forward funding allows the RTA's to pay for needs up front rather than being required to borrow money to pay for needs, which results in interest payments. This along with increased operating assistance has allowed PVTA to make both service and capital improvements system wide. A summary of the estimated transit needs over the life of the RTP is presented in Table 15-6.

Table 15-6 – Estimated Transit Need 2016 – 2040

Estimated Transit Capital Need

	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	Grand Total
Springfield Union Station Redevelopment	$ -					$ -
Sprinfield Bus Maint/Storage Facility	$ 76,125,000					$ 76,125,000
SATCO Rehabilition to Paratransit Facility	$ 4,275,000					$ 4,275,000
Westfield Intermodal Center	$ 4,875,000					$ 4,875,000
Northampton Garage rehabilitation	$ 9,975,000					$ 9,975,000
Northampton Intermodal Center	$ 8,950,000					$ 8,950,000
UMTS Maintenance Facility	$ 19,600,000					$ 19,600,000
Holyoke Maintenance Facility	$ 500,000					$ 500,000
PVTA Facility maintenance/Environmental	$ 1,080,000	$ 4,878,466	$ 8,338,181	$ 10,144,672	$ 12,342,545	$ 36,783,864
PVTA Fleet Replacment Program	$ 46,998,000	$ 44,916,297	$ 48,653,279	$ 59,194,153	$ 72,018,738	$ 271,780,467
Vehicle Maintenance	$ 35,150,000	$ 39,749,580	$ 48,361,442	$ 58,839,089	$ 71,586,749	$ 253,686,860
Bus Shelters	$ 332,000	$ 1,370,675	$ 1,667,636	$ 2,028,934	$ 2,468,509	$ 7,867,754
Bus stop sign replacment	$ 125,000	$ 532,037	$ 140,824	$ 171,334	$ 208,454	$ 1,177,649
ITS/AVL and communication equipment	$ 20,318,038	$ 6,270,839	$ 7,629,434	$ 9,282,374	$ 11,293,427	$ 54,794,112
MAP van program	$ 3,780,000	$ 5,977,051	$ 6,929,041	$ 8,032,657	$ 9,312,051	$ 34,030,800
Available for Programming in Pioneer Valley RTP	**$ 232,083,038**	**$ 103,694,945**	**$ 121,719,837**	**$ 147,693,213**	**$ 179,230,473**	**$ 784,421,506**

Estimated Transit Operating Need 2016-2040

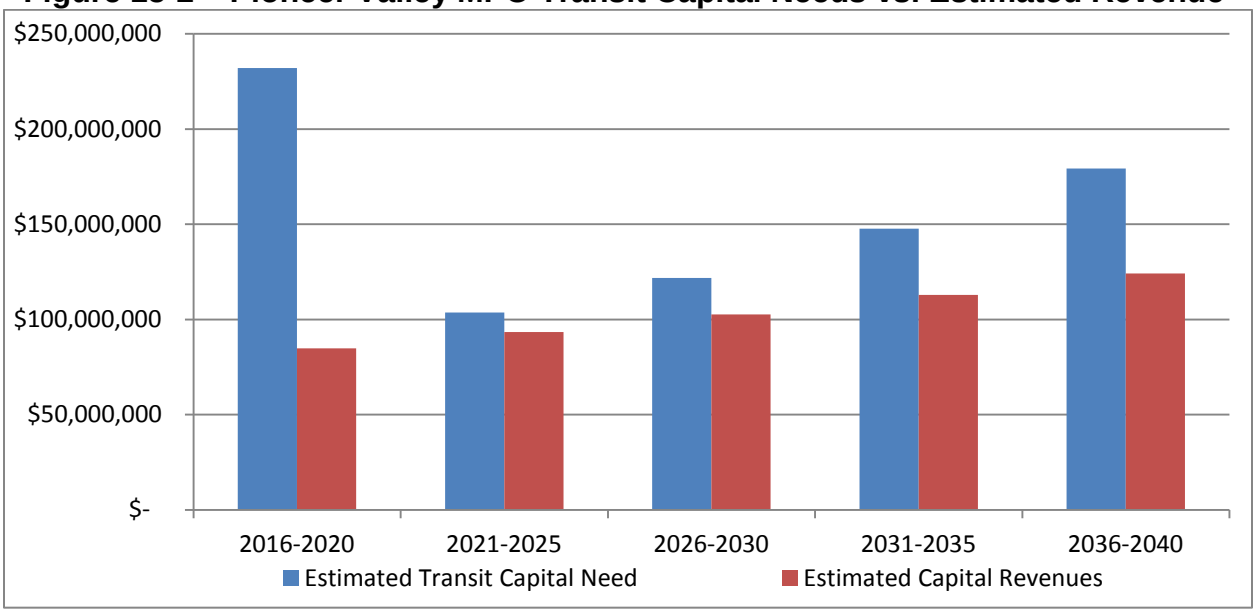
	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	Grand Total
PVTA Fixed Route	$ 182,859,117	$ 214,080,151	$ 250,238,375	$ 292,746,063	$ 342,753,350	$ 1,282,677,057
PVTA Paratransit	$ 46,545,498	$ 54,492,592	$ 63,696,413	$ 74,516,445	$ 87,245,447	$ 326,496,396
PVTA Administration	$ 23,429,977	$ 27,430,369	$ 32,063,369	$ 37,509,934	$ 43,917,433	$ 164,351,082
FRTA Paratransit	$ 3,853,014	$ 4,510,871	$ 5,272,758	$ 6,168,436	$ 7,222,136	$ 27,027,215
Total Operating Need (4% annual Escalation)	**$ 256,687,606**	**$ 300,513,983**	**$ 351,270,915**	**$ 410,940,878**	**$ 481,138,367**	**$ 1,800,551,750**
Grand Total of Needs	**$ 488,770,644**	**$ 404,208,928**	**$ 472,990,752**	**$ 558,634,091**	**$ 660,368,840**	**$ 2,584,973,256**

- FY 2016 was arrived at from the Budget approved at the 05/27/2015 Advisory Board Meeting
- FRTA Data based off financial report http://www.pvtaapps.com/opengov/pdfs/frta/FRTAfinal.pdf
- 2021-2040 an estimated increase per 5 year period was calculated (% of TIP increase), plus a 4% escalation factor.
- All PVTA project cost estimates by PVTA, April 2015.

In addition, operating funding needs also include $100,000 per year (escalated 4% annually) for FRTA paratransit in 14 outlying towns in the PVPC region that are not served by PVTA. FRTA anticipates that the cost of providing paratransit van service in the 14 PVMPO municipalities not served by PVTA will increase at a rate greater than 4% in the 2016-2020 timeframe due to the growing need to replace volunteer drivers with professional drivers in many communities.

The funding outlook with respect to capital project needs is also a significant concern. Figure 15-2 shows the anticipated transit capital project needs versus estimated revenues (2016-2040) for the region. It shows that over the life of this plan, the gap between estimated capital needs ($784,421,506) and anticipated revenue ($517,968,332) would be $206 million. Therefore, transit capital needs are 50% greater than the amount of funds that are expected to be available.

Figure 15-2 – Pioneer Valley MPO Transit Capital Needs vs. Estimated Revenue



c) Rail Need

Similar to highway and transit needs, an estimate was developed of the regional rail needs based on completed study recommendations advocating for expanded passenger rail service. This information is shown in Table 15-7. It should be noted that these estimates are presented for informational purposes only as these projects are not currently part of the financially constrained RTP. Enhanced passenger rail service does however remain a high regional priority that is recommended should an adequate funding source be identified.

Table 15-7 – Estimated Rail Need 2016 – 2040

Rail Capital Needs

Project Name	Project Description	Community	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	Total
High Speed Rail Capital for entire corridor	East/West high speed rail Capital entire system -Boston to Springfield to Vermont/Canada Line	Regionwide	$785,000,000					**$785,000,000**
Commuter Rail	Commuter Rail - Springfield to New Haven - Capital	Regionwide	$30,000,000					**$30,000,000**
Commuter Rail	Commuter Rail - Springfield to Greenfield - Capital	Regionwide	$10,000,000					**$10,000,000**
Freight Congestion	Freight congestion improvements	Regionwide		Further Study				**$0**
Passenger Rail Operating Cost	Connecticut State Line to Greenfield - Operating Per $2,980,000 per year	Regionwide						**$0**
Track Expansion	Track Expansion Palmer Ind Park	Palmer		$570,000				**$570,000**
Westfield Industrial Park Track Expansion	Track Expansion Westfield Ind Park	Westfield		$3,025,070				**$3,025,070**
Central Corridor Passenger Rail Study	Central Corridor Passenger Rail Study	Regionwide			Further Study			**$0**
		Total Need	**$825,000,000**	**$3,595,070**	**$0**	**$0**	**$0**	**$828,595,070**

Rail Operating Needs

Project Name	Project Description	Community	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	Total
Passenger Rail Operating Cost	Connecticut State Line to Greenfield - Operating Per $2,980,000 per year	Regionwide	$16,140,641	$19,637,558	$23,892,092	$29,068,383	$35,366,133	**$124,104,807**
High Speed Rail Operating for entire corridor	East/West high speed rail Operating entire system -Boston to Springfield to Vermont/Canada Line ($24,000,000)	Regionwide	$158,154,830	$192,419,532	$234,107,783	$284,827,913	$284,827,913	**$1,154,337,971**
			$174,295,471	**$212,057,090**	**$257,999,874**	**$313,896,296**	**$320,194,046**	**$1,278,442,777**

- East/west operating costs are based on Alternative 1from the Intercity Rail Initiative presentation given to the stakeholders at the 10/22/14 meeting held at PVPC.
- Knowledge Corridor operating cost are based on Option 1 of the March 23, 2015 HDR Rail Service Analysis
- Operating cost for both projects are inflated by 4% annually
- East/west capital costs are based on Alternative 1from the Intercity Rail Initiative presentation given to the stakeholders at the 10/22/14 meeting held at PVPC.
- Knowledge Corridor capital cost are based on Option 1 of the March 23, 2015 HDR Rail Service Analysis

C. FINANCIALLY CONSTRAINED PROJECTS

The Pioneer Valley MPO used the following methodology to populate the Operating and Maintenance Expenditure Tables. Projects were assigned to an estimated construction year based on project readiness, TEC Score, RTP Priority, and project cost unless otherwise specified.

Operating and Maintenance expenditures were developed separately for the areas of Highway and Transit planning. Cost estimates for each of the priority projects included as recommendations of the RTP were assigned a construction year for planning purposes. An inflation factor of 4% per year was applied to each project to reflect anticipated increases in construction materials over the life of the plan. Inflation factors were not applied to projects included as part of the current TIP as all of these projects have a 25% contingency applied to their current cost estimate.

Each project was assigned to the appropriate federal funding category to correspond with the revenues estimated in Table 15-1. The total cost estimates for each category were then compared to the recommended minimum investment as developed by MassDOT.

- The Statewide bridge listing was used to populate the bridge funding category.
- The MassDOT project information database was used to populate IM/NHS.
- Federal Earmarks where applicable were added to the Regional Discretionary Targets.

1. Funding Categories

The following provides a brief description of the how projects were assigned to each funding category to develop the financially constrained portion of the RTP.

- Statewide Bridges – Funding provided for the MassDOT bridge program, this funding cannot be used for any other program.
- Statewide Interstate Maintenance – Funding used for any Interstate improvement project.
- Statewide National Highway System – Funding used for any National Highway System improvement project.
- Non Federal Aid Bridge Preservation – Funding provided for bridges located on non federal aid roadways.
- Statewide Infrastructure – Funding used for any statewide infrastructure improvement project.
- Regional Discretionary Projects – Pioneer Valley MPO target to program any non-bridge or non Interstate Maintenance project.
- Remaining Statewide Programs – Estimated funding to be used for funding statewide CMAQ, HSIP, TAP, as well as other statewide categories.

The Pioneer Valley MPO assumed the following breakdown to allocate Regional Discretionary dollars for the FY2031-2035 and FY2036-2040 funding periods. This breakdown was developed using the historical spending data, Cartegraph analysis, and through consultation with the JTC. Table 15-8 gives the recommended distributions of the regional discretionary funds based on available funding.

Table 15-8 – Regional Discretionary Funding Allocation

70%	Roadway Maintenance
12.5%	Congestion Mitigation
12.5%	Safety Improvements
2.5%	CMAQ Projects
2.5%	Bicycle and Pedestrian

Table 15-9 – Operating and Maintenance Expenditures FY2016 - 2020

Project Name	Project Description	Community	SID	Area of Emphasis	RTP Priority	Total Cost
Statewide and NFA Bridge Preservation Projects						
Bridge Reconstruction	Route 147 over Westfield River and intersection improvements at 3 locations	Agawam / West Springfield	605384	Safety and Security	High	$13,869,440
Bridge Reconstruction/Rehab	AMHERST- BRIDGE REPLACEMENT, A-08-008, MILL STREET OVER MILL RIVER	Amherst	607528	The Movement of People	Low	$2,158,416
Bridge Demolition	BELCHERTOWN- WARREN BRIDGE DEMOLITION, B-05-023, W-07-012,(EAST MAIN STREET/NAULTAUG BROOK)	Belchertown	607524	Sustainabilty	Low	$2,477,738
Bridge Replacement	CHESTERFIELD- BRIDGE REPLACEMENT, C-12-009, IRELAND STREET OVER WEST BRANCH BRONSON BROOK	Chesterfield	607549	The Movement of People	Low	$3,474,682
Bridge Betterment	Route 9 and Route 112 over the Westfield River	Cummington	605452	Safety and Security	High	$4,094,505
Structures Maintenance	CUMMINGTON- BRIDGE MAINTENANCE, C-21-025, ROUTE 9 OVER THE WESTFIELD RIVER	Cummington	607939	Sustainabilty	Medium	$324,480
Structures Maintenance	SYSTEMATIC BRIDGE MAINTENANCE AT VARIOUS LOCATIONS (2016) Project consists of systematic maintenance on various bridges in District Two.	District 2	607516	Sustainabilty	Low	$1,712,942
Structures Maintenance	SYSTEMATIC BRIDGE MAINTENANCE AT VARIOUS LOCATIONS (2017) Project consists of systematic maintenance on various bridges in District Two.	District 2	607517	Sustainabilty	Low	$1,923,977
Structures Maintenance	SYSTEMATIC BRIDGE MAINTENANCE AT VARIOUS LOCATIONS (2018) Project consists of systematic maintenance on various bridges in District Two.	District 2	607959	Sustainabilty	Low	$1,776,852
Painting - Structural	LONGMEADOW-SPRINGFIELD- STRUCTURAL STEEL GIRDER PAINTING, S-24-042, S-24-043, A-05-001=S-24-005 & L-14-001, US 5 OVER I-91, RAMP C OVER RAMP A & I-91, US 5 OVER CONNECTICUT RIVER & AMTRAK & I-91 OVER EMERSON ROAD	Longmeadow / Springfield	607644	Sustainabilty	Medium	$3,115,373
Bridge Rehabilitation	East Street over Chicopee River	Ludlow / Wilbraham	605618	The Movement of People	Low	$1,000,000
Bridge Replacement	Hospital Hill Road over Quaboag Street	Monson	602178	The Movement of People	Medium	$1,760,403
Bridge Reconstruction/Rehab	NORTHAMPTON- BRIDGE RECONSTRUCTION, N-19-059, I-91 OVER US 5/BMRR & N-19-060, I-91 OVER HOCKANUM ROAD	Northampton	606552	Safety and Security	High	$58,494,084
Bridge Replacement	Route 10/202 Southwick Street over Little River	Westfield	400103	Safety and Security	Medium	$10,528,727
	Other Regional Bridge Projects	Other Regional Bridge Projects				$52,771,328
Total of Recommended Projects						**$159,482,948**
Recommended Investment for Statewide Bridge Projects						**$105,433,448**
Recommended Investment for NFA Bridge Preservation						**$54,049,500**
Statewide Interstate Maintenance						
Resurfacing	PALMER- RESURFACING & RELATED WORK ON I-90 (MM 60 TO MM 66)	Palmer	606610	The Movement of People	Low	$7,722,754
Resurfacing I-91	HATFIELD- NORTHAMPTON- WHATELY- INTERSTATE MAINTENANCE & RELATED WORK ON I-91, FROM MM 26.9 TO MM 34.4 (7.5 MILES)	Hatfield	606577	The Movement of People	Low	$10,335,146
INTERSTATE MAINTENANCE & RELATED WORK ON I-390	INTERSTATE MAINTENANCE & RELATED WORK ON I-391	Chicopee/Holyoke	607560	The Movement of People	Low	11,347,575
Other Statewide Interstate Maintenance Projects	Other Statewide Interstate Maintenance Projects					344,707
Total of Recommended Projects						**$29,750,182**
Recommended Investment for Statewide Interstate Maintenance						**$29,750,182**
Statewide Infrastructure Projects						
Other Projects	Other Major Infraustructure Projects	Regionwide				$4,219,341
Recommended Investment for Statewide Infrastructure Projects						**$4,219,341**
Statewide National Highway System						
Resurfacing Route 202	GRANBY- SOUTH HADLEY- RESURFACING & RELATED WORK ON ROUTE 202, FROM LYMAN STREET SOUTH HADLEY TO PLEASANT STREET GRANBY (2 MILES)	Granby / South Hadley	607474	The Movement of People	Low	1,466,400
Route 9 Roadway Reconstruction Phase 1	RECONSTRUCTION ON ROUTE 9 Phase 1 Middle Street to East Street	Hadley	605032	The Movement of People	High	$5,697,211
Statewide NHS Projects	Statewide NHS Projects	Regionwide				$12,408,520
Total of Recommended Projects						**$19,572,131**
Recommended Investment for Statewide National Highway System						**$19,572,131**
Remaining Statewide Programs						
Remaining Statewide Programs	Remaining Statewide Programs	Regionwide				$96,040,886
Recommended Investment for Remaining Statewide Programs						**$96,040,886**

Table 15-9 – Operating and Maintenance Expenditures FY2016 – 2020 (cont.)

Regional Discretionary Funding						
Project Name	**Project Description**	**Community**	**SID**	**Area of Emphasis**	**Prop. 2016 RTP Priority**	**Total Cost**
N. Westfield St. / S. Westfield St. (Rte. 187)	Reconstruction: Pine Street to Westfield TL	Agawam	600513	The Movement of People	Medium	$1,752,628
Route 187/ 57 Intersection Improvements	Route 187/ 57 Intersection Improvements	Agawam	604203	Safety and Security	high	$1,664,000
Resurfacing and Related work	AGAWAM- RESURFACING & RELATED WORK ON ROUTE 159, FROM MEADOW STREET TO 150 FT. SOUTH OF SUFFIELD STREET (1.1 MILES)	Agawam	607626	The Movement of People	Low	$1,696,295
Resurfacing and Related work	Improvements and Related Work on Route 9 and 116 from University Drive to South Pleasant Street (0.8 miles)	Amherst	608084	The Movement of People	Medium	$1,412,447
Resurfacing and Related work	Resurfacing and Related work on Route 20 from W. Old Sturbridge Road (MM 88.3) to Old Streeter Road (MM92.1)	Brimfield / Sturbridge	608022	The Movement of People	Low	$3,500,000
Connecticut Riverwalk	Construction: Plainfield St. to Nash Fld.	Chicopee	602911	The Movement of People	Low	$3,743,004
Chicopee Riverwalk	Construction: From Chicopee Center, 2.5 mi.	Chicopee	602912	The Movement of People	Low	$3,902,850
Fuller Rd. Corridor Improvements	Reconstruction: From Rte. 33 to Shawinigan Drive	Chicopee	604434	The Movement of People	Low	$6,716,736
Signal Upgrades on Route 33	SIGNAL & INTERSECTION IMPROVEMENTS AT 11 INTERSECTIONS ALONG ROUTE 33 (MEMORIAL DRIVE), FROM FULLER ROAD TO BRITTON STREET	Chicopee	607736	The Movement of People	High	$4,518,556
Route 9 Resurfacing	GOSHEN- RESURFACING AND RELATED WORK ON ROUTE 9 FROM CUMMINGTON T.L. TO ROUTE 112 (CAPE STREET)	Goshen	608126	The Movement of People	Low	$4,094,505
Route 202 Intersection Improvments - 2 locations	Route 202 Intersection Improvements 2 Locations @ 5 Corners and @ School Street	Granby	606895	Safety and Security	Medium	$1,068,621
Route 9 Pedestrian Signals	PEDESTRIAN SIGNAL INSTALLATION AT 2 LOCATIONS ALONG ROUTE 9 NEAR WEST ST	Hadley	606547	The Movement of People	Medium	$157,463
I-91 exit 17 at Route 141 intersection improvements	I-91 exit 17 at Route 141 intersection improvements	Holyoke	606156	Safety and Security	Medium	$2,924,646
High and Maple Street Intersection Improvements	TRAFFIC SIGNAL UPGRADES AT 15 INTERSECTIONS ALONG HIGH & MAPLE STREETS	Holyoke	606450	The Movement of People	Low	$1,627,462
Intersection Improvements I-91 Exit 15	IMPROVEMENTS TO LOWER WESTFIELD ROAD ON I-91 (INTERCHANGE 15)	Holyoke	606903	The Movement of People	High	$1,072,500
Resurfacing Dwight, Front, and Heritage Street	RESURFACING & RELATED WORK ON HERITAGE STREET, FRONT STREET & DWIGHT STREET FROM MAPLE ST TO THE 1ST LEVEL CANAL (.54 MILES)	Holyoke	607256	The Movement of People	Low	$3,213,317
Route 5 Reconstruction from Ashley Ave.	REHABILITATION OF ROUTE 5 (RIVERDALE ROAD), FROM I-91 (INTERCHANGE 13) TO MAIN STREET IN HOLYOKE & FROM ELM STREET TO NORTH ELM STREET IN WEST SPRINGFIELD (3.2 MILES)	Holyoke/West Springfield	604209	The Movement of People	High	$3,239,608
Resurfacing Converse Street	RESURFACING & RELATED WORK ON CONVERSE STREET, FROM LAUREL STREET TO DWIGHT STREET (2.04 MILES)	Longmeadow	606445	The Movement of People	Low	$2,851,730
Resurfacing Longmeadow Street (Route 5)	RESURFACING & RELATED WORK ON LONGMEADOW STREET (ROUTE 5), FROM THE CT S.L. TO CONVERSE STREET (2.88 MILES)	Longmeadow	607430	The Movement of People	Medium	$2,961,204
Center Street (Route 21) reconstruction	Center street reconstruction	Ludlow	605011	The Movement of People	High	$5,114,773
Damon Rd. Safety Improvement	Reconstruction: Rte. 9 to King St. (Rte. 5)	Northampton	180525	The Movement of People	High	$5,200,000
I-91 Ramps at Exit 19	This study is reviewing alternatives to relieve congestion and improve safety in the transportation network near Interchange 19	Northampton	604597	The Movement of People	High	$5,972,015
Hatfield Street @ Route 5 and 10	Intersection Improvements (Round about or Signalization	Northampton	606555	The Movement of People	Low	$3,033,680
King Street Intersection Improvements	INTERSECTION IMPROVEMENTS AT KING STREET, NORTH STREET & SUMMER STREET AND AT KING STREET & FINN STREET	Northampton	607502	The Movement of People	Medium	$1,766,415
Main Street (Route 9) New South (Route 10), State, and West Street (Route 66)	NORTHAMPTON- INTERSECTION IMPROVEMENTS @ ELM STREET, MAIN STREET, WEST STREET, STATE STREET & NEW SOUTH STREET	Northampton	607893	The Movement of People	Medium	$1,574,810
Pioneer Valley Regional Bike Share	Pioneer Valley Regional Bike Share	Northampton, Amherst, Holyoke, Springfield		The Movement of People	Medium	$584,929
Intersection Improvements	SOUTH HADLEY- SIGNAL & INTERSECTION IMPROVEMENTS AT ROUTE 202 (GRANBY ROAD) & ROUTE 33 (LYMAN STREET)	South Hadley	607735	The Movement of People	High	$550,000
Glendale Rd. (Phase II)	Reconstruction: Pomeroy Meadow Road to Route 10.	Southampton	604738	The Movement of People	Low	$2,764,702
Safe Routes to School	SOUTHAMPTON- SAFE ROUTES TO SCHOOL (WILLIAM E. NORRIS ELEMENTARY)	Southampton	607453	The Movement of People	Medium	$827,064
Route 57 Reconstruction	Reconstruction Rt. 57 (Feeding Hills Road) from Route 10/202 to Powder Mill Road	Southwick	603477	Safety and Security	Medium	$4,366,128
Congamond Rd. (Rte. 168) Reconstruction	Roadway reconstruction: From Route 202 to 250 ft before state line (before culvert)	Southwick	604033	The Movement of People	Medium	$5,798,520
Roosevelt Ave. @ Island Pond Rd and Roosevelt Ave @ Alden Street	Realign Island Pond Road and Roosevelt Avenue to create a three way signalized intersection signal upgrade	Springfield	605385	The Movement of People	Medium	$2,389,267
Pedestrian Bridge	SPRINGFIELD- NORTH END PEDESTRIAN PATH CONSTRUCTION (UNDER PAN-AM RAILROAD), BETWEEN PLAINFIELD STREET AND BIRNIE AVENUE	Springfield	607589	The Movement of People	High	$438,697

Table 15-9 – Operating and Maintenance Expenditures FY2016 – 2020 (cont.)

Regional Discretionary Funding						
Project Name	**Project Description**	**Community**	**SID**	**Area of Emphasis**	**Prop. 2016 RTP Priority**	**Total Cost**
Intersection Improvments Ware Center	WARE- INTERSECTION IMPROVEMENTS @ MAIN STREET, WEST STREET, NORTH STREET, SOUTH STREET & CHURCH STREET	Ware	607987	The Movement of People	Medium	$2,193,485
Memorial Ave. Complete Streets	Memorial Avenue Complete Streets Project	West Springfield		The Movement of People	High	$17,547,878
Improvements Court Street and Western Ave (Phase II)	ROUTE 20 ACCESS IMPROVEMENTS ON COURT STREET & WESTERN AVENUE, FROM LLEWELLYN DRIVE EASTERLY TO LLOYDS HILL ROAD (PHASE I) HPP $2,503,688	Westfield	603449	The Movement of People	Medium	$3,040,359
Columbia Greenway Rail trail and River Walk Phase I (Middle)	1.25 miles in length and extends from the Columbia Manufacturing Company to the Cowles Court and Sibley Ave access paths in the north and includes replacement of 5 bridges, rehab of a 6th	Westfield	603783	The Movement of People	Medium	$5,091,077
Route 187 - Little River Road reconstruction	Reconstruct Route 187 from 300 ft south of Route 20 to 260 ft North of Sherman Bridge	Westfield	604446	Safety and Security	Medium	$6,206,561
Columbia Greenway Rail Trail Phase III (North)	Construction of the North Section - Cowles Court to Westfield River Bridge TFPC for project is $2,696,193	Westfield	604968	The Movement of People	Low	$300,000
Improvements Court Street and Western Ave (Phase II)	WESTFIELD- IMPROVEMENTS & RELATED WORK ON ROUTE 20, COURT STEET & WESTERN AVENUE, LLOYDS HILL ROAD TO HIGH STREET/MILL STREET INTERSECTION (PHASE II) Eastern Section	Westfield	607773	The Movement of People	Medium	$5,723,234
Boston Rd Reconstruction (Route 20)	Reconstruction of Boston Rd and other infrastructure improvements	Wilbraham	607869	Safety and Security	High	$1,292,428
	Additional Projects in FFY2016					$359,931
Total of Recommended Projects						**$111,112,260**
Regional Discretionary Funding Guideline						**$111,112,260**
Connecticut Riverwalk Chicopee SW-CMAQ						**$3,743,004**
Chicopee Riverwalk - Chicopee -SW CMAQ						**$3,902,850**
High and Maple Street Intersection Improvements - Holyoke - SW CMAQ						**$1,627,462**
Hatfield Street @ Route 5 and 10 - Northampton - SW CMAQ						**$3,033,680**
Route 57 Reconstruction - Southwick - SW CMAQ						**$4,366,128**
SOUTHAMPTON- SAFE ROUTES TO SCHOOL (WILLIAM E. NORRIS ELEMENTARY) - SRS						**$827,064**
Columbia Greenway Rail Trail Phase III (North) - HPP 1656						**$2,275,000**
South Hadley Intersection Impr Rt 202 @ Rt 33 - 2016 SW HSIP						**$550,000**
Columbia Greenway Rail trail and River Walk Phase I (Middle) - 2017 SW CMAQ						**$6,532,895**
Total Investment in Regional Discretionary Projects						**$137,970,343**
Recommended Investment for All Programs						**$447,035,831**
Transit						
Capital Projects		**Community**		**Area of Emphasis**		**Total Cost**
Westfield Intermodal Center		Regionwide		The Movement of People		$2,800,000
Holyoke Intermodal Facility		Regionwide		The Movement of People		$280,000
PVTA Facility maintenance, Environmental compliance, and shop equipment		Regionwide		The Movement of People		$818,275
SATCO Rehabilitation to Paratransit Facility		Regionwide		The Movement of People		$4,275,000
PVTA Fleet Replacement Program - Fixed Route, Paratransit, and Support Vehicles		Regionwide		The Movement of People		$31,103,666
Vehicle maintenance		Regionwide		The Movement of People		$26,631,808
Bus shelters and accessories		Regionwide		The Movement of People		$450,000
Bus stop sign replacement		Regionwide		The Movement of People		$225,000
ITS/AVL, communications equipment, and security services		Regionwide		The Movement of People		$15,394,198
MAP van program		Regionwide		The Movement of People		$2,863,961
Total Transit Capital Projects						**$84,841,908**
NFA Capital Projects						
Springfield Bus Storage and Maintenance Facility - MassDOT NFA funding Commitment				The Movement of People		$76,126,000
Total NFA Capital Investment						**$76,126,000**
Total All Capital Investments						**$160,967,908**
Operating Revenue		**Transit Agency**				**Total Cost**
State Contract Assistance		PVTA				$125,723,298
Local Assessments		PVTA				$43,637,997
5307 Federal Urbanized Area Formula		PVTA				$53,120,529
5339 Bus and Bus Facillities Fromula Grants		PVTA				$3,614,988
5310 Federal Elderly & Disabled		PVTA				$2,704,105
Farebox		PVTA				$41,119,964
Advertising, other revenue		PVTA				$2,948,172
Total Operating Revenue						**$272,869,054**
Total Transit Investment						**$433,836,961**

Table 15-10 – Operating and Maintenance Expenditures FY2021 – 2025

Project Name	Project Description	Community	SID	Area of Emphasis	RTP Priority	Total Cost
Bridge Reconstruction/Rehab	CHESTER- BRIDGE BETTERMENT, C-11-033, ROUTE 20 OVER WALKER BROOK,	Chester	605207	Safety and Security	Medium	$326,975
Bridge Preservation	BRIDGE REPLACEMENT, H-01-017, NORTH HA	Hadley	604049	The Movement of People	Low	$4,701,147
Bridge Replacement	BRIDGE REPLACEMENTS, H-21-014, ROUTE 141 (APPLETON STREET) OVER SECOND LEVEL CANAL & H-21-020 OVER FIRST LEVEL CANAL	Holyoke	600935	Safety and Security	Medium	$11,612,952
Bridge Replacement	Lyman Street over First Level Canal	Holyoke	600936	Safety and Security	Medium	$3,132,881
Bridge Rehabilitation	Route 21 (Center Street) over Chicopee River (Putts Bridge)	Ludlow/Springfield	601156	Safety and Security	Medium	$30,128,664
Bridge Reconstruction/Rehab	MONSON- BRIDGE REHABILITATION, M-27-022, BRIMFIELD ROAD (US 20) OVER THE QUABOAG RIVER	Monson	607688	Sustainabilty	Medium	$4,132,392
Painting - Structural	SPRINGFIELD- STRUCTURAL STEEL GIRDER PAINTING, PAINT REMOVAL & REPAIR ON S-24-070, S-24-071 & S-24-072, TAPLEY STREET, ST. JAMES AVENUE & RAMP P OVER I-291	Springfield	607643	Sustainabilty	Medium	$6,106,065
Bridge Reconstruction/Rehab	SPRINGFIELD- WEST SPRINGFIELD- BRIDGE PRESERVATION ON I-91 CORRIDOR: S-24-042, S-24-079, S-24-085, S-24-087, W-21-037, W-21-042	Springfield / West Springfield	605417	Sustainabilty	High	$11,558,385
Bridge Replacement	Mass Central RR over Route 9/32 East Main Street	Ware	601701	Safety and Security	Medium	$12,813,788
Bridge Replacement	Route 9 (East Street) over the Ware River	Ware	604212	Safety and Security	Medium	$2,098,726
Deck Replacement	Route 32 (Palmer Road) over the Ware River	Ware	605126	Safety and Security	Medium	$4,679,529
Bridge Reconstruction/Rehab	WEST SPRINGFIELD- BRIDGE REHABILITATION, BRIDGE W-21- 27, ROUTE 20 (PARK AVENUE) OVER ROUTE 5	West Springfield	607443	Safety and Security	High	$4,706,025
Bridge Reconstruction/Rehab	WESTFIELD- SUPERSTRUCTURE REPLACEMENT, W-25-021, LOCKHOUSE ROAD OVER PVRR	Westfield	607646	The Movement of Goods	Medium	$2,182,675
	Other Regional Bridge Projects	Other Regional Bridge Projects				$58,791,062
MPO Recommended Investment						**$156,971,268**
Recommended Investment Statewide Bridge Projects						**$102,111,025**
Recommended Investment NFA Bridge Projects						**$54,860,243**
Statewide Interstate Maintenance						
Structures Maintenance	NORTHAMPTON- CULVERT REPAIR UNDER I-91, ROUTE 5 AND BMRR AT STA 245	Northampton	605617	The Movement of People	Low	$1,879,729
Traffic Signals I-90 @ Exit 6	CHICOPEE- TRAFFIC SIGNAL IMPROVEMENTS & RAMP RESURFACING @ I 90 (INTERCHANGE 6)	Chicopee	606599	The Movement of people	Medium	$3,691,011
Resurfacing I-90	LUDLOW- PALMER- WILBRAHAM- RESURFACING, GUARDRAIL & RELATED WORK ON I-90 (MM 55 TO MM 60)	Ludlow / Palmer	606595	The Movement of People	Low	$8,171,936
I&M Projects	Other Interstate Maintenance Projects	Regionwide				$14,414,447
Total of Recommended Projects						**$28,157,124**
Recommended Investment for Statewide Interstate Maintenance						**$28,157,124**
Statewide Infrastructure Projects						
Other Projects	Other Major Infraustructure Projects	Regionwide				$4,086,381
Recommended Investment for Statewide Infrastructure Projects						**$4,086,381**
Statewide National Highway System						
Route 9 reconstruction Phase 2	RECONSTRUCTION ON ROUTE 9 Phase 2 East Street to Lowe's Site Drive	Hadley	605881	The Movement of People	High	$12,790,857
Statewide NHS Projects	Statewide NHS Projects	Regionwide				$6,164,516
Recommended Investment for Statewide National Highway System						**$18,955,373**
Remaining Statewide Programs						
Remaining Statewide Programs	Remaining Statewide Programs	Regionwide				$101,493,887
Recommended Investment for Remaining Statewide Programs						**$101,493,887**

Table 15-10 – Operating and Maintenance Expenditures FY2021 – 2025 (cont.)

Regional Discretionary Funding Project Name	Project Description	Community	SID	Area of Emphasis	RTP Priority	Total Cost
Roadway Reconstruction	RECONSTRUCTION OF ROUTE 187, FROM SOUTHWICK/SPRINGFIELD STREET TO ALLISON LANE (1.29 MILES - PHASE II)	Agawam	607316	The Movement of People	Medium	$7,320,015
Roadway Reconstruction	Route 187 Reconstruction from Allison Ln to Westfield City Line, 1.69 miles(Phase III)	Agawam	607317	The Movement of People	Medium	$10,802,464
Sidewalk Construction	Sidewalk Construction on Route 159 From CT Line to Woodcliff Ave and From South St to River Road	Agawam	607876	The Movement of People	Low	$592,518
Resurfacing Route 9	RESURFACING & RELATED WORK ON ROUTE 9 FROM SOUTHEAST ST IN AMHERST THROUGH PELHAM TO THE BELCHERTOWN T.L. (2.2 MILES)	Amherst / Pelham	606230	The Movement of People	Medium	$2,368,677
N. Washington Street Reconstruction	Reconstruction: S. Main St. to North Liberty Street	Belchertown 2021	604692	The Movement of People	Low	$4,550,805
Route 202 Resurfacing	Resurfacing and related work on Route 202	Belchertown / Granby	604819	The Movement of People	Low	$6,415,167
Keystone Arch Bridge Project	Restoration of two historic Keystone Arch Bridges to a condition for public access	Chester	607210	The Movement of People	Low	$1,762,579
Route 9 Retaining Wall	Route 9 Retaining Wall	Cummington	606797	The Movement of People	Low	$2,019,644
Route 9 reconstruction	Resurface: Rte. 112 to Williamsburg TL	Goshen	602888	The Movement of People	Medium	$9,489,893
West Street Reclamation	Resurfacing and related work on West Street from South Maple Street to Chesterfield TL 1.8 miles	Goshen	605150	The Movement of People	Low	$3,542,893
Route 47 Resurfacing and Culvert	RESURFACING AND RELATED WORK ON ROUTE 47 FROM COMINS DRIVE TO OLD RIVER DRIVE, INCLUDES CULVERT REPLACEMENT AT RUSSELVILLE BROOK	Hadley	607886	Sustainability	Low	$1,094,988
Route 9 @ Route 116 Pedestrian and Bicycle Improvements	INTERSECTION, BICYCLE AND PEDESTRIAN IMPROVEMENTS @ ROUTES 9, 116 & WESTGATE CENTER DRIVE	Hadley	608089	Safety and Security	Medium	$1,879,388
Brimfield Road improvements	Resurfacing and related work from Brimfield Town Line to Stafford Road	Holland	604962	The Movement of People	Low	$1,824,979
I-91 Retaining wall	RETAINING WALL REPLACEMENT/REHABILITATION ON I-91 (SB)	Longmeadow / Springfield	606469	Safety and Security	Medium	$7,474,811
Mountain Rd (Route 5) improvements	Improvements to Mt. Tom Rd	Northampton	605048	The Movement of People	Medium	$1,460,120
Retaining Wall Replacement North King Street	NORTHAMPTON- RETAINING WALL REPLACEMENT AT CULVERT UNDER NORTH KING STREET (ROUTE 5&10), 300 FEET SOUTH OF COLES MEADOW ROAD (MM 25.4)	Northampton	608161	Sustainability	Low	$1,751,980
Rte. 32 (Ware Road) Reconstruction Phase I	RECONSTRUCTION OF ROUTE 32, FROM 765 FT. SOUTH OF STIMSON STREET TO 1/2 MILES SOUTH OF RIVER STREET (PHASE I) (1.63 MILES)	Palmer	601504	Safety and Security	Low	$8,394,912
Route 20 improvements	RESURFACING & RELATED WORK ON ROUTE 20 - FROM EAST OF RTE 32 INTERSECTION EASTERLY TO MM 81.7 (2.0 MILES)	Palmer	603873	The Movement of People	Low	$1,642,283
Route 116 Resurfacing	RESURFACING & RELATED WORK ON ROUTE 116 (AMHERST ROAD), FROM WOODBRIDGE STREET TO PEARL STREET	South Hadley	606452	The Movement of People	Low	$2,062,559
East St. Roadway Rehabilition	Reconstruction: Rte. 10 to Holyoke TL	Southampton	604653	The Movement of People	Medium	$6,873,227
Rail Trail Construction	GREENWAY RAIL TRAIL CONSTRUCTION, FROM COLEMAN RD TO ROUTE 10 (3.5 MILES)	Southampton	607823	The Movement of People	Low	$7,694,053
Routes 10/202 resurfacing (northerly)	Routes 10/202 resurfacing (northerly)	Southwick	604155	Safety and Security	Medium	$1,894,942
Highway Reconstruction	FEEDING HILLS ROAD (ROUTE 57) FROM COLLEGE HIGHWAY TO THE AGAWAM TOWN LINE	Southwick	606141	The Movement of People	Low	$5,807,112
Resurfacing Route 9	RESURFACING & RELATED WORK ON ROUTE 9, FROM .1 MILE WEST OF THE WARE T.L. EASTERLY TO MM 64.7 IN WARE (2.1 MILES)	Ware	603874	The Movement of People	Low	$1,742,387
Resurfacing Route 20	RESURFACING & RELATED WORK ON ROUTE 20, FROM STONY HILL ROAD TO THE PALMER TOWN LINE (4.8 MILES)	Wilbraham	607990	The Movement of People	Medium	$8,111,938
	Additional Projects in FFY2021-2025					$8,379,849
Total of Recommended Projects						**$116,954,184**
Regional Discretionary Funding Guideline						**$116,954,184**

Table 15-10 – Operating and Maintenance Expenditures FY201 – 2025 (cont.)

				$426,618,217
Transit Capital Projects	**Community**		**Area of Emphasis**	**Total Cost**
PVTA Fleet Replacement Program - Fixed route, Paratransit, and Support Vehicl	Regionwide		The Movement of People	$38,826,169
Vehicle maintenance	Regionwide		The Movement of People	$34,360,000
PVTA Facility maintenance	Regionwide		The Movement of People	$4,217,003
Bus shelters and accessories	Regionwide		The Movement of People	$1,184,828
Bus stop sign replacement	Regionwide		The Movement of People	$459,899
ITS/AVL, communications equipment, and security services	Regionwide		The Movement of People	$5,420,586
Intelligent fareboxes	Regionwide		The Movement of People	$3,690,981
MAP van program	Regionwide		The Movement of People	$5,166,632
Total Transit Capital Projects				**$93,326,099**
Operating Revenue	**Transit Agency**			**Total**
State Contract Assistance	PVTA			$145,747,760
Local Assessments	PVTA			$49,372,389
5307 Federal Urbanized Area Formula	PVTA			$57,917,522
5339 Bus and Bus Facillities Fromula Grants	PVTA			$3,937,914
5310 Federal Elderly & Disabled	PVTA			$2,913,090
Farebox	PVTA			$45,399,763
Advertising, other revenue	PVTA			$3,255,020
Total Operating Revenue				**$308,543,458**
Total Transit Investment				**$401,869,556**

Table 15-11 – Operating and Maintenance Expenditures FY2026 – 2030

Project Name	Project Description	Community	SID	Area of Emphasis	Prop. 2011 RTP Priority	Total Cost
Bridge Projects						
Structures Maintenance	DISTRICT 2- SCOUR COUNTERMEASURES & SUBSTRUCTURE MAINTENANCE OF D-06-002=G-12-003, M-27-022=P-01-033, P-01-013, W-19-005, W-39-007	District 2	603935	Sustainabilty	Low	$5,027,687
Bridge Replacement	BRIDGE REPLACEMENT, H-11-025, ELM STREET OVER THE B&M R.R.	Hatfield	603608	The Movement of People	Low	$766,075
Bridge Reconstruction/Rehab	HOLYOKE- WEST SPRINGFIELD- SUPERSTRUCTURE REPLACEMENT ON I-91: H-21-058=W-21-039 (SB), W-21-037 (NB), W-21-038 (SB) & W-21-042 & BRIDGE PRESERVATION OF W-21-040	Holyoke / West Springfield	606467	Safety and Security	High	$43,916,998
Bridge Replacement	State Avenue over the Quaboag River	Monson / Palmer	604136	The Movement of People	Low	$6,427,779
Bridge Rehabilitation	Bridge Street over Westfield River	Russell	606499	The Movement of People	Low	$15,200,840
Bridge Replacement	Valley Road over Moose Brook	Southampton	603024	The Movement of People	Low	$2,251,845
Bridge Betterment/Structures Maintenance	SCOUR COUNTERMEASURES, S-24-003=W-21-002, ROUTE 20 (PARK AVENUE) OVER CT RIVER	Springfield / West Springfield	603278	Safety and Security	Low	$9,574,173
Bridge Reconstruction/Rehab	WEST SPRINGFIELD- BRIDGE RECONSTRUCTION, W-21-011, PROSPECT AVENUE OVER PVRR	West Springfield	607526	The Movement of People	Low	$1,143,989
Bridge Replacement	WILLIAMSBURG- BRIDGE REPLACEMENT, W-36-011, BRIDGE STREET OVER THE MILL RIVER	Williamsburg	607675	The Movement of People	Low	$9,371,261
	Other Regional Bridge Projects	Other Regional Bridge Projects				$89,588,692
MPO Recommended Investment						**$183,269,339**
Recommended Investment Statewide Bridge Projects						**$127,598,354**
Recommended Investment NFA Bridge Projects						**$55,670,985**
Statewide Interstate Maintenance						
I&M Projects	Other Interstate Maintenance Projects	Regionwide				$35,185,257
Recommended Investment for Statewide Interstate Maintenance						**$35,185,257**
Statewide Infrastructure Projects						
Other Projects	Other Major Infraustructure Projects	Regionwide				$5,106,359
Recommended Investment for Statewide Infrastructure Projects						**$5,106,359**
Statewide National Highway System						
Route 9 reconstruction Phase 3	Reconstruction form Middle St to E/O Mill Valley Rd (Lowes)	Hadley	605881	The Movement of People	High	$19,391,200
Statewide NHS Projects	Statewide NHS Projects	Regionwide				$4,295,512
Recommended Investment for Statewide National Highway System						**$23,686,712**
Remaining Statewide Programs						
Remaining Statewide Programs	Remaining Statewide Programs	Regionwide				$126,827,176
Recommended Investment for Remaining Statewide Programs						**$126,827,176**

Table 15-11 – Operating and Maintenance Expenditures FY2026 – 2030 (cont.)

Regional Discretionary Funding						
Project Name	**Project Description**	**Community**	**SID**	**Area of Emphasis**	**Prop. 2016 RTP Priority**	**Total Cost**
Sidewalks on Route 10	SIDEWALK CONSTRUCTION & RELATED WORK ON ROUTE 10, FROM MM 19.9 NORTHERLY TO MM 20.9 (600' SOUTH OF SOUTH STREET)	Easthampton / Southampton	608026	The Movement of People	Low	$676,444
South Maple Street	Reconstruction: South of Rte. 9 to Bay Rd.	Hadley	602796	The Movement of People	Low	$7,401,221
Rte. 32 (Ware Road) Reconstruction Phase II	PALMER- RECONSTRUCTION OF ROUTE 32, FROM 1/2 MILE SOUTH OF RIVER STREET TO THE WARE T.L. (PHASE II) (2.1 MILES)	Palmer	607372	The Movement of People	Low	$14,114,445
Routes 10/202 resurfacing (southerly)	Routes 10/202 resurfacing (southerly)	Southwick	604153	Safety and Security	Medium	$3,848,635
Sidewalk improvements	Sidewalk reconstruction and resurfacing at various locations on Route 119	Wales	605669	The Movement of People	Low	$500,323
Reconstruction Monson Road	WALES- RECONSTRUCTION & IMPROVEMENTS ON MONSON ROAD, FROM THE MONSON T.L. TO REED HILL ROAD (1.5 MILES)	Wales	608163	The Movement of People	Low	$5,314,811
Union Street Underpass	BRIDGE REPLACEMENT, W-21-006, CSX RAILROAD OVER UNION STREET	West Springfield	604746	The Movement of People	Medium	$21,800,061
Route 187 - Sherman's Mill Bridge reconstruction	Reconstruct Route 187 from 260ft north of Bridge to 800ft east of Pontoosic rd.	Westfield	604445	Safety and Security	Medium	$10,252,483
Westfield River Levee Multi use Path	WESTFIELD RIVER LEVEE MULTI-USE PATH CONSTRUCTION, FROM CONGRESS ST TO WILLIAMS RIDING WAY (NEAR MEADOW ST) (2MILES)	Westfield	608073	The Movement of People	Low	$7,107,733
Resurfacing High and Mountain Stree	Reconstruction of High Street and Mountain Street	Williamsburg	607231	The Movement of People	Low	$5,542,035
Resconstruction Route 143	Route 143 Reconstruction and Related Work	Worthington	606912	The Movement of People	Low	$19,243,176
	Additional Projects in FFY2026-2030					$50,345,060
Total of Recommended Projects						**$146,146,427**
Regional Discretionary Funding Guideline						**$146,146,427**
Recommended Investment for All Programs						**$520,221,270**
Transit						
Capital Projects		**Community**		**Area of Emphasis**		**Total Cost**
PVTA Fleet Replacement Program - Fixed route, Paratransit, and Support Vehicles		Regionwide		The Movement of People		$41,034,254
Vehicle maintenance		Regionwide		The Movement of People		$40,788,119
PVTA Facility maintenance, Environmental compliance, and shop equipment		Regionwide		The Movement of People		$7,032,435
Bus shelters and accessories		Regionwide		The Movement of People		$1,406,487
Bus stop sign replacement		Regionwide		The Movement of People		$118,772
ITS/AVL, communications equipment, and security services		Regionwide		The Movement of People		$6,434,677
MAP van program		Regionwide		The Movement of People		$5,843,964
Total Transit Capital Projects						**$102,658,709**
Operating Revenue		**Transit Agency**				**Total**
State Contract Assistance		PVTA				$168,961,600
Local Assessments		PVTA				$55,860,326
5307 Federal Urbanized Area Formula		PVTA				$62,393,619
5339 Bus and Bus Facillities Fromula Grants		PVTA				$4,242,253
5310 Federal Elderly & Disabled		PVTA				$3,138,225
Farebox		PVTA				$50,125,006
Advertising, other revenue		PVTA				$3,593,805
Total Operating Revenue						**$348,314,834**
Total Transit Investment						**$450,973,543**

Table 15-12 – Operating and Maintenance Expenditures FY2031 – 2035

	Project Name	Project Description	Community	Area of Emphasis	TotalCost
Bridge Projects					
	Statewide Bridge Projects	Other Regional Bridge Projects	Regionwide		$144,482,963
	NFA Bridge Preservation	Other NFA Bridge Projects	Regionwide		$56,481,728
MPO Recommended Investment					**$200,964,691**
Recommended Investment Statewide Bridge Projects					**$144,482,963**
Recommended Investment NFA Bridge Projects					**$56,481,728**
Statewide Interstate Maintenance					
	I&M Projects	Other Interstate Maintenance Projects	Regionwide		$39,841,190
Recommended Investment for Statewide Interstate Maintenance					**$39,841,190**
Statewide Infrastructure Projects					
	Other Projects	Other Major Infraustructure Projects	Regionwide		$5,782,064
Recommended Investment for Statewide Infrastructure Projects					**$5,782,064**
Statewide National Highway System					
	Statewide NHS Projects	Statewide NHS Projects	Regionwide		$26,821,085
Recommended Investment for Statewide National Highway System					**$26,821,085**
Remaining Statewide Programs					
	Remaining Statewide Programs	Remaining Statewide Programs	Regionwide		$143,609,738
Recommended Investment for Remaining Statewide Programs					**$143,609,738**
Regional Discretionary Funding					
70%	Roadway Maintenance Projects		Regionwide		$115,839,802
12.5%	Congestion Improvement Projects		Regionwide		$20,685,679
12.5%	Safety Improvement Projects		Regionwide		$20,685,679
2.5%	Bicycle/Pedestrian Improvement Projects		Regionwide		$4,137,136
2.5%	CMAQ Projects		Regionwide		$4,137,136
Total of Recommended Projects					**$165,485,432**
Regional Discretionary Funding Guideline					**$165,485,432**
Recommended Investment for All Programs					**$582,504,200**
Transit					
Capital Projects			**Community**	**Area of Emphasis**	**Total Cost**
	PVTA Fleet Replacement Program - Fixed route, Paratransit, and Support Vehi		Regionwide	The Movement of People	$43,401,803
	Vehicle maintenance		Regionwide	The Movement of People	$43,141,466
	PVTA Facility maintenance, Environmental compliance, and shop equipment		Regionwide	The Movement of People	$7,438,185
	Bus shelters and accessories		Regionwide	The Movement of People	$1,487,637
	Bus stop sign replacement		Regionwide	The Movement of People	$125,624
	ITS/AVL, communications equipment, and security services		Regionwide	The Movement of People	$6,805,938
	Intelligent fareboxes		Regionwide	The Movement of People	$4,634,294
	MAP van program		Regionwide	The Movement of People	$5,889,632
Total Transit Capital Projects					**$112,924,579**
Operating Revenue			**Transit Agency**		**Total**
	State Contract Assistance		PVTA		$195,872,803
	Local Assessments		PVTA		$63,200,831
	5307 Federal Urbanized Area Formula		PVTA		$67,215,646
	5339 Bus and Bus Facillities Fromula Grants		PVTA		$4,570,110
	5310 Federal Elderly & Disabled		PVTA		$3,380,759
	Farebox		PVTA		$55,342,057
	Advertising, other revenue		PVTA		$3,967,851
Total Operating Revenue					**$393,550,058**
Total Transit Investment					$506,474,637

Table 15-13 – Operating and Maintenance Expenditures FY2036 – 2040

	Project Name	Project Description	Community	Area of Emphasis	TotalCost
Bridge Projects					
	Statewide Bridge Projects	Other Regional Bridge Projects	Regionwide		$155,649,185
	NFA Bridge Preservation	Other NFA Bridge Projects	Regionwide		$57,292,470
MPO Recommended Investment					**$212,941,655**
Recommended Investment Statewide Bridge Projects					**$155,649,185**
Recommended Investment NFA Bridge Projects					**$57,292,470**
Statewide Interstate Maintenance					
	I&M Projects	Other Interstate Maintenance Projects	Regionwide		$42,920,276
Recommended Investment for Statewide Interstate Maintenance					**$42,920,276**
Statewide Infrastructure Projects					
	Other Projects	Other Major Infraustructure Projects	Regionwide		$6,228,925
Recommended Investment for Statewide Infrastructure Projects					**$6,228,925**
Statewide National Highway System					
	Statewide NHS Projects	Statewide NHS Projects	Regionwide		$28,893,926
Recommended Investment for Statewide National Highway System					**$28,893,926**
Remaining Statewide Programs					
	Remaining Statewide Programs	Remaining Statewide Programs	Regionwide		$154,708,473
Recommended Investment for Remaining Statewide Programs					**$154,708,473**
Regional Discretionary Funding					
70%	Roadway Maintenance Projects		Regionwide		$124,792,364
12.5%	Congestion Improvement Projects		Regionwide		$22,284,351
12.5%	Safety Improvement Projects		Regionwide		$22,284,351
2.5%	Bicycle/Pedestrian Improvement Projects		Regionwide		$4,456,870
2.5%	CMAQ Projects		Regionwide		$4,456,870
Total of Recommended Projects					**$178,274,806**
Regional Discretionary Funding Guideline					**$178,274,806**
Recommended Investment for All Programs					**$623,968,061**
Transit					
Capital Projects			**Community**	**Area of Emphasis**	**Total Cost**
	PVTA Fleet Replacement Program - Fixed route, Paratransit, and Support Vehicles		Regionwide	The Movement of People	$49,913,132
	Vehicle maintenance		Regionwide	The Movement of People	$49,613,739
	PVTA Facility maintenance, Environmental compliance, and shop equipment		Regionwide	The Movement of People	$8,554,094
	Bus shelters and Accessoiries		Regionwide	The Movement of People	$1,710,819
	Bus stop sign replacement		Regionwide	The Movement of People	$144,471
	ITS/AVL, communications equipment, and security services		Regionwide	The Movement of People	$7,826,995
	MAP van program		Regionwide	The Movement of People	$6,453,788
Total Transit Capital Projects					**$124,217,037**
Operating Revenue			**Transit Agency**		**Total**
	State Contract Assistance		PVTA		$227,070,262
	Local Assessments		PVTA		$71,505,940
	5307 Federal Urbanized Area Formula		PVTA		$72,410,341
	5339 Bus and Bus Facillities Fromula Grants		PVTA		$4,923,307
	5310 Federal Elderly & Disabled		PVTA		$3,642,038
	Farebox		PVTA		$61,102,103
	Advertising, other revenue		PVTA		$4,380,829
Total Operating Revenue					**$445,034,819**
Total Transit Investment					**$569,251,856**

D. FINANCIAL CONSTRAINT

Cost estimates for construction of transportation improvement projects included as part of the Regional Transportation Plan for the Pioneer Valley Metropolitan Planning Organization are developed in consultation with the local community, MassDOT and MassDOT Highway Divisions 1 and 2. Through this consultation process, the most up to date estimates are used in the development of the financial component of the RTP. Estimates for longer range projects that have not yet entered the design process are estimated based on the type of project and overall extent of proposed work. Estimates of future transportation revenue for the Pioneer Valley MPO were developed by MassDOT. This revenue was allocated towards various maintenance projects through consultation with MPO members.

The estimated available funds for the region must be greater than or equal to the financial needs of the region over the life of the plan in order to maintain financial constraint. As can be seen from Table 15-14, the Pioneer Valley Regional Transportation Plan is financially constrained over the life of the plan.

E. ALTERNATIVE FUNDING SCENARIOS

It is estimated it will take 15 years to fund all of the current projects included in the TIP backlog for the Pioneer Valley. This is a growing concern as regional targets have not increased significantly while project costs continue to rise. This is illustrated in Figures 15-3 and 15-4. Inflation plays a big role in the number of projects and cost of projects funded per year as project costs rise significantly the further out they are programmed. As can be seen in Table 15-15 it is estimated that projects that will be ready for funding in the next 4 years will cost an additional $1,000,000 to $3,000,000 due to inflation by the time funding becomes available to construct the project. On average over the past 10 years the PVMPO has been able to fund 6 transportation projects per year using regional discretionary funds. As can be seen in Figure 15-3 the number of projects has not fluctuated very much from year to year, this indicates that for every project funded with regional discretionary funds, a new project takes its place in the queue for funding. The big exception is the reduction in projects from year 2010 to 2011, this was the result of two events; the first was the one-time availability of ARRA funds (American Recovery and Reinvestment Act) and the ongoing removal of inactive projects from the regional project backlog by MassDOT.

Based on this information, the region does not have enough money to fund our transportation program in a financially viable time frame. In order to identify the amount of money necessary to fund the transportation program in a financially viable time frame PVPC staff utilized scenario based planning to develop a series of four scenarios to identify the funding necessary to bring regional pavement condition to acceptable levels. This information is summarized in Figure 15-5 and Table 15-16.

Table 15-14 – Financial Constraint Summary

	2016 - 2020	2021 - 2025	2026 - 2030	2031 - 2035	2036 - 2040	GRAND TOTAL
Total Estimated Highway Revenue	$420,177,748	$426,618,217	$520,221,270	$582,504,200	$623,968,064	**$2,573,489,499**
Statewide Interstate Maintenance	$ 29,750,182	$ 28,157,124	$ 35,185,257	$ 39,841,190	$ 42,920,276	**$ 175,854,029**
Statewide NHS	$ 19,572,131	$ 18,955,373	$ 23,686,712	$ 26,821,085	$ 28,893,926	**$ 117,929,227**
Statewide Bridge	$ 105,433,448	$ 102,111,025	$ 127,598,354	$ 144,482,963	$ 155,649,185	**$ 635,274,975**
Statewide Infrastructure	$ 4,219,341	$ 4,086,381	$ 5,106,359	$ 5,782,064	$ 6,228,925	**$ 25,423,070**
Remaining Statewide Programs	$ 96,040,886	$ 101,493,887	$ 126,827,176	$ 143,609,738	$ 154,708,473	**$ 622,680,160**
NFA Bridge Preservation	$ 54,049,500	$ 54,860,243	$ 55,670,985	$ 56,481,728	$ 57,292,470	**$ 278,354,926**
Regional Discretionary Funding	$ 111,112,260	$ 116,954,184	$ 146,146,427	$ 165,485,432	$ 178,274,809	**$ 717,973,112**
Total Estimated Remaining Earmark Funds	$2,275,000	$0	$0	$0	$0	**$2,275,000**
Estimated Statewide CMAQ	$16,673,124	$0	$0	$0	$0	**$16,673,124**
Estimated Statewide HSIP	$7,082,895	$0	$0	$0	$0	**$7,082,895**
Estimated Safe Routes to School	$827,064	$0	$0	$0	$0	**$827,064**
Grand Total	$447,035,831	$426,618,217	$520,221,270	$582,504,200	$623,968,064	**$2,575,764,499**
Total of Programmed Highway Projects in the 2016 RTP	$447,035,831	$426,618,217	$520,221,270	$582,504,200	$623,968,064	**$2,575,764,499**
Difference	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

	2016 - 2020	2021 - 2025	2026 - 2030	2031 - 2035	2036 - 2040	GRAND TOTAL
Total Estimated Transit Capitol Revenue	$84,841,908	$93,326,099	$102,658,709	$112,924,579	$124,217,037	**$517,968,332**
RTACAP	$ 20,285,825	$ 22,314,408	$ 24,545,848	$ 27,000,433	$ 29,700,476	**$123,846,990**
ITC Cap Program	$ 1,145,277	$ 1,259,805	$ 1,385,785	$ 1,524,364	$ 1,676,800	**$6,992,031**
Federal Matching grants	$ 63,410,806	$ 69,751,887	$ 76,727,075	$ 84,399,783	$ 92,839,761	**$387,129,311**
Springfield O+M Facility - NFA	$76,126,000	$ -	$ -	$ -	$ -	**$76,126,000**
Total Estimated Transit Operating Revenue	$272,869,054	$308,543,458	$348,314,834	$393,550,058	$445,034,819	**$1,768,312,223**
State Contract Assistance	$ 125,723,298	$ 145,747,760	$ 168,961,600	$ 195,872,803	$ 227,070,262	**$863,375,723**
Local Assessments	$ 43,637,997	$ 49,372,389	$ 55,860,326	$ 63,200,831	$ 71,505,940	**$283,577,483**
5307 Federal Urbanized Area From	$ 53,120,529	$ 57,917,522	$ 62,393,619	$ 67,215,646	$ 72,410,341	**$313,057,657**
*5339 Federal ** *	$ 3,614,988	$ 3,937,914	$ 4,242,253	$ 4,570,110	$ 4,923,307	**$21,288,572**
5310 Federal Ederly & Disabled	$ 2,704,105	$ 2,913,090	$ 3,138,225	$ 3,380,759	$ 3,642,038	**$15,778,217**
Farebox	$ 41,119,964	$ 45,399,763	$ 50,125,006	$ 55,342,057	$ 61,102,103	**$253,088,893**
Advertising, other revenue	$ 2,948,172	$ 3,255,020	$ 3,593,805	$ 3,967,851	$ 4,380,829	**$18,145,677**
Grand Total	$433,836,962	$401,869,557	$450,973,543	$506,474,637	$569,251,856	**$2,362,406,555**
Total of Programmed Transit Projects in the 2016 RTP	$433,836,962	$401,869,557	$450,973,543	$506,474,637	$569,251,856	**$2,362,406,555**
Difference	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Table 15-15 – Project Cost Impacts Due to 4% Per Year Inflation

	2016-2020	2021-2025	2026-2030*
Base Project Cost	$110,598,969	$79,213,307	$61,708,369
Project Cost with Inflation (4% per year)	$120,724,219	$104,675,303	$95,801,367
Difference	$10,125,250	$25,461,996	$34,092,998
Number of Projects	42	23	11
Average Project Increase as a Result of Inflation	**$241,077**	**$1,107,043**	**$3,099,363**

* Regional Discretionary Funding not fully allocated

Figure 15-3 – Pioneer Valley Project Backlog History 2002 - 2015

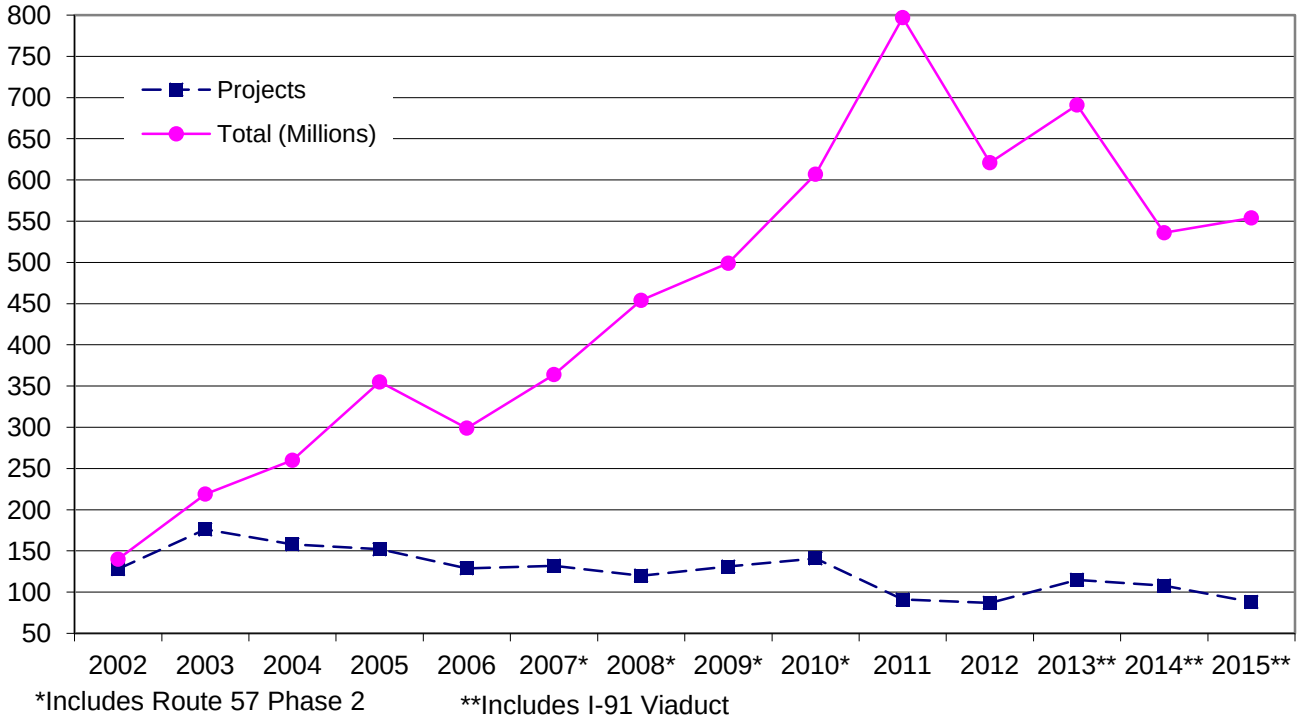
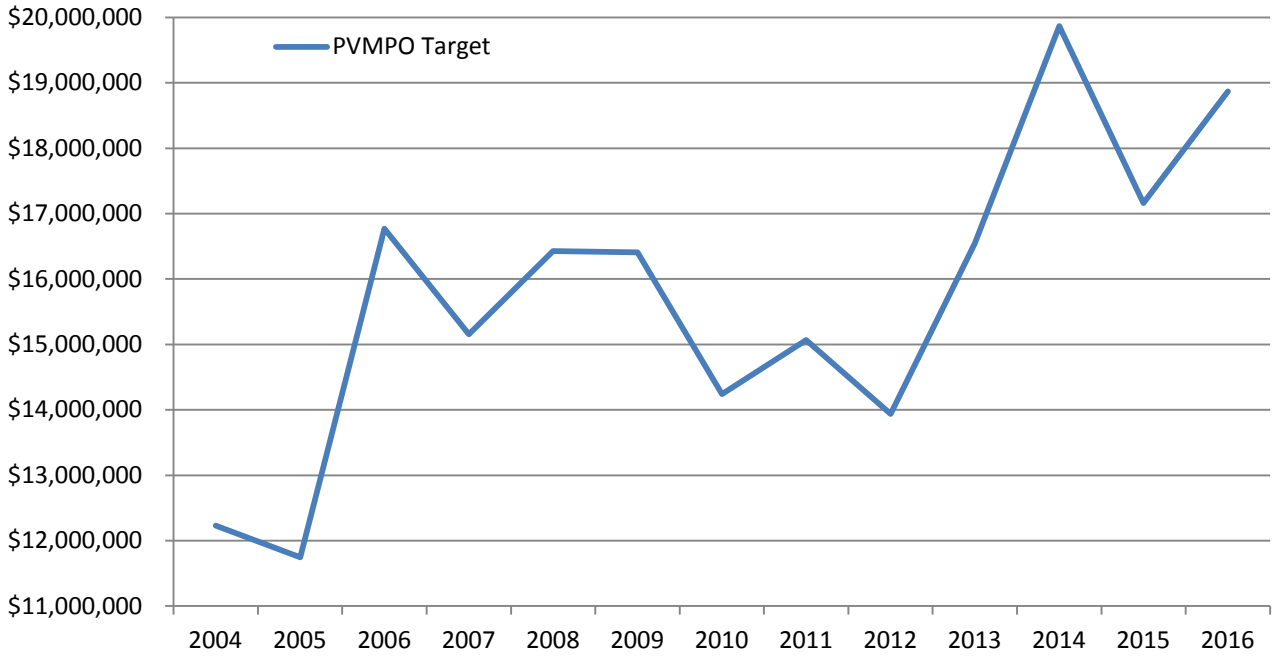


Figure 15-4 – PVMPO Historic TIP Targets



1. Summary of Identified Scenarios

a) Scenario 1 - Use 70% of Regional Discretionary Funds and 70% of Other Statewide Funds to fund pavement maintenance

This Scenario assumes an investment of 70% of all Regional Discretionary funding and 70% of all Remaining Statewide Program funding over the life of the plan be allocated towards pavement maintenance.

b) Scenario 2 - Fund inflation of revenue (currently 1.5%) at the same 4% applied to project cost

This scenario is based on the same allocation of 70% of Regional Discretionary funding and 70% Remaining Statewide Program funding towards pavement maintenance but increases the revenue increase to 4% per year rate starting in 2021 to match the project inflation rate (MassDOT used 1.5% inflation rate on revenue).

c) Scenario 3 - Develop a regional revenue source to supplement existing funding (see section d for examples)

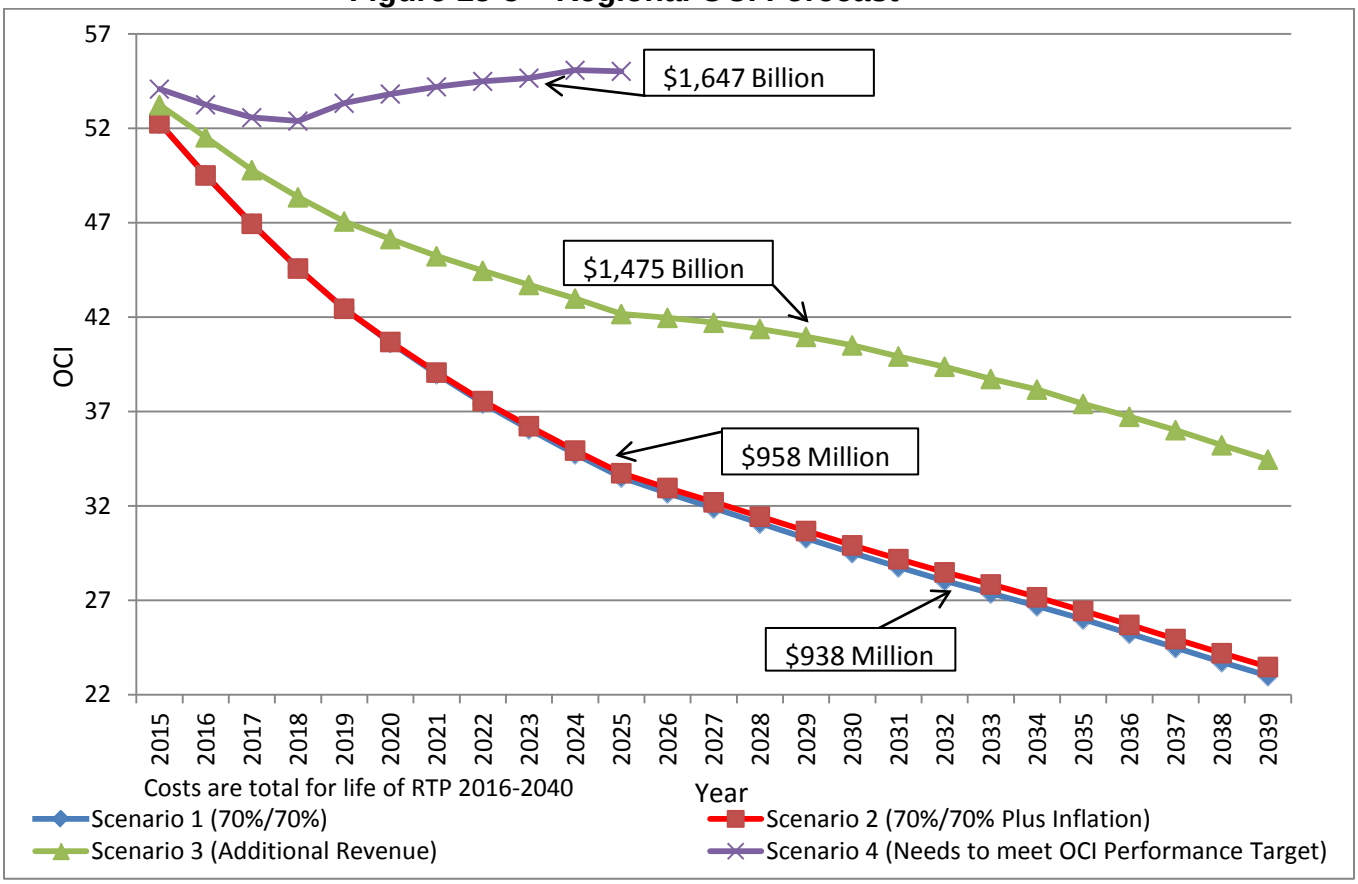
This scenario was again based on the allocation of 70% of Regional Discretionary funding and 70% Remaining Statewide Programs funding to pavement maintenance but also includes additional revenue equal to 40% per year of the combined total of Regional Discretionary and Remaining Statewide Program funding. The 40% was based on research performed by PVPC staff regarding local revenue generation in

other states. Several states have approved legislation allowing for the collection of taxes or fees, which are to be spent in the region on transportation projects.

d) Scenario 4 - Determine funding level needed to maintain a state of good repair

This Scenario was used to determine the true investment needed to increase the OCI by 5% by 2025 as required by PVPC's performance measures.

Figure 15-5 – Regional OCI Forecast



Under Scenario, 1 a significant funding commitment is being made to attempt to bring the system up to a state of good repair. A total of $145 million is being spent in the first five years of the plan under this scenario with limited effects on slowing the deterioration of roadways. A slight decrease in the rate of deterioration can be seen starting in year 2027, this is the result of the GANS payments being complete which will allow for additional funding for roadways.

Under Scenario 2, revenue is set to match the 4% per year inflation tied to project cost. The results of this scenario show the same trend in OCI as Scenario 1 for the first ten years. The last years of Scenario 2 show slight improvement over scenario one, but the decline in OCI is still significant.

Scenario 3 allocates $228 million dollars towards pavement maintenance in the first five years of the plan. As can be seen in Figure 13-5, there is only a slight increase in OCI over the first two scenarios for the first five years of Scenario 3, however, over the next ten years there is a significant improvement in OCI. Although an improvement over the first two scenarios, the results appear to trend in the same direction in the later years as Scenarios 1 and 2. The OCI appears to decline at a similar rate.

Under Scenario 4, PVPC staff ran a regional budget in CarteGraph based of the results of the previous three scenarios. The numbers were modified until a 5% increase in OCI by 2025 was achieved. Based on this analysis, approximately $328 million dollars (more than double current levels of funding) would need to be spent in the first five years of the plan before a significant improvement is realized. Results from this analysis show the year 2015 unimproved OCI to be 50.00, however with improvements this increases to 54.08. In the year 2025 the improved OCI was estimated to be 55.02, this represents a 10.9% increase from the unimproved year 2015 OCI, but only 1.7% increase from the improved year 2015 OCI of 54.08. Based on these results it is believed that additional money would be needed to continue the OCI trend in the upward direction.

A summary of the investment totals by scenario is shown in Table 15-16.

Table 15-16 – Scenario Summary

Scenario		2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	Total
1	Total 70% of all funding	$145,007,202	$152,913,649	$191,081,522	$216,366,620	$233,088,297	$938,457,291
2	Total 4% Revenue inflation	$145,007,202	$156,736,490	$195,858,560	$221,775,786	$238,915,505	$958,293,543
3	Additional Local Tax (40% of revenue)	$227,858,371	$240,282,762	$300,260,823	$339,994,524	$366,271,420	$1,474,667,900
4	Amount of funding needed to increase the average OCI for the Region by 5% by 2025	$327,858,371	$340,282,762	$400,260,823	$439,994,524	$466,271,420	$1,646,809,530

2. Local Revenue Options [13]

The ability to establish a local revenue source to fund transportation improvements in the Pioneer Valley region would first require action by the Massachusetts Legislature. It could also require a successful ballot initiative by local voters. The information below on local revenue options is provided solely to illustrate options that other states have used to raise additional revenue to fund transportation improvement projects.

1. Local Motor Fuel Tax - The revenue base provided by these optional taxes is supplemental in nature because fuel taxes in addition to state and federal fuel taxes would likely cause drivers to purchase fuel outside the local area levying the tax.

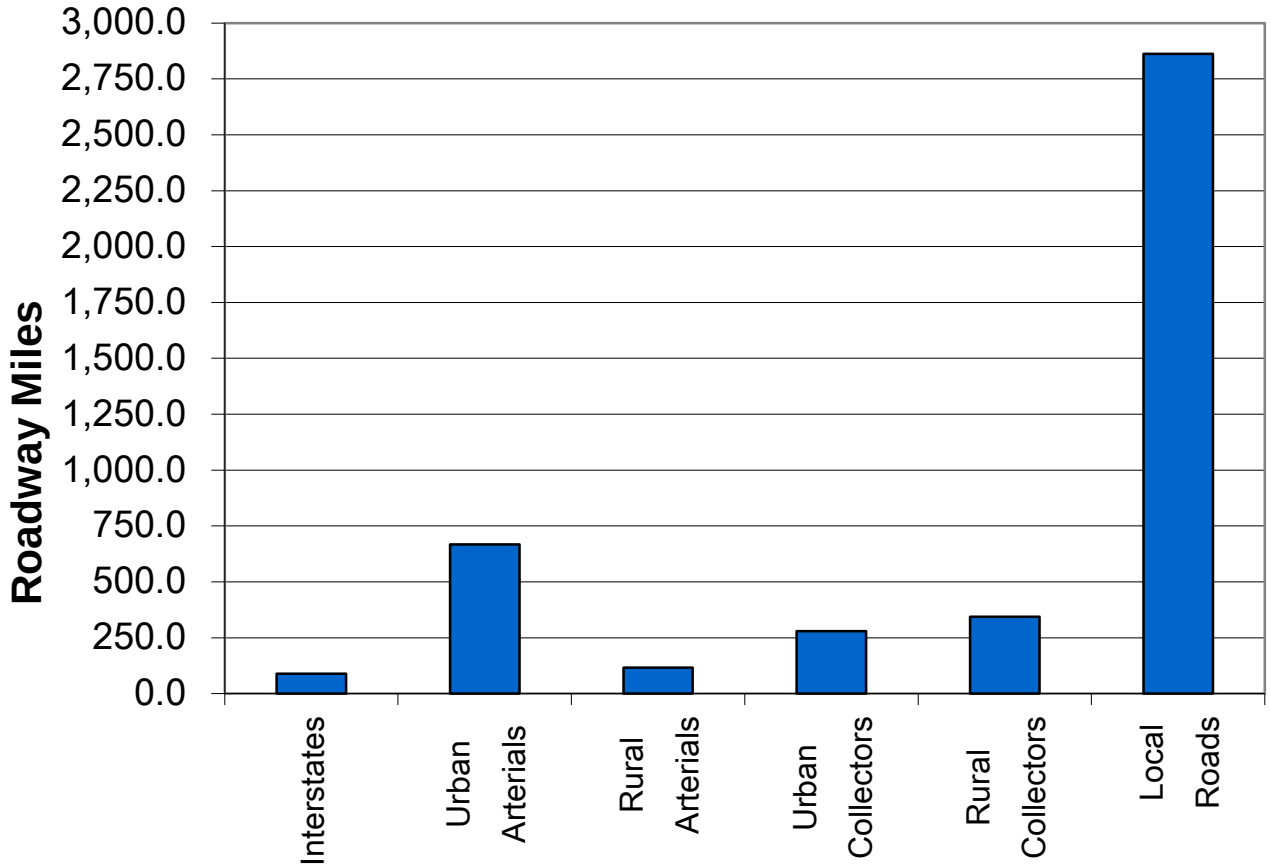
[13] http://www.transportation-finance.org/funding_financing/funding/local_funding/

2. Local Motor Vehicle Registration Fee - Local counties and municipalities are authorized by many states to levy an additional fee on motor vehicle registration. These fees are typically collected by the state and returned to the locality. Most local registration fees are used for general revenue or directed towards transportation purposes, often for pay-as-you-go routine maintenance or operations. Some specific transportation improvement programs are funded through local registration fees.
3. Local Option Sales Tax - Many states authorize localities to levy local option sales taxes for transportation purposes. The use of a local option sales tax requires a voter referendum. Spending authority varies from state to state, some granting localities the choice of earmarking funding or using it as general revenue. Other states require a specific purpose be attached to the tax, such as roadway improvement projects.
4. Local Income/Payroll/Employer Tax – Local income taxes are levied across a particular municipality. This can create differences in neighboring income tax rates that discourage residents from settling there. Payroll taxes (often referred to as commuter taxes), on the other hand, are based on the total of all salaries paid out by employers, effectively taxing a place of employment rather than a place of residence. One example of the application of these taxes would be to support transit service into a city.
5. Local Severance Taxes - A severance tax is a weight-based charge levied on operators of natural resource extraction operations such as coal, timber, or stone. It is used to fund road improvements in several rural regions of states where heavy truck operations from these activities cause a disproportionate amount of damage to remote roads.
6. Value Capture - Value capture refers to cases where the public sector is able to capture some of the increased value, usually property value, that results from public investment. Some transportation investments, such as a new freeway or interchange for example, increase the value of adjacent properties by improving access.
7. Tax Increment Financing - Tax Increment Financing (TIF) allows cities or counties to create special districts to generate extra tax revenue and to use that new income to make public improvements. The legislative process for implementing and utilizing TIF financing is a complicated process involving the creation of the special district and the public agency to act as the administrator of the funds.

3. Local Pavement Maintenance Needs

Currently, roadways classified as “local” roads are not eligible for federal funds. In the Pioneer Valley Region the vast majority of roadways (66%) are classified as local roads, meaning that over half of all roads in the region are being maintained using Chapter 90 funds or other local sources of revenue.

Figure 15-6 – Miles of Roadway by Functional Classification

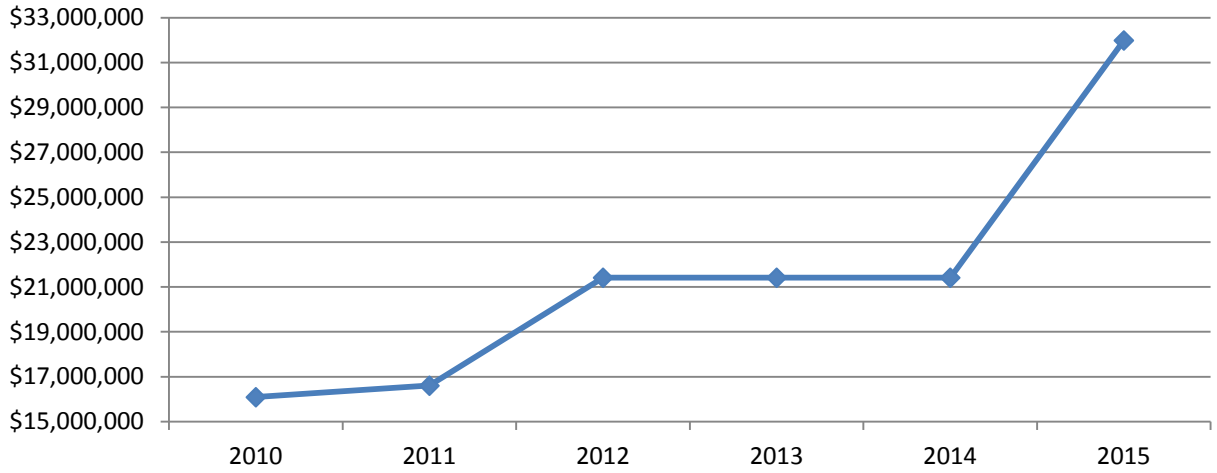


During the past several years a number of political, social, and economic trends have influenced the form and substance of local highway maintenance practices. Significant among them is the increasing pressure of fiscal austerity on local resources which place constraints on local tax revenues and make it difficult for the local highway superintendent or engineer to adequately meet the maintenance needs of local roads in the community.

The cost increase to maintain local infrastructure, the loss of local revenue, and the need for more Chapter 90 funding are common concerns of local communities in the region. The state’s Chapter 90 allocation had been level funded since the middle of the 1990s. As can be seen in Figure 15-7, in recent years Chapter 90 funding has seen a modest increase. In 2015 the Governor of Massachusetts approved an

additional $100,000,000 ($10.5 million to the Pioneer Valley) in Chapter 90 funding. In addition to this increase, the (Massachusetts Municipal Association) MMA as well as local officials have been lobbying to tie Chapter 90 funding to inflation to ensure rising maintenance cost do not negate increases in allotments.

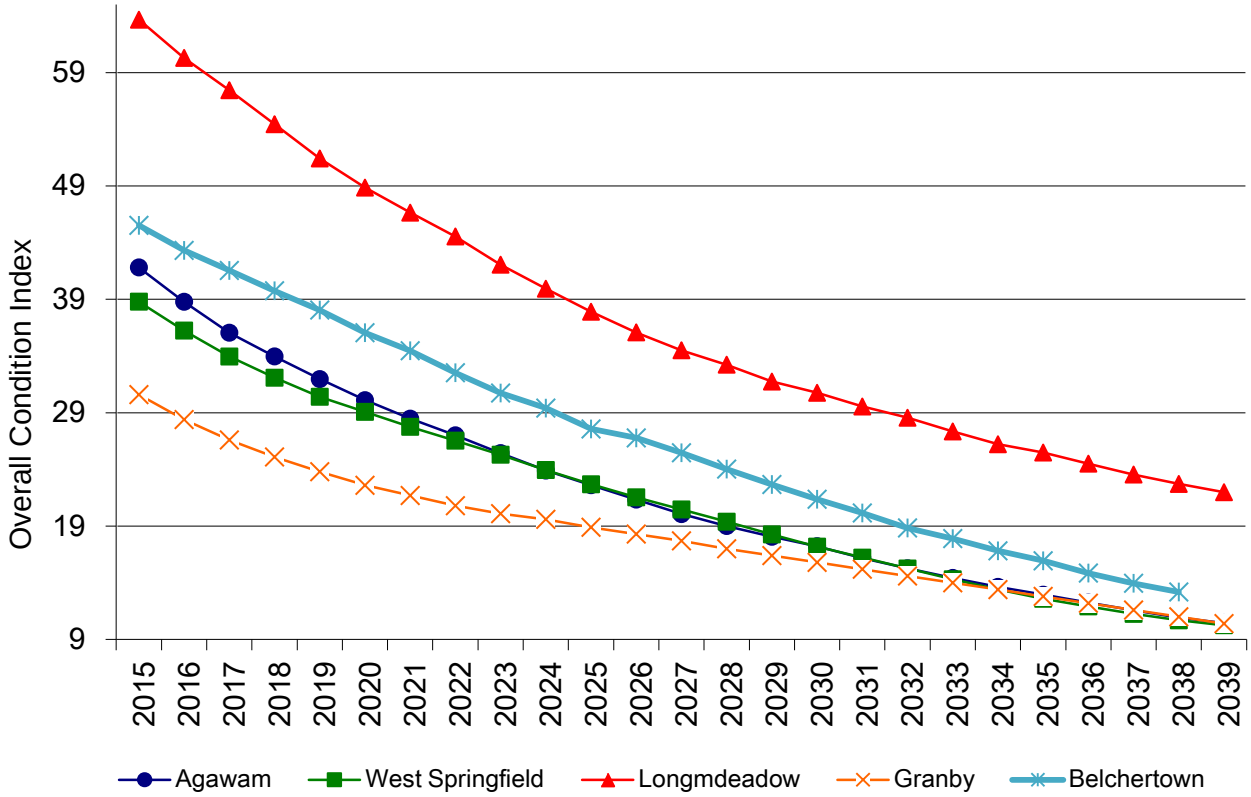
Figure 15-7 – Pioneer Valley Municipal Chapter 90 Funding 2010-2015



PVPC reviewed the long term impact of existing Chapter 90 Funding levels on local roadways in five communities. This information, presented in Figure 15-8, shows a clear downward trend over time indicating the current level of funding is not sufficient to maintain the condition of local roadways into the future. As the cost of construction materials continues to increase, the condition of roads will continue to deteriorate. This decline in the average OCI level is the result of the improvement rate being offset by the roadway deterioration rate. Also, the amount of needed repairs (backlog) increases as the average OCI declines.

According to the findings of a survey administered by the MMA, a Chapter 90 funding level of $562,169,719 is needed statewide in order to bring local roads up to a state of good repair. This information was obtained from the MMA report – Making a Difference Where the Rubber Meets the Road: https://www.mma.org/resources-mainmenu-182/cat_view/148-public-works-energy-and-utilities/191-transportation.

Figure 15-8 – Projected Overall Pavement Condition Index at Level Funding



In order to identify the level of need in the Pioneer Valley, PVPC staff developed 4 scenarios based off the findings of the MMA survey. Under each of the scenarios, it is assumed that 100% of local Chapter 90 funding is being applied to pavement maintenance in one local community in the Pioneer Valley region.

a) Scenario 1 - MMA recommended $562 million Chapter 90 funding level

A portion of the $562 million statewide figure was applied to one local community over the life of the plan based on the current Chapter 90 allocation formula. This resulted in a total investment $46 Million over the life of the plan, assuming no inflation.

b) Scenario 2 - MMA recommended local funding level with 4% revenue inflation to match project cost inflation

A portion of the $562 million statewide figure was applied to one local community over the life of the plan based on the current Chapter 90 allocation formula. This resulted in a total investment $85 Million over the life of the plan, assuming a 4% per year inflation factor.

c) Scenario 3 - Assumes Scenario 2 with an additional year 1 investment of $8 million

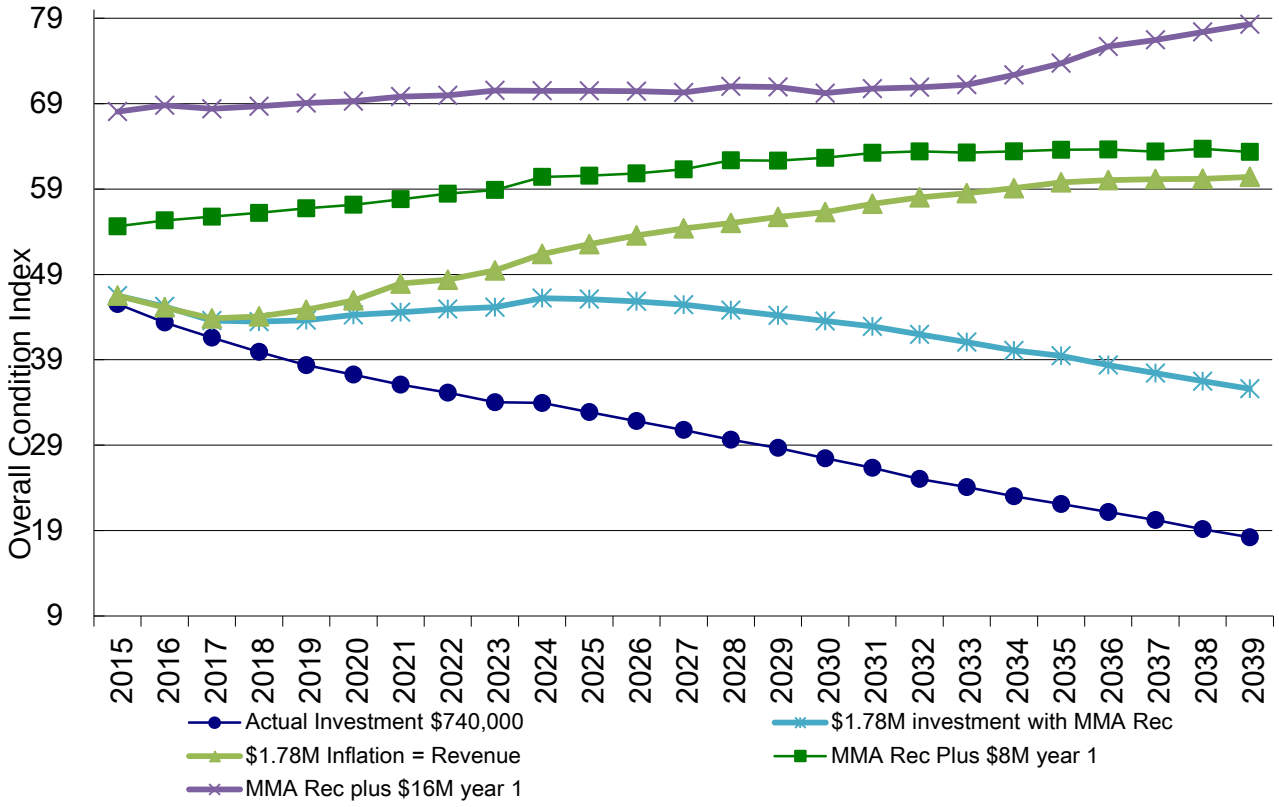
This scenario was based off the $85 million investment from Scenario 2 with an increase in year 1 revenue from $1.7 million to $8million. The $8 million represents a quarter of the municipal backlog of improvements as calculated with Cartegraph. The total investment of this scenario is $91 million over the life of the plan.

d) Scenario 4 - Assumes Scenario 2 with an additional year 1 investment of $16 million

This scenario was based off the $85 million investment from Scenario 2 with an increase in year 1 revenue from $1.7 million to $16 million. The $16 million represents half of the municipal backlog of improvements as calculated with Cartegraph.

The results of the four scenarios as well as the baseline $740,000 investment scenario can be seen in Figure 15-9.

Figure 15-9 – Community OCI Scenario Planning



Scenario 1 results in an improvement to OCI beginning in 2018 before the OCI begins to decline in 2026. This is as a result of the impact of inflation decreasing the amount of revenue available to be invested into the maintenance of the local roadway system.

Scenario 2 generally follows the trend line of Scenario 1 for the first ten years, however, the impact of increasing funding in line with inflation results in the OCI continuing to improve over the life of the plan. It appears, however, that OCI begins to level off in the later years of the plan which may indicate additional revenues would be needed to continue to improve local OCI in the future.

The impact of the increased year 1 spending of $8 million under Scenario 3 results in the immediate improvement to the overall OCI. While the first two scenarios indicated an initial decline in OCI over the first three years, this scenario allows the municipality to fund a quarter of the backlog of roadway maintenance during year 1. This immediately improves roadway conditions and also allows a greater amount of money to be invested in preventative maintenance. As a result, the OCI improves every year for the first 20 years of the plan. Similar to Scenario 2, it appears that additional funding would be required in the last 5 years of the plan to continue increase the overall OCI into the future.

Scenario 4 is the first scenario that appears to fund the local roadway system at an adequate level. The $16 million investment in year 1 allows the municipality to fund 50% of the project backlog resulting in an immediate increase in OCI. The OCI also continues to steadily increase over the life of the plan.

The results of the four scenarios indicate that additional revenue is required early on to begin to curtain the decline in local OCI levels. In addition, the scenarios clearly show the need to tie local funding levels to inflation in order to ensure that increased construction costs do not offset increased funding allocations. Scenario 4 had the greatest impact on local OCI levels. In order to realize the benefits of Scenario 4 on local roadways in the Pioneer Valley region, it is estimated that an additional $343 million dollars would need to be invested in local roadway maintenance projects.

CHAPTER 16

CONFORMITY

A. MASSACHUSETTS TRANSPORTATION COMFORMITY

1. 2008 Ozone Nonattainment Area

As of July 20, 2013, Dukes County, Massachusetts [Dukes County Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts] is nonattainment, classification marginal, for the 2008 8-Hour Ozone National Ambient Air Quality Standard (NAAQS), also known as the 2008 ozone standard. Final Rule: "*Air Quality Designations for the 2008 Ozone National Ambient Air Quality Standards*," Monday, May 21, 2012; (77 FR 30088); effective July 20, 2012.

Interagency Transportation Conformity Consultation has determined Dukes County, Massachusetts to be an isolated rural nonattainment area for the 2008 8-hour ozone standard.

Isolated rural nonattainment and maintenance areas are areas that do not contain or are not part of any metropolitan planning area as designated under the transportation planning regulations. Isolated rural areas do not have federally required metropolitan transportation plans or TIPs and do not have projects that are part of the emissions analysis of any MPO's metropolitan transportation plan or TIP. Projects in such areas are instead included in statewide transportation improvement programs. These areas are not donut areas.

See 40 CFR Section 109(g) for conformity in isolated rural nonattainment and maintenance areas.

2. 1997 Ozone Nonattainment Areas

As of July 20, 2013, the 1997 8-Hour Ozone NAAQS (the 1997 ozone standard) is revoked for transportation conformity purposes in the Boston-Lawrence-Worcester (Eastern Massachusetts), Massachusetts and the Springfield (Western Massachusetts), Massachusetts areas. Transportation conformity no longer applies to the 1997 ozone NAAQS in Massachusetts. Final Rule: "*Implementation of the 2008 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications Approach, Attainment Deadlines and Revocation of the 1997 Ozone Standards for Transportation Conformity Purposes,"* Monday, May 21, 2012; (77 FR 30160); effective July 20, 2012.

a) MassDOT Response to Conservation Law Foundation

Some Massachusetts MPO's received comments from the Conservation Law Foundation (CLF) contending that air quality conformity determinations for ozone

precursors should continue to be conducted in Massachusetts. MassDOT has prepared the following response to the CLF comment letters:

All the Massachusetts MPOs and MassDOT continue to meet the requirements of air quality conformity according to the Code of Federal Regulations, and as evaluated through inter-agency consultation. Specifically:

On March 6, 2015, (80 FR 12264, effective April 6, 2015) EPA published the Final Rulemaking, "Implementation of the 2008 National Ambient Air Quality Standards (NAAQS) for Ozone: State Implementation Plan Requirements; Final Rule." This rulemaking removed transportation conformity to the 1997 Ozone NAAQS (the standard referenced by CLF and the subject of a 12/23/14 DC Circuit Court decision).

Link to Final EPA Rulemaking: http://www.gpo.gov/fdsys/pkg/FR-2015-03-06/pdf/2015-04012.pdf

Since the RTPs have been developed, reviewed, and will be approved after April 6, 2015, air quality conformity determinations to the 1997 Ozone NAAQS are no longer required, as those standards and all associated area designations have been permanently replaced by the 2008 NAAQS, which (with actually a stricter level of allowable ozone concentration than the 1997 standards) no longer designate Massachusetts as a non-attainment area(s) for ozone (except for Dukes County – see below).

Through the Interagency air quality consultation process (involving U.S. DOT, EPA, MassDEP, MassDOT, and the MPOs) the latest EPA rulemakings, the referenced court decision, ozone standards and area designations were all reviewed. Specific transportation conformity requirements in Massachusetts for this RTP round are as follows:

- No conformity determination is required for the 2008 Ozone NAAQS, as Dukes County (the only designated non-attainment area) is classified as an "isolated rural nonattainment area" and therefore only needs to evaluate transportation conformity when the Martha Vineyard Commission has a "regionally significant" project that would trigger conformity.
- The Boston carbon monoxide attainment area with a current maintenance plan in place (with a carbon monoxide motor vehicle emission budget) will prepare a carbon monoxide air quality analysis for the Boston Area (nine communities).
- The Lowell, Waltham, Worcester and Springfield Areas are classified attainment with a limited maintenance plan in place. No regional air quality analysis is required in limited maintenance plan areas as emissions may be treated as essentially not constraining for the length of the maintenance period because it is unreasonable to expect that such areas will experience so much growth in that period that a violation of the carbon monoxide NAAQS

would result. Therefore, in areas with approved limited maintenance plans, Federal actions requiring conformity determinations under the transportation conformity rule are considered to satisfy the "budget test." All other transportation conformity requirements under 40 CFR 93.109(b) continue to apply in limited maintenance areas, including project level conformity determinations based on carbon monoxide hot spot analyses under 40 CFR 93.116.

In consideration of the comments received, combined with MassDOT's greenhouse gas (GHG) reporting requirements for the Commonwealth's Global Warming Solutions Act (310 CMR 60.05), MassDOT will conduct a "conformity-related" emissions analysis for ozone precursors, consistent with the 1997 NAAQS standards (currently superseded by the 2008 NAAQS). This emissions analysis will be for informational purposes only (as it is currently NOT federally required), and will be contained in a separate air quality document (also to include GHG emissions analysis) that will be completed at the end of August 2015 – the results of which will then be available to the MPOs, the Massachusetts Executive Office of Energy and Environmental Affairs (and affiliate agencies), and all other interested parties.

3. Carbon Monoxide Full Maintenance Plan

As of April 1, 1996, the Boston carbon monoxide area was redesignated to attainment and EPA approved a maintenance plan for the Boston area (Boston, Chelsea, Revere, Quincy, Cambridge, Everett, Malden, Medford, and Somerville) through a Direct Final Rulemaking: "*Approval and Promulgation of Implementation Plans and Designation of Areas for Air Quality Planning Purposes; State of Massachusetts; Change in National Policy Regarding Applicability of Conformity Requirements to Redesignation Requests*," Tuesday, January 30, 1996; (61 FR 2918). SIP approved year 2010 CO motor vehicle emission budget 228.33 tons per winter day.

4. Carbon Monoxide Limited Maintenance Plan

As of April 22, 2002, the cities of Lowell, Waltham, Worcester and Springfield were redesignated as being in attainment for CO, with an EPA-approved limited-maintenance plan. No regional air quality analysis is required in limited maintenance plan areas as emissions may be treated as essentially not constraining for the length of the maintenance period because it is unreasonable to expect that such areas will experience so much growth in that period that a violation of the carbon monoxide NAAQS would result. Therefore, in areas with approved limited maintenance plans, Federal actions requiring conformity determinations under the transportation conformity rule are considered to satisfy the "budget test." All other transportation conformity requirements under 40 CFR 93.109(b) continue to apply in limited maintenance areas, including project level conformity determinations based on carbon monoxide hot spot analyses under 40 CFR 93.116.

5. Transportation conformity requirements under 40 CFR 93.109(b) that continue to apply:

These requirements must be addressed by Interagency Consultation and as appropriate the RTP Transportation conformity evaluation document.

- Latest planning assumptions
- Latest emissions model
- Consultation (including:
- Evaluating events which will trigger new conformity determinations in addition to those triggering events established in §93.104;
- Which projects should be considered to have a significant change in design concept and scope from the transportation plan or TIP;
- Whether projects otherwise exempted should be treated as non-exempt in cases where potential adverse emissions impacts may exist;
- Past obstacles to implementation of TCMs which are behind the schedule established in the applicable implementation plan have been identified and are being overcome;
- Whether State and local agencies with influence over approvals or funding for TCMs are giving maximum priority to approval or funding for TCMs; [This process shall also consider whether delays in TCM implementation necessitate revisions to the applicable implementation plan to remove TCMs or substitute TCMs or other emission reduction measures.)
- Public participation
- U.S. DOT fiscal constraint requirements
- Transportation Control Measures approved into the State Implementation Plan
- Currently conforming plan and TIP
- Project from a conforming plan and TIP
- CO hot-spots analysis and project level conformity.

B. GREENHOUSE GAS MONITORING AND EVALUATION

1. Metropolitan Planning Organizations and the Global Warming Solutions Act

The Commonwealth's Global Warming Solutions Act (GWSA) of 2008 requires statewide reductions in greenhouse gas (GHG) emissions of 25 percent below 1990 levels by the year 2020, and 80 percent below 1990 levels by 2050. As part of the GWSA, the Executive Office of Energy and Environmental Affairs developed the Massachusetts Clean Energy and Climate Plan (CECP), which outlines programs to attain the 25 percent reduction by 2020 – including a 7.6 percent reduction that would be attributed to the transportation sector.

The Commonwealth's thirteen metropolitan planning organizations (MPOs) are integrally involved in helping to achieve greenhouse gas reductions mandated under the GWSA. The MPOs work closely with the Massachusetts Department of Transportation (MassDOT) and other involved agencies to develop common transportation goals, policies, and projects that would help to reduce GHG emission levels statewide. For example, one of the programs in the CECP is MassDOT's sustainability initiative known as GreenDOT. GreenDOT policy goals were developed in accordance with the GWSA, and are as follows:

- **Reduce greenhouse gas (GHG) emissions.** MassDOT will achieve this by taking GHG emissions into account in all of its responsibilities, from strategic planning to project design and construction and system operations.
- **Promote the healthy transportation modes of walking, bicycling, and public transit.** MassDOT will achieve this by pursuing multi-modal, "complete streets" design standards; providing choice in transportation services; and by working with MPOs and other partners to prioritize and program a balance of projects that serve drivers, pedestrians, bicyclists, and public transit riders.
- **To support smart growth development.** MassDOT will achieve this by working with MPOs and other partners to make transportation investments that enable denser, smart growth development patterns that support reduced GHG emissions.

The Pioneer Valley MPO shares in these goals and is working to meet the specific requirements of the GWSA regulation – Global Warming Solutions Act Requirements for the Transportation Sector and the Massachusetts Department of Transportation (310 CMR 60.05). The purpose of this regulation is to assist the Commonwealth in achieving their adopted GHG emission reduction goals by:

- Requiring MassDOT to demonstrate that its GHG reduction commitments and targets are being achieved
- Requiring each MPO to evaluate and track the GHG emissions and impacts of its Regional Transportation Plan and Transportation Improvement Program
- Requiring each MPO, in consultation with MassDOT, to develop and utilize procedures to prioritize and select projects in its RTP and TIP based on factors that include GHG emissions and impacts

Meeting the requirements of this regulation will be achieved through the transportation goals and policies contained in the 2016 Regional Transportation Plan, the major projects planned in the RTPs, and the mix of new transportation projects that are programmed and implemented through the Transportation Improvement Program. The GHG tracking and evaluation processes enable the MPOs to identify the anticipated GHG impacts of the planned and programmed projects, and also to use GHG impacts as a criterion in prioritizing transportation projects. This approach by the MPO is consistent with the greenhouse gas reduction policies of promoting healthy transportation modes through prioritizing and programming an appropriate balance of roadway, transit, bicycle and pedestrian investments; as well as supporting smart growth development patterns through the creation of a balanced multi-modal transportation system. All of the MPOs and MassDOT are working toward reducing greenhouse gases with plans, actions, and strategies that include (but are not limited to):

- Reducing emissions from construction and operations
- Using more fuel-efficient fleets
- Implementing and expanding travel demand management programs
- Encouraging eco-driving
- Providing mitigation for development projects
- Improving pedestrian, bicycle, and public transit infrastructure and operations (healthy transportation)
- Investing in higher density, mixed use, and transit-oriented developments (smart growth)

2. Regional GHG Tracking and Evaluation in RTPs

MassDOT coordinated with MPOs and regional planning agency (RPA) staffs on the implementation of GHG tracking and evaluation in development of each MPO's 2012 RTPs, which were adopted in September 2011. This collaboration has continued for the MPO's 2016 RTPs and 2016-19 TIPs. Working together, MassDOT and the MPOs have attained the following milestones:

- Modeling and long-range statewide projections for GHG emissions resulting from the transportation sector for use before final RTP endorsement. Using the Boston MPO's regional travel demand model and the statewide travel demand model for the remainder of the state, GHG emissions will be projected for 2020 no-build and build conditions, and for 2040 no-build and build conditions. The results of this modeling will be available before the endorsement of this RTP and the MPO staff will present on the results to the MPO membership before a vote on endorsement.
- All of the MPOs will include GHG emission reduction projections in their RTPs, along with a discussion of climate change and a statement of MPO support for reducing GHG emissions as a regional goal.

MassDOT, using its statewide travel demand model, will provide the Pioneer Valley MPO with statewide estimates of CO_2 emissions resulting from the collective list of all recommended projects in all the Massachusetts RTPs combined (and supplemented by CO_2 emission reduction results for smaller, "off-model" projects supplied by the MPO). Emissions will be estimated using the new (2014) MOVES model, and also incorporate the latest planning assumptions including updated socio-economic projections for the Commonwealth.

The project mix from this RTP (and all other RTPs) – modeled for both 2020 and 2040 using an Action (Build) vs. Baseline (No-Build) analysis to determine the CO_2 emissions attributed to all MPO's mix of projects and smart-growth land use assumptions – is expected to show a neutral shift toward meeting the statewide greenhouse gas emissions reduction goal of 25 percent below 1990 levels by the year 2020, and 80 percent below 1990 levels by 2050. The reason for the anticipated neutral shift is that early indicators have shown that major infrastructure projects, both individually and collectively, would not trigger a significant change in GHG emission levels.

Working closely with MassDOT, the Pioneer Valley MPO continues to make efforts toward progress through planning activities to meet the GHG reductions targets and complying with the requirements of the GWSA. As part of this activity, the MPO will provide further public information on the topic and will continue to advocate for steps needed to accomplish the MPO's and Commonwealth's goals for greenhouse gas reductions.

CHAPTER 17

ENVIRONMENTAL CONSULTATION AND MITIGATION

Regional Transportation Plans must provide information on the efforts to consult with state and local agencies responsible for environmental, land use, and preservation in the development of the RTP. In addition, the RTP must include a discussion of the types of potential environmental mitigation activities and potential areas to carry out these activities. The following sections demonstrate how these requirements have been integrated into the RTP for the Pioneer Valley Metropolitan Planning Organization.

A. ENVIRONMENTAL CONSULTATION

The Pioneer Valley Metropolitan Planning Organization must consult "as appropriate" with state and local agencies responsible for land use management, natural resources, environmental protection, conservation, and historic preservation to develop the long range transportation plan. PVPC scheduled an environmental consultation meeting on Wednesday May 13, 2015. Invitations were sent to a number of federal, state, and local agencies to review the draft transportation improvement projects included as part of the RTP. PVPC staff was available for questions and comments from 12:00 PM to 4:00 PM. Transportation Improvement projects were mapped over several environmental maps including:

- Environmental Justice Minority and Poverty Block Groups
- 100 and 500 Year Flood Zones
- Valley Vision Priority Development and Priority Protection Areas
- Regional Wetlands
- Pioneer Valley Bike Linkages Map
- Critical Linkages II Habitat Connectivity

These maps are shown in Figures 17-1 – 17-6. A complete list of agencies invited to participate in the Environmental Consultation is presented in Table 17-1. Each of these agencies will also be sent a draft copy of the RTP. Comments received as part of Environmental Consultation have been summarized in Chapter 3 of the RTP.

Figure 17-1 – RTP Project Impacts on Environmental Justice Minority and Poverty Block Groups

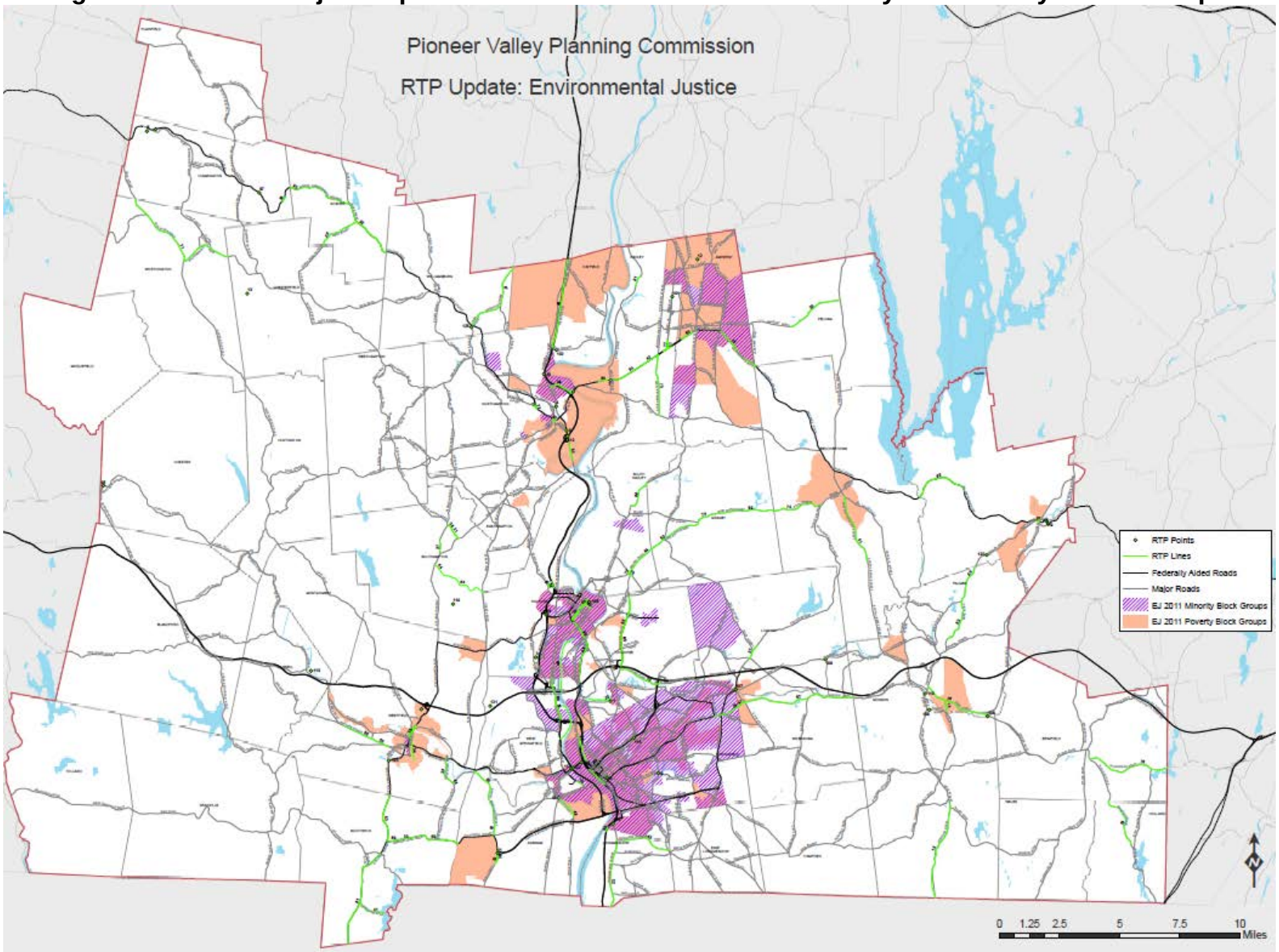


Figure 17-2 – RTP Project Impacts on 100 and 500 Year Flood Zones

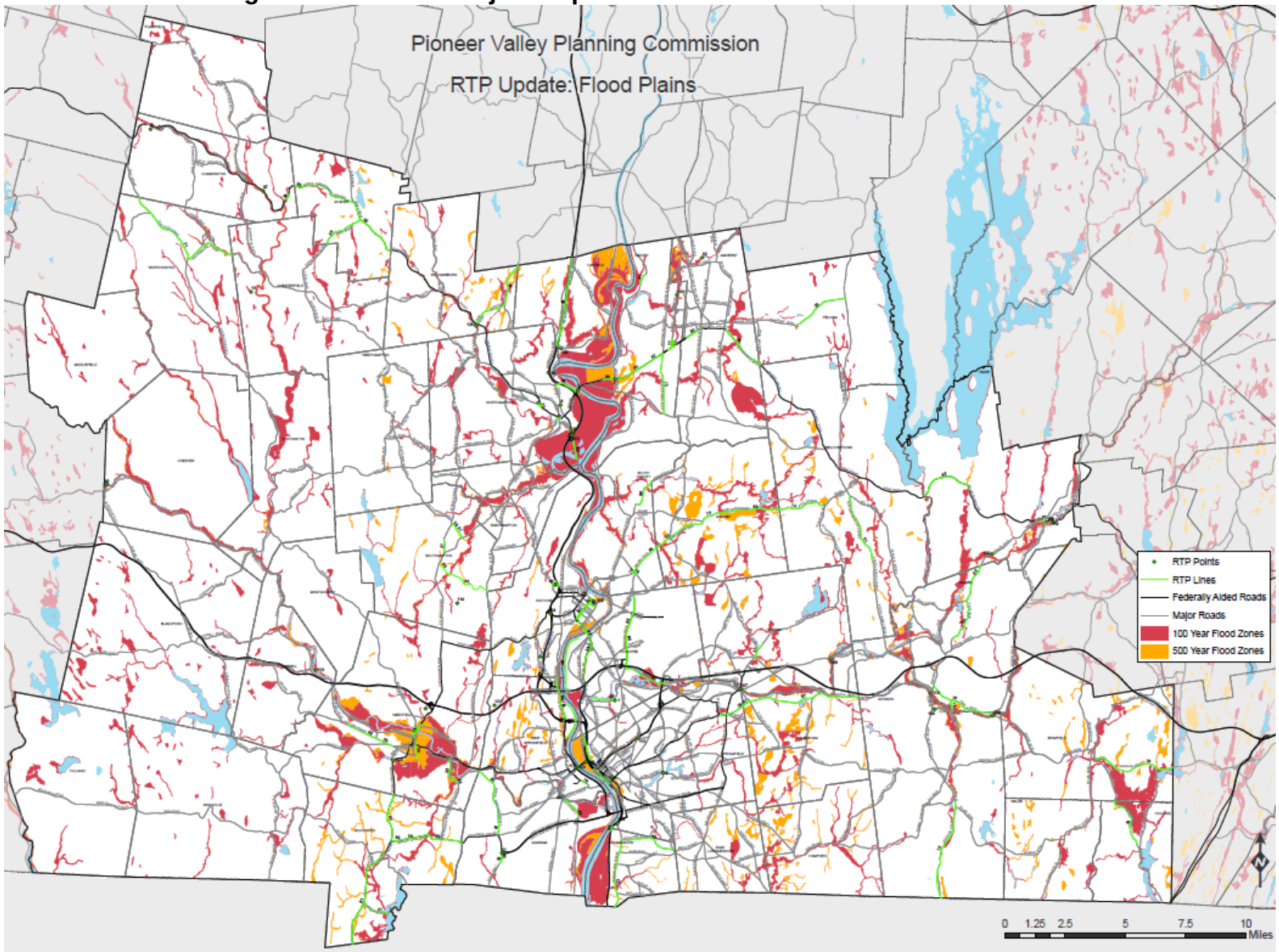


Figure 17-3 – RTP Project Impacts on Valley Vision Priority Development and Priority Protection Areas

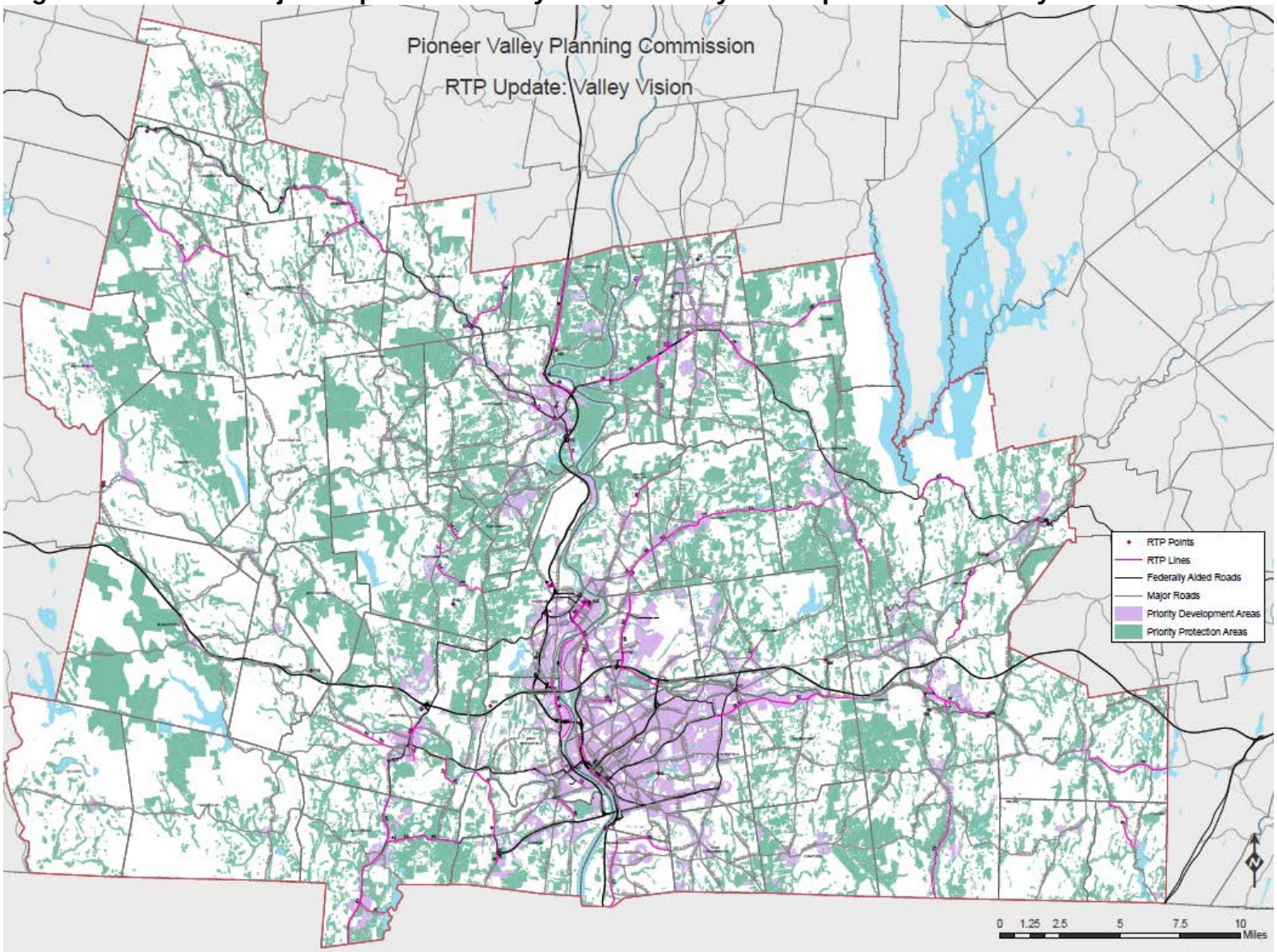


Figure 17-4 – RTP Project Impacts on Regional Wetlands

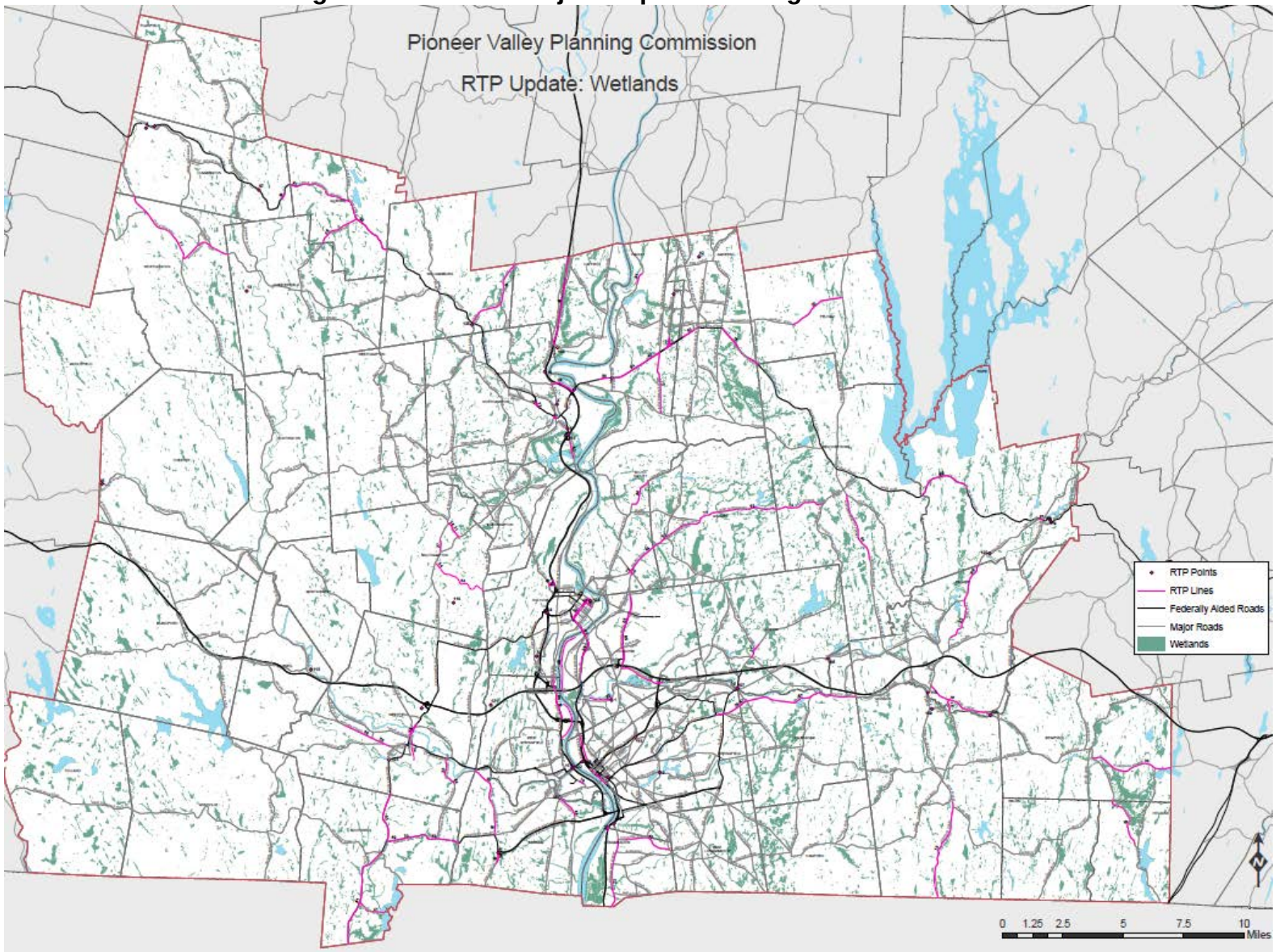


Figure 17-5 – Pioneer Valley Bike Linkages Map

Figure 17-6 – RTP Project Impacts on Critical Linkages II Habitat Connectivity

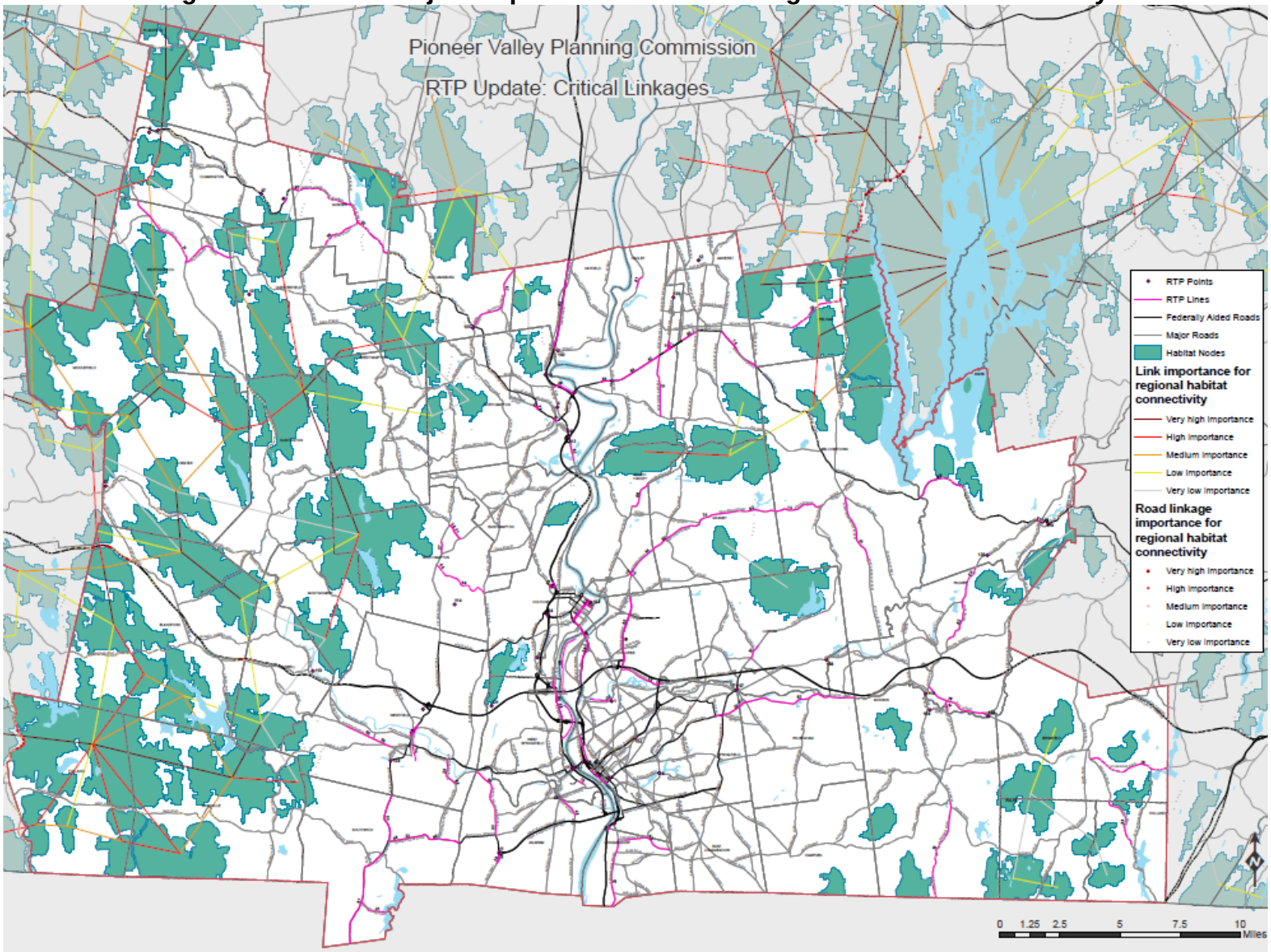


Table 17-1 – Environmental Consultation on the Draft RTP

Organization	Organization
American Farmland Trust	MA DEP
American Mountain Club	MA DFW
Arise for Social Justice	MA DPH
Barnes Aquifer Committee	Mason Square Task Force
Chicopee River Watershed Council	Mass Climate Action Network – MCAN
City of Springfield Green Committee	MassAudubon
Cooley Dickinson Health Care Healthy Communities Coalition	National Park Service
CT River Cleanup Committee	Neighbor to Neighbor
CT River Stormwater Committee	Nuestras Raices
CT River Watershed Council	PV Asthma Coalition
Division of Ecological Restoration, Mass DFG	Pioneer Valley MPO Mailing List
Dunbar Community Center/YMCA	PVPC JTC Members and Alternates
Gardening the Community	Springfield YMCA
Grow Food Amherst	The Nature Conservancy
Grow Food Northampton	Trout Unlimited Pioneer Valley
Hampden County Health Coalition	Trustees of Reservations
Hampshire Regional YMCA	US Fish Wildlife Service (Conte Refuge)
Holyoke Food and Fitness Policy Council	Vida Urbana
Kestrel Land Trust	Westfield River Watershed Association
LiveWell Springfield	Westfield River Wild & Scenic Committee
MA DCR	Winding River Land Conservancy

B. MASSACHUSETTS ENVIRONMENTAL MITIGATION

Throughout the region, the Pioneer Valley Planning Commission is leading a wide array of policies, programs and actions geared towards preserving this region's high quality of life, a large portion of which is attributable to the health of the local environment. In addition to State and Federal protections given to the natural community, PVPC is working through several programs in the Commonwealth to preserve the region's environmental quality.

1. Regulatory Protection for Habitat and Wildlife in Massachusetts

Massachusetts has a long track record of passing progressive, forward thinking environmental policies. The protections given to Massachusetts' endangered species, wetlands, and rivers are among some of the nation's most effective rules and regulations. All construction and transportation projects that take place within PVPC's jurisdiction will comply with the regulations listed below. This will result in mitigation measures that are built into the project from the earliest phase.

a) National Heritage Endangered Species Program

The National Heritage Endangered Species Program (NHESP) protects crucial habitat for terrestrial and aquatic plants, vertebrates, and invertebrates. In Massachusetts, the Massachusetts Endangered Species Act (MESA; M.G.L. c 131A) serves as the regulatory framework for promoting the conservation of rare species habitat through the delineation of boundaries of rare and endangered species habitat in Massachusetts.

Massachusetts National Heritage Endangered Species Program staff evaluate projects when they fall within an area that has been identified as Priority Habitat for a rare animal or plant species. Estimated Habitats are a sub-set of the Priority Habitats based on the geographical extent of habitat of state-listed rare wetlands wildlife. This process is initiated when a proponent files documentation with NHESP detailing work proposed within a NHESP habitat area. Within 30 days, staff from NHESP respond, indicating whether or not the submission is complete; 60 days after that, NHESP determines whether or not a project, as proposed, will result in the "take" of a rare species. Should that be the case, NHESP might require a redesign of the project to avoid a "take." If a project cannot be amended to avoid a "take," the proponent can only be issued a Conservation and Management Permit. To qualify for a Conservation and Management Permit, a proponent must submit alternative assessments of temporary and permanent impacts to species, demonstrate that a proposed project will impact only an insignificant portion of the local population of a state-listed species, and design and implement a conservation management plan that provides for the long term net benefit of the affected state-listed species. This net-benefit mitigates adverse impacts on species through on or off-site permanent habitat protection, management or restoration of state-listed species habitat, or conservation research designed to benefit the species affected by a given project.

Priority and Estimated Habitat maps are used for determining whether or not a proposed project must be reviewed by the NHESP for MESA and Wetlands Protection Act (WPA) compliance. These maps can be accessed online through the following link: http://www.mass.gov/eea/agencies/dfg/dfw/natural-heritage/regulatory-review/regulatory-maps-priority-and-estimated-habitats/

For issues relating to transportation projects, there are some key exemptions granted: utility repairs within 10 feet of existing paved roads; maintenance, repair or replacement (but not widening of) existing paved roads; shoulder repair up to 4 feet; and paved parking areas, excluding actions that would change stormwater drainage.

b) Army Corps of Engineers Stream Crossing Standards

The Massachusetts River & Stream Crossing Standards seek to achieve, through varying degrees, three goals:

- Facilitate movement of fish and other aquatic organisms.

- Maintain continuity of the aquatic and benthic elements of river and stream ecosystems.
- Facilitate movement of wildlife species including those primarily associated with river and stream ecosystems and others that may utilize riparian areas as movement corridors.

The current version of the Massachusetts River & Stream Crossing Standards was developed by the Department of Fish and Game, Division of Ecological Restoration. The University of Massachusetts–Amherst coordinated an effort to create the original Standards in 2004. The standards are intended for new permanent crossings and, when possible, for replacing existing permanent crossings. A complete copy of the standards is located at: http://www.mass.gov/eea/docs/dfg/der/pdf/stream-crossings-handbook.pdf.

c) Design of Bridges and Culverts for Wildlife Passage at Freshwater Streams

This document, developed by MassDOT, requires the development of transportation facilities that fit the environmental resources setting, while maintaining safety and mobility for all users. This guidance document assists project designers and planners in complying with regulatory standards for structures to address wildlife passage standards. A complete copy of the document is located at: http://www.massdot.state.ma.us/highway/Departments/EnvironmentalServices/FormsPublicationsDocuments/StormwaterManagement.aspx

Additional resources include:

- MassDOT Project Development and Design Guide - https://www.massdot.state.ma.us/highway/DoingBusinessWithUs/ManualsPublicationsForms/ProjectDevelopmentDesignGuide.aspx
- Direct link to the Design Guide Wildlife Accommodation Chapter: http://www.massdot.state.ma.us/Portals/8/docs/designGuide/CH_14.pdf

2. Wetlands Protection Act (WPA)

The Massachusetts Wetlands Protection Act provides definitions of wetland resource areas and their 100 foot Buffer Zones, and gives jurisdiction to the Conservation Commission (Con Com) of each City or Town. If a project is located within a 100 foot Buffer Zone, or proposes work within a wetland, stream or intermittent stream, a proponent must go before the appropriate local Con Com. Depending on the impacts of the project the proponent may need to file either a Request for Determination of Applicability or a Notice of Intent (NOI). In turn the Con Com, and DEP would review the project and issue a Determination or an Order of Conditions. If the project requires a NOI and is also within NHESP Habitat, the NOI must be sent to NHESP for their review and comment.

There are Buffer Zone and other limited exemptions within the WPA, and as listed above there are exemptions to work within NHESP Habitat.

http://www.mass.gov/eea/agencies/massdep/water/regulations/310-cmr-10-00-wetlands-protection-act-regulations.html

3. The River Protection Act

Chapter 258 of the Acts of 1996 protects areas within 200 feet of rivers and perennial streams, beginning at the mean annual high water line on both sides of the river or stream. This 200 foot resource area known as Riverfront Area is a consideration the Wetlands Protection Act and is under jurisdiction of the Local Conservation Commissions and DEP.
http://www.mass.gov/eea/agencies/massdep/water/regulations/massachusetts-rivers-protection-act.html

Transportation infrastructure that was in existence, or in the process of being permitted, at the time of the passage of the Rivers Act are exempt, but new construction is not. For this reason, project proponents operating within PVPC's member communities must work with DEP to ensure that no encroachment on the 200 foot or 25 foot buffer occurs.

In addition to protecting this resource area, the Commonwealth has also issued Stormwater Management standards and guidelines to complement the Wetlands Protection Act and the Rivers Act. Project proponents must work with the local Conservation Commission and the Department of Environmental Protection to ensure that there is no net change in stormwater discharge between pre-development and post-development runoff conditions and to minimize pollutant loading in the affected water bodies. This process commences with the filing of a Notice of Intent; mitigating measures are issued as part of the Order of Conditions that a project proponent must comply with throughout and after the development process.

4. Massachusetts Environmental Policy Act (MEPA)

The Massachusetts Environmental Policy Act (MEPA) requires that state agencies study the environmental consequences of their actions and take all feasible measures to avoid, minimize, and mitigate damage to the environment. MEPA applies to projects that trigger predefined thresholds and that involve some state agency action. This includes projects that are proposed by a state, municipal, or non-profit agency, or are proposed by a private party and require a permit, financial assistance, or land transfer from a state agency.

The MEPA process requires public study, disclosure, and development of feasible mitigation for proposed projects. It does not make decisions on the environmental benefits of projects or determine if a project can or should receive a particular permit. Those decisions are left to the respective permitting agencies. MEPA review occurs before permitting agencies act to ensure that they know the environmental consequences of their actions. Table 17-2 summarizes transportation

improvement projects in the Pioneer Valley that have gone through the MEPA process since the endorsement of the 2012 RTP.

Table 17-2 – Pioneer Valley TIP Projects Reviewed by MEPA

Date	MEPA ID	Community	Project
December 2011	14823	Springfield	Allen Street and Bicentennial Highway Roadway Improvements
January 2012	14840	Amherst	Route 116 Reconstruction
February 2012	14857	Easthampton	Intersection Improvements at Pomeroy Meadow Road, Loudville Road, Glendale Road, and West Street
June 2012	14614	Amherst, Belchertown, Hadley, Northampton	Norwottuck Rail Trail Rehabilitation Project
October 2012	14452	Westfield	Little River Streambank Restoration Project
March 2013	15026	Springfield	PVTA Bus Maintenance and Operations Facility
May 2013	15050	Westfield	Elm Street Urban Renewal Plan
July 2013	15069	Amherst	University of Massachusetts Amherst 2012-2021 Capital Improvement Program
July 2013	15080	Statewide	All-Electronic Tolling System Implementation Project
February 2014	15157	Westfield	Lozierville and Meadows Old Town Road improvements

C. REGIONAL ENVIRONMENTAL MITIGATION EFFORTS

Regional planning agencies have no regulatory authority or other implementation powers in Massachusetts. Consequently, the Pioneer Valley Planning Commission has relied upon its connections with the region's municipalities, non-profit sector, academic institutions, businesses, and informed citizenry to incorporate environmental quality enhancements across a wide range of planning topic areas. This section details the ways in which PVPC has taken a leadership role in mitigating the environmental problems and challenges the region is facing.

The Pioneer Valley Planning Commission is a leader in promoting land use policies—in the form of zoning bylaws, general bylaws, amendments to subdivision regulations, and regional planning—that encourage development practices that are *both* environmentally sustainable and sensitive to the needs of the local business community. This has resulted in a series of programs and policies that seek to address environmental issues on a regional scale. The mitigation measures PVPC has successfully developed and implemented are listed below.

1. Valley Vision 4

This section summarizes relevant background, objectives and activities of Valley Vision 4 and ongoing regional land use planning processes.

Valley Vision was originally released in 1999. It was updated in 2007 and 2011 with funds from the Commonwealth's Executive Office of Housing and Economic Development. The most recent update, Valley Vision 4, was released in 2014, with work supported by a HUD Sustainable Communities Initiative regional planning grant. These updates to Valley Vision have helped it achieve regional consistency with the Commonwealth's Sustainability Principles, as well as state programs and planning best practices.

Valley Vision and its updates present detailed strategies to promote compact, mixed-use growth in and around urban, town, and village centers, while promoting protection of open space and natural resources outside developed centers. Through an intergovernmental compact, PVPC has continued to work with municipalities in the region to meet the requirements of the compact and help make local plans and zoning regulations consistent with the recommendations of the regional plan.

Land use planning and transportation planning are closely related and interdependent activities. Transportation has a direct effect on land development patterns; likewise, land use decisions about housing and commercial development exert influence on mobility options and travel habits. Unplanned decisions about land use and transportation can result in the inefficient use of energy and resources, stunted economic growth and environmental degradation.

The main purposes of Valley Vision 4 are to:

- Update and expand the strategies for managing the region's growth and development to include innovative new approaches such as transit-oriented development.
- Promote integration and consistency between the region's land use and transportation plans.
- Identify specific actions that will advance equity and address environmental justice.
- Compare the recommendations of Valley Vision with land use plan strategies of the neighboring Capital Regional Council of Governments to promote bi-state consistency.

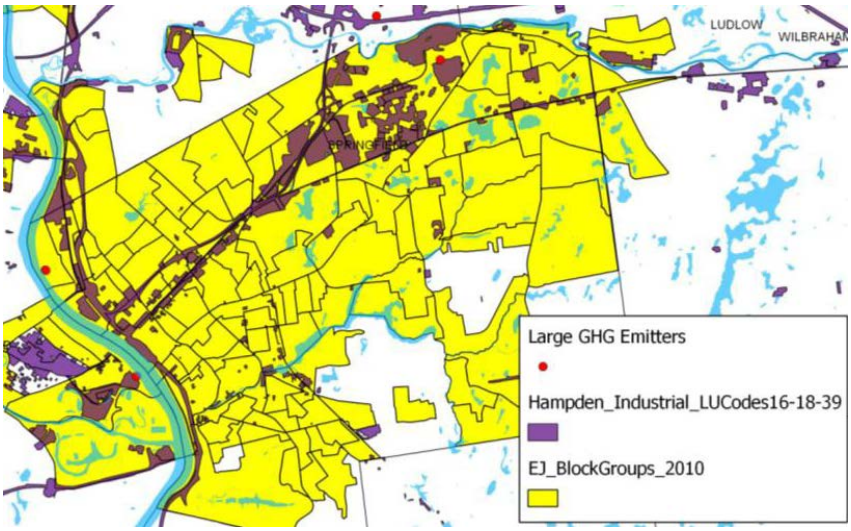
Valley Vision 4 compares the Pioneer Valley Regional Transportation Plan and the regional land use planning process and finds that these two plans display a relatively high degree of consistency and share many policy goals. Notable among these are support of the Commonwealth's GreenDOT program; environmental protection measures, especially those to mitigate stormwater runoff impacts; and focusing growth in areas with adequate infrastructure to support it.

A key regional land use trend identified by Valley Vision 4 is the continued expansion of suburban and rural residential development with relatively little or no population growth (i.e., “sprawl without growth”). Valley Vision 4 presents analysis and opportunities to mitigate this type of development that are associated with proposed increases in transit and passenger rail services along the I-91 Knowledge Corridor, particularly smart growth strategies and actions that will encourage transit-oriented development (TOD) in suitable locations. The plan also considers ways to maintain these more compact, traditional neighborhood density (TND) areas for the long term with a better, more regionally representative mix of incomes among residents.

A central theme of Valley Vision 4 is that of regional equity. The plan finds that income inequality continues to exist throughout the region, as it does throughout the nation. Poverty is concentrated in the region’s urban areas; several neighborhoods of Holyoke (27%) Springfield (21.8%) have the largest proportion of families below federal poverty thresholds, followed by exurban and rural communities of Hatfield (16.6%), Cummington and Ware (both 12.8%).

A regional spatial analysis of industrial land uses and environmental justice neighborhoods performed for Valley Vision 4 found that 6.4% of census block groups with proportions of residents that exceed the regional averages for either low-income or people of color or both (the definition of “environmental justice” in this region) contain land that is classified industrial (MassGIS land use codes 16 manufacturing, 18 industrial parks and 39 junkyards), versus 1.8% for the region as a whole. This is more than 3.5 times the regional average, and is of significant concern because of the documented adverse health impacts for people who live in and near industrial areas. Environmental justice areas constitute 9.3% of the region’s total land area. This phenomenon is especially evident in Springfield, as seen in Figure 17-7.

Figure 17-7 – Industrial Land Use and Environmental Justice Areas in Springfield



Source: PVPC EJ layers 2012, MassGIS 2005 Land Use Codes

a) Objectives of Valley Vision Regional Land Use Planning Process

- Achieve a coordinated bi-state land use vision and smart growth plan for the Knowledge Corridor and determine strategies for multi-jurisdictional land use planning efforts;
- Provide better coordination between the Regional Land Use Plan and the Regional Transportation Plan, with a particular focus on actions to encourage transit oriented development;
- Work to advance equity and address environmental justice in the implementation of the Regional Land Use plan and locally through land use and zoning strategies;
- Ensure consistency between the regional land use plan, local plans, and zoning regulations through implementation of smart growth strategies at the municipal level.

b) Major Activities

- Continue to identify areas of intersection between “Valley Vision” the Regional Land Use Plan, “Our Next Future” the Regional Sustainability Plan and the Regional Transportation Plan and develop processes to better integrate land use and transportation priorities to encourage high density, transit oriented development.
- Continue to work with the Hartford Capital Region Council of Governments to review land use recommendations between the two regional land use plans, identify potential land use conflicts for communities that share a boundary between the two states, and develop recommendations for implementation.
- Continue to develop innovative smart growth strategies to promote higher density, transit oriented development at locations identified along the Knowledge Corridor. The Valley Development Council, which is the advisory

body to the Valley Vision land use planning process, ranked the following as the region's top ten priority smart growth strategies in Valley Vision 4:

  - Mixed Use Village Districts
  - Bike and Pedestrian Features
  - Traditional Neighborhood Development
  - Adaptive Reuse and Infill Development
  - Cluster or Open Space Residential Development
  - Low Impact Development
  - Community Preservation Act
  - Planning Board Assistance Program
  - Brownfields Redevelopment Projects
  - Tax Incentives and Business Improvement Districts

- Continue to use and promote the web-based, interactive Valley Vision Toolbox as an outreach and education tool, develop new fact sheets, model bylaws, and identify case studies on identified innovative smart growth strategies that encourage higher density, transit oriented development and advance equity and environmental justice. The smart growth strategies identified in Valley Vision 4 are:
  - Create traditional neighborhood developments
  - Promote mixed use
  - Revitalize urban core area and downtowns
  - Develop incentives for open space development
  - Improve housing opportunities and neighborhood quality
  - Redevelop brownfields
  - Preserve farmland and support farm businesses
  - Establish greenbelts and blueways for open space protection
  - Build an intermodal pedestrian, bicycle and transit network
  - Protect environmental quality and prevent pollution
  - Control commercial strip development
  - Improve infrastructure in urban areas and limit infrastructure expansions
  - Encourage sustainable design
  - Overhaul antiquated state statues and local zoning laws
  - Promote regional solutions to smart growth problems
  - Assist small towns in addressing unique growth problems
- Provide local technical assistance to communities to assist in the adoption and implementation of zoning bylaws to promote higher density, transit oriented development and advance equity and environmental justice.
- Continue to engage and expand membership in regional civic engagement process resulting from Sustainable Knowledge Corridor 2011-2013. Continue to identify specific actions that will advance equity and address environmental justice through the Civic Engagement process and meetings with targeted existing environmental justice groups in the region.

- Increase membership of the Valley Development Council, the implementation committee of the Valley Vision plan, to include representatives from groups that represent low income / traditionally marginalized populations.

c) Products/Outcomes

- Ongoing meetings with existing community based organizations with a focus on serving environmental justice residents to better understand and develop solutions to advance social and income equity in the region;
- Continue to recruit membership of the Valley Development Council to include representatives from groups that represent low income and traditionally marginalized populations.

2. Pioneer Valley Green Infrastructure Plan

The Pioneer Valley Green Infrastructure Plan aims to change the way stormwater is handled by promoting useful strategies to address stormwater where it falls (such as through infiltration, rain gardens, or cisterns). These strategies are applicable to road projects. The Green Infrastructure Plan is the basis for much of the outreach PVPC is conducting to communities regulated by existing and a forthcoming Municipal Separate Storm Sewer System (MS4) permit as well as those under EPA Administrative Orders to remediate combined sewer overflow systems. The Plan advocates for the integration of green infrastructure into the design of already-planned projects, such as road reconstruction, and identifies projects around the region with the potential to integrate green infrastructure based on a set of criteria. As part of implementing the Green Infrastructure Plan, PVPC developed new scoring criteria for TIP projects that included stormwater management through green infrastructure. PVPC also provides technical assistance to communities looking to incorporate green infrastructure into their local policies, such as incentives in subdivision and zoning regulations.

In addition, since 2006 PVPC has also facilitated the Connecticut River Stormwater Committee, a coalition of MS4 regulated communities that meet bi-monthly to develop regional approaches to NPDES MS4 education and outreach requirements.

3. Westfield River Wild and Scenic River and Advisory Committee

In 1993, the Westfield River, located in the western Hampshire and Hampden Counties, received Federal Wild and Scenic River Designation for its remarkable and unique geological features, fish populations, scenic vistas, and cultural resources. When a project either receives federal funding or requires a permit from a federal agency *and* is located within a quarter mile of the mean high water mark of sections of the Wild and Scenic Sections of the Westfield River, the proponent must obtain comments and conditions from the National Park Service (NPS). The NPS is one of several federal and state agencies that sign off during the review process of a proposed project's plans. This process is designed to ensure that the river's remarkable wild and scenic qualities are considered during the planning stages of a

project. The NPS is the designated federal administering agency for the Westfield River.

In addition to the federal protections granted to the Westfield River, a regional committee promotes policies that preserve the Westfield River. The Westfield River Wild and Scenic Advisory Committee is composed of appointed representatives from Huntington, Cummington, Chester, Chesterfield, Middlefield, Worthington, Savoy, Becket, Washington, Windsor, the Pioneer Valley Planning Commission, the Trustees of Reservations, the Commonwealth of Massachusetts, National Park Service, and the Berkshire Regional Planning Commission.

All six communities with Westfield River Wild and Scenic designations in PVPC's region have adopted some version of the Westfield River Wild and Scenic Bylaw. This bylaw restricts industrial and commercial uses within 100 feet of the water line (150 in Huntington) and regulates land use types to prevent pollutants from entering the river. As PVPC helps the member communities implement these bylaws, surface water contamination will be mitigated by further increasing the scenic and physical protections granted to the Westfield River.

4. Regulatory Framework for Promoting Ecologically Sound Landscapes

Throughout the region, PVPC has led efforts to reform the outdated 1950s era zoning regulations of many of the region's cities and towns. This promotes development that is more in keeping with the historical character of New England and continues to occur through Local Technical Assistance and District Local Technical Assistance funding. PVPC has been a leader in the passage and implementation of cluster development bylaws, mixed use bylaws, low impact development standards, transfer of development rights programs, steep slope and open space overlay districts, as well as revising subdivision regulations. In concert, these policies support a regional response to promoting development that preserves open space, encourages sustainability, and is environmentally friendly.

5. Regional Planning for Open Space

a) Farmland

PVPC has worked with stakeholder groups, non-profits, municipalities and private citizens to develop long range visions for preserving the Pioneer Valley's most important environmental assets. In 2001, PVPC released *Growing Together: a Strategic Plan for Integrating Agriculture and Growth Management in the Connecticut River Valley of Massachusetts*. This document contained key actions steps for using economic development, zoning and public awareness to preserve the region's farmland.

PVPC has assisted four communities to adopt Transfer of Development Rights bylaws or ordinances: Hadley, Hatfield, Easthampton, and Westfield. These bylaws help to mitigate the impacts of development on farmland by using private

development funds to purchase development rights on farmland in return for high density development projects elsewhere in these communities. Hadley has also received contributions to its Route 9 mitigation fund from commercial developers along the Route 9 corridor; these funds have been used to preserve farmland through Agricultural Preservation Restrictions (APRs).

b) Trails, Greenways, and Habitat Corridors

In 2011, PVPC completed a regional trails map to encourage the use of alternative (non-automobile) modes of transportation by providing the public with a high quality map of bicycle, walking, and hiking trails across the Pioneer Valley region. These maps also contain a narrative to encourage the public to use healthy transportation, with descriptions and photographs of the regional trails. The map is available at http://www.pvpc.org/content/pioneer-valley-trails-hiking-and-biking-guide. The regional trails map is currently undergoing an update.

PVPC is also working with committees associated with the Connecticut River Scenic Byway, Routes 112 and 116 scenic byways, and Jacobs Ladder Scenic Byway to develop trail networks associated with the byways into surrounding river valley and upland areas. Trails associated with the Connecticut River Scenic Byway are undergoing the implementation phase as funding becomes available. Potential trails associated with the hilltown scenic byways are currently undergoing identification, and will utilize and link existing trails and old roads as much as possible.

PVPC has also prepared a regional map and plan for preserving the Pioneer Valley's greenways focus areas. This plan identified the Holyoke Range, the Metacomet-Manadnock-Metabessett (MMM) Trail, the Upper Westfield River, the Manhan River, the Upper Connecticut River Valley, the Scantic River and Mount Hitchcock as target areas. These areas are also included in the 2014 Pioneer Valley Priority Protection Area maps, which identify detailed target areas for open space protection town-by-town and on a regional scale based on habitat characteristics, scenic/historic values, recreational values, and the potential to link habitats, among others.

To accomplish these goals and preserve the region's environmental legacy, PVPC has completed the following tasks:

- Completed and distributed the Pioneer Valley Trails Map, which is currently undergoing an update
- Worked with the National Park Service on a feasibility study for designating the MMM Trail as a National Scenic Trail.
- Crafted new regulatory protections for key sections of the Westfield River
- Promoted the passage of local funding mechanisms (the Massachusetts Community Preservation Act, primarily) to secure local funding for land preservation efforts

- Completed design of Connecticut River Scenic Byway recreational trails, which will link the Byway with the Connecticut River and scenic upland viewpoints in Hadley and South Hadley
- Identified trails and trail linkages to create trail network associated with Routes 112 and 116 and Jacobs Ladder scenic byways.

6. Water Quality Mitigation

PVPC is a key collaborator and project leader on several water quality efforts within the region. The regional nature of water quality issues requires PVPC to straddle political boundaries and form coalitions that are capable of working towards the long term goal of high quality surface and groundwater supplies throughout the region. These projects and programs (listed below) detail the extent of PVPC's mitigation efforts.

7. Source Water Protection Plans

PVPC has written and drafted Source Water Protection Plans for several member communities. A Source Water Protection Plan is a guidance document for the protection of municipal water supplies, and it examines all the factors that affect the watershed of a water supply including existing land uses and potential land uses allowed under current zoning, protected open space, public access and recreation, wildlife, and any other concerns of the community related in reference to the water supply. These plans make recommendations on the best practices for addressing any problems identified during the course of the assessment and protecting the quality and quantity of the water supply. The towns of Cummington, Easthampton, Hatfield, Huntington, Russell, and the Granville Reservoir have worked with PVPC to develop action plans for preserving their water supplies.

8. Combined Sewer Overflow Clean-Up

In a 1988 engineering study completed for the Massachusetts Division of Water Pollution Control, one hundred thirty four combined sewer overflows (CSOs) were identified in the seven communities located in the southern reach of the Connecticut River below the Holyoke Dam. The Lower Connecticut River Phase II Combined Sewer Overflow Study (Metcalf & Eddy, Inc.) identified CSO locations, water quality issues associated with CSOs, and steps and costs for addressing the problem in Agawam, Chicopee, Holyoke, Ludlow, South Hadley, Springfield, and West Springfield. The study determined that ninety percent of existing CSO discharges needed to be eliminated within the seven communities to achieve the goal of attaining Class B fishable/swimmable goal, at a cost of $377 million. As of 2015, Agawam, South Hadley, and West Springfield had eliminated all of their CSOs. As of 2013, the total number of CSOs was reduced by 52% and the total volume of CSO discharge was reduced by 60%. Dry weather overflows were reduced from thirty one in 1988 to zero in 2005.

Table 17-3 – CSO Historic Data

	Combined Sewer Overflows					Dry Weather Overflows		
	1988	2001	2005	2009	2012	1988	2001	2005
Agawam	14	0	0	0	0	4	0	0
Chicopee	39	33	30	29	28	19	2	0
Holyoke	20	15	14	14	12	1	1	0
Ludlow	10	1	1	1	0	0	0	0
South Hadley	11	3	3	0	0	2	0	0
Springfield	32	25	24	23	24	5	0	0
West Springfield	8	1	0	0	0	0	0	0

Area communities are continuing to find funding and work to control the CSO problem using a number of infrastructural solutions, including:

- Long term control plans - Chicopee, Holyoke, and Springfield have developed plans to identify and prioritize appropriate abatement measures.
- Sewer separation - Separate storm drain and sewer lines can be installed to separate combined flows in the existing system and to allow for more capacity in the collection system.
- In-line storage - Holding tanks or enlarged storage pipes can be installed to hold combined flows until a storm has passed and the flows in the system have peaked. Those flows would then be returned to sewers instead of the river.
- Increased treatment capacity - Pump stations and wastewater treatment facilities can be upgraded to increase their capacity to handle additional storm flow, thereby decreasing flows to the river.
- Reduced infiltration and inflow - Sewer pipes can be improved to reduce inflow of groundwater and to separate streams from combined systems.
- Reducing stormwater at the source - Directing stormwater from impervious surfaces such as rooftops, driveways, and parking lots towards rain gardens, rain barrels, and other LID or infiltration systems.

9. Barnes Aquifer Protection Advisory Committee

The Barnes Aquifer is a sole-source aquifer west of the Connecticut River that serves as the municipal drinking water supply for four growing communities. The natural interdependence that results from sharing and directly impacting this regionally significant water supply gave rise to a collaborative effort, facilitated by PVPC, which is designed to protect and safeguard the Barnes Aquifer.

The Barnes Aquifer Protection Advisory Committee (BAPAC) is a coalition of four communities - Westfield, Holyoke, Easthampton, and Southampton - and the PVPC, which work together to protect the Barnes Aquifer, an important regional groundwater resource. The chief elected official of each member community appoints three representatives to the committee. These municipal members

currently represent water, planning, conservation, and community development departments. PVPC designates one representative for the committee.

BAPAC educates and advises local governments, citizen groups, and small businesses about groundwater protection and effects on the aquifer. The committee reviews Developments of Regional Impact (DRI) within the aquifer and provides comments to approval authorities. DRI reviews evaluate both the proposed use and its potential for aquifer contamination and provisions within the site plan for treatment and infiltration of clean stormwater. DRI comments evaluate the proposed project's level of compliance with the local aquifer protection zoning bylaw, and it recommends Best Management Practices for aquifer protection that may have been overlooked by the proponent.

BAPAC also works to coordinate land protection efforts for opportunities that present significant protection in the aquifer, which is increasingly important as development in the coalition communities intensifies.

10. Pioneer Valley Climate Action and Clean Energy Plan

Completed in March 2014, the purpose of the Climate Action and Clean Energy Plan is to promote greater understanding of the causes and consequences of climate change in the Pioneer Valley. The plan is intended to help the people of the region respond to climate-related changes in their communities by creating workable strategies for local and regional actions to reduce greenhouse gas emissions, including greater use and production of clean and renewable energy, and protect their communities from climate-related damage. This plan identifies the amounts and sources of the Pioneer Valley's greenhouse gas emissions; offers regional targets for GHG reduction; and recommends strategies for both mitigating climate change impacts and actions to adapt our communities and infrastructure to the climate-related changes that are occurring and will continue to take place. The complete plan is located at:
http://www.pvpc.org/sites/default/files/PVPC%20Climate%20Action%20Clean%20Energy%20Plan%20FINAL%2002-18-14.pdf

11. Habitat Continuity Partnership – Critical Linkages

The design and location of a transportation improvement project can impact people, wildlife, water, and habitat. Inadequate river crossings can cause washouts of the road during flood conditions, as well as impede the movement of wildlife including brook trout, salamanders, turtles, and mink. Well-designed crossings can provide safe passage for water and wildlife including large mammals, keeping all safely off the road. The U.S. Army Corps of Engineers website provides guidance and standards for complying with the stream crossing requirements that should result in enhanced aquatic passage and stream continuity. In an effort to determine where transportation projects can have the biggest positive or negative impact on

movement of wildlife and connectivity of habitat, the University of Massachusetts, The Nature Conservancy, and many other partners have developed maps and data that may be useful for transportation planners. Critical Linkages I looks at local connectivity and opportunities to improve it. Critical Linkages II takes that statewide to look at regional connectivity and opportunities. This information is available at the following website: http://www.umasscaps.org

Critical Linkages I data, scores road-stream crossings in terms of how well they currently allow water and fish and aquatic organisms to pass, and how much improvement could be realized if they were upgraded. Figure 17-8 identifies the top road stream crossings that are most important to bring up to (or beyond) the minimum stream crossing standards based on Critical Linkages I.

Figure 17-8 – Prioritization of Road Stream Crossings in the Pioneer Valley

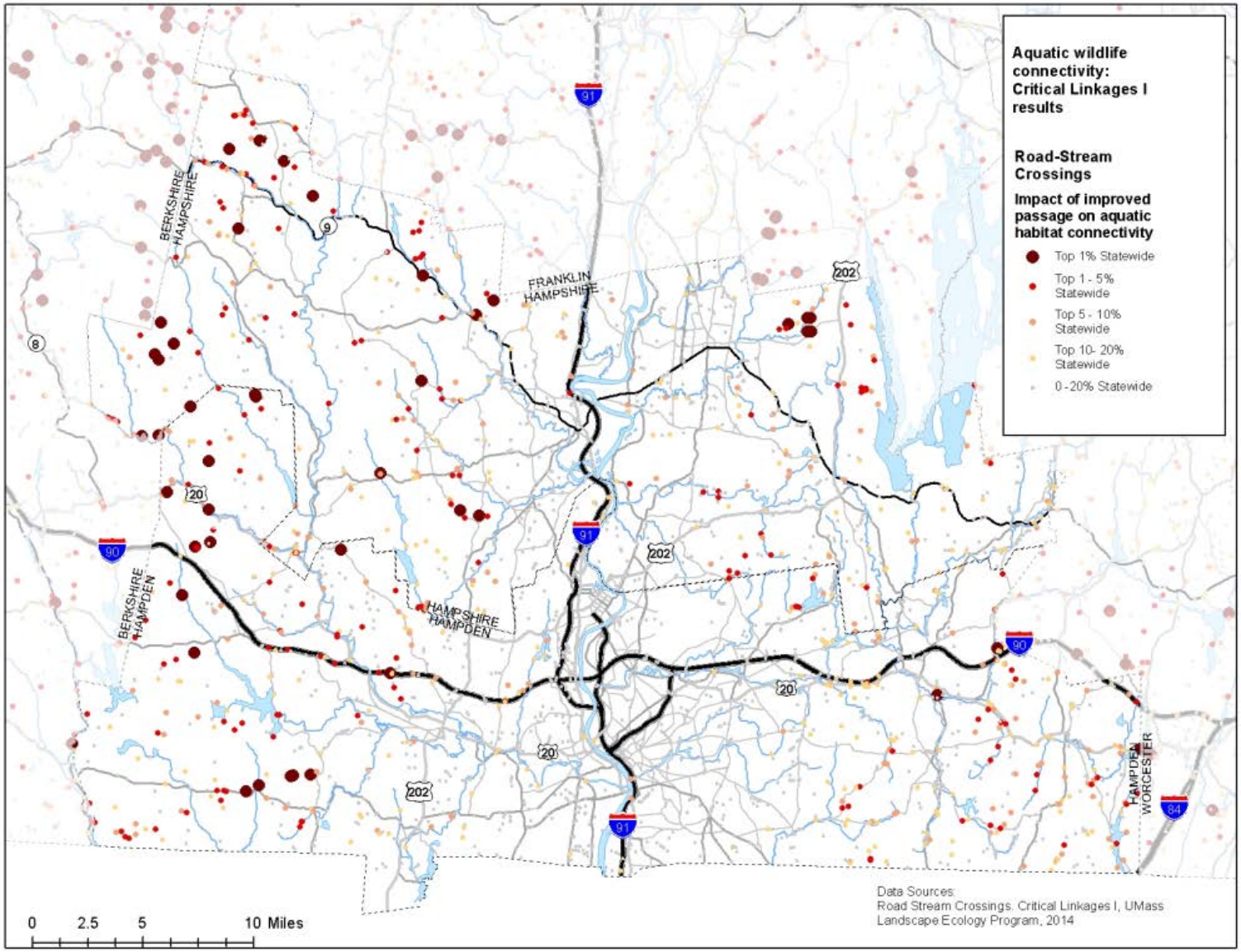


Figure 17-6 shows the potential impact of transportation improvement projects on the Critical Linkages II map for the Pioneer Valley. This data identifies four key areas:

- Nodes, which are large areas of habitat 500 acres or more in size.
- Road linkages, which are 300 meter segments of roads where accommodations for wildlife would have a low to high potential to improve movement of wildlife across the entire network of connected habitat.
- Links, shown by lines connecting the center of one node to another node (the lines are not actual places on the ground, but rather represent the connection between two habitats), where breaking the connection between habitats by developing the area in between or adding or expanding a road between nodes has a low to high impact on the entire network of connected habitat.
- EEA Symbols so data and maps can be compatible for grant applications and other programs.

Regional and town planners can use the Critical Linkages data sets to help decide whether habitat connectivity is an important consideration in a road improvement project, and make the best use of scarce financial resources, by answering the following questions:

- Does the road bisect important habitat as defined by BioMap2?
- Does the road represent a significant barrier as defined by Critical Linkages?
- Does current road/stream crossing represent a significant barrier as defined by the stream continuity data?

If the answer to any of these questions is yes, towns or other project proponents can get advice, permitting assistance, and potential funding assistance from a range of groups working to re-connect stretches of river and other habitat. In many cases, transportation improvements that benefit wildlife also benefit people by reducing road washouts and reducing animal-vehicle collisions.

12. Stream Continuity

The North Atlantic Aquatic Connectivity Collaborative (NAACC) has developed a protocol for the volunteer assessment of stream crossings. This data base is located at http://streamcontinuity.org/ and includes data forms, instructions, and training materials. Since 2012, many road-stream crossings have been surveyed for PVPC region and now include assessments of what types of wildlife, if any, can pass through each road-stream crossing. This website is a useful resource to provide data on the economic benefits of right-sized stream crossings as well as stream crossing design examples. Before and after photographs of stream crossings re-designed to connect habitat are shown in Figure 17-9.

Figure 17-9 – Photos of Stream Crossings Re-designed to Connect Habitat

McNearney Road crossing of Shaker Brook, Becket, before and after. (Credit: Carrie Banks)

Dingle Road crossing of Bronson Brook, Worthington, before and after. (Credit: Carrie Banks)

D. ENVIRONMENTAL REVIEW OF PROJECTS INCLUDED IN THE RTP

All of the projects included as part of the Regional Transportation Plan for the Pioneer Valley Metropolitan Planning Organization were reviewed to assess their potential environmental impacts. This preliminary analysis was conducted using overlays of the following resource data:

- Environmental Justice Minority and Poverty Block Groups
- 100 and 500 Year Flood Zones
- Valley Vision Priority Development and Priority Protection Areas
- Regional Wetlands
- Pioneer Valley Bike Linkages Map
- Critical Linkages II Habitat Connectivity

The projects identified in Chapter 13 were overlaid on the above referenced data to provide a review of their potential environmental impacts. Table 17-4 summarizes the potential impacts of each project. Each column identifies projects included as part of the Draft RTP that have the potential to add to the existing highway system through the expansion of existing right of way or other associated project impacts during construction. Transportation improvement projects that are identified as having "Potential Environmental Impacts" do not necessarily have negative impacts on the environment, but are identified to increase awareness of environmental concerns during the design and construction phases.

Projects that were identified to impact "Valley Vision" areas could have potential impacts on Priority Protection Areas identified in Valley Vision 4. Areas with "Critical Linkages" impacts were projects in proximity to areas that could sever a critical link between existing habitat nodes. These projects deserve careful thought as to their potential impact as they may require additional enhancements to ensure that connectivity is maintained.

Environmental Justice areas show the regionally identified Minority and Poverty Block Groups. Transportation improvements in these areas must avoid, minimize, or mitigate any adverse human health and environmental impacts. Projects identified as having potential "Wetlands" impacts lie in close proximity to existing wetlands or aquifer protection areas. Flood Plains projects abut or are located in a designated 100 Year or 500 Year Flood Plain.

Table 17-4 – Potential Environmental Impacts of RTP Projects

Map Key	Town	Description	Total Cost	Valley Vision	Critical Linkages	Environmental Justice	Wetlands	Flood Plains
1	CHICOPEE	602912 - CHICOPEE RIVER RIVERWALK MULTI-USE PATH CONSTRUCTION	$2,273,911	✓		✓		
2	NORTHAMPTON	604597 - I-91 INTERCHANGE 19 IMPROVEMENTS	$6,720,000	✓		✓	✓	✓
3	HOLYOKE	606903 - IMPROVEMENTS TO LOWER WESTFIELD ROAD	$1,155,000	✓			✓	
4	NORTHAMPTON	607502 - INTERSECTION IMPROVEMENTS	$1,829,128			✓		
5	SPRINGFIELD	N/A - UNION STATION REDEVELOPMENT	$1,066,843			✓		
6	CUMMINGTON	606417 - RETAINING WALL REPLACEMENT ON ROUTE 9	$1,500,000					
7	HADLEY	604035 - SIGNAL & INTERSECTION IMPROVEMENTS AT ROUTE 9	$3,038,060			✓		✓
8	NORTHAMPTON	605066 - INTERSECTION IMPROVEMENTS AT ROUTE 5	$1,592,248			✓		
9	SPRINGFIELD	605385 - SIGNAL & INTERSECTION IMPROVEMENTS	$1,976,000	✓		✓	✓	✓
10	NORTHAMPTON	606555 - ROUNDABOUT CONSTRUCTION AT INTERSECTION ROUTES 5/10	$2,874,896			✓		
11	AGAWAM	604203 - INTERSECTION IMPROVEMENTS AT ROUTE 187 & ROUTE 57	$1,620,000	✓		✓	✓	
12	AMHERST	607528 - BRIDGE REPLACEMENT	$2,644,040	✓		✓	✓	✓
13	CHESTERFIELD	607549 - IRELAND STREET OVER WEST BRANCH OF WESTFIELD RIVER	$3,649,520	✓	✓		✓	✓
14	MONSON/PALMER	606663 - RESURFACING & RELATED WORK ON ROUTE 32	$1,800,000	✓		✓		✓
16	SPRINGFIELD	607731 - VIADUCT DECK REPLACEMENT OF S-24-061 ON I-91	$230,000,000			✓		✓
17	WESTFIELD	604968 - COLUMBIA GREENWAY RAIL TRAIL CONSTRUCTION	$2,575,000					
19	BERNARDSTON	607182 - INTERSTATE MAINTENANCE & RELATED WORK ON ROUTE I-91	$2,796,543					
20	AGAWAM	600513 - RECONSTRUCTION OF ROUTE 187	$1,682,640	✓		✓		
21	SOUTHAMPTON	604738 - RECONSTRUCTION OF GLENDALE ROAD	$2,570,400	✓			✓	✓
22	CHICOPEE	604434 - RECONSTRUCTION & RELATED WORK ON FULLER ROAD	$6,955,200	✓			✓	✓
23	LONGMEADOW	607430 - RESURFACING & RELATED WORK ON LONGMEADOW STREET	$2,478,941	✓			✓	✓
24	CHICOPEE/HOLYOKE	607560 - INTERSTATE MAINENANCE AND RELATED WORK ON I-391	$10,911,130	✓		✓	✓	
25	WESTFIELD	604446 - RECONSTRUCTION OF ROUTE 187	$5,724,561	✓		✓	✓	✓
27	SOUTHAMPTON	607453 - SOUTHAMPTON SAFE ROUTES TO SCHOOL	$800,000	✓				
28	PELHAM	607207 - RECONSTRUCTION OF AMHERST ROAD	$4,200,000	✓	✓		✓	✓
29	SPRINGFIELD/WILBRAHAM	605213 - RECONSTRUCTION OF BOSTON ROAD	$1,903,482			✓		
30	SPRINGFIELD	605222 - NORTH END & BRIGHTWOOD INFRASTRUCTURE IMPROVEMENTS	$4,402,320					
31	WEST SPRINGFIELD	603730 - CONNECTICUT RIVERWALK & BIKEWAY EXTENSION	$1,640,736	✓		✓	✓	✓
32	HOLYOKE	606450 - TRAFFIC SIGNAL UPGRADES	$1,564,867			✓		
33	SOUTHWICK	603477 - INTERSECTION IMPROVEMENTS	$3,617,872	✓				✓
34	WESTFIELD	603783 - COLUMBIA GREENWAY RAIL TRAIL CONSTRUCTION	$300,000	✓		✓		✓
35	CHICOPEE	602912 - CHICOPEE RIVER RIVERWALK CONSTRUCTION	$2,273,911	✓			✓	✓
37	LUDLOW	605011 - RECONSTRUCTION OF CENTER STREET	$4,918,051	✓				✓
39	NORTHAMPTON	180525 - RECONSTRUCTION OF DAMON ROAD	$2,273,050	✓		✓		✓
40	CHICOPEE	602911 - CONNECTICUT RIVERWALK CONSTRUCTION	$3,261,288	✓		✓	✓	✓
41	SOUTHWICK	604033 - RECONSTRUCTION CONGAMOND ROAD	$5,512,964	✓			✓	✓
42	HADLEY	605032 - RECONSTRUCTION ON ROUTE 9	$4,782,361	✓			✓	
43	LONGMEADOW	606445 - RESURFACING & RELATED WORK ON CONVERSE STREET	$1,712,621	✓			✓	
44	GRANBY/SOUTH HADLEY	607474 - RESURFACING AND RELATED WORK ON ROUTE 202	$1,712,794	✓			✓	✓
45	HATFIELD/WHATELY	606577 - INTERSTATE MAINTENANCE & RELATED WORK ON I-91	$11,597,040	✓		✓	✓	✓
46	WESTFIELD	604445 - ROUTE 187, REPLACEMENT OF W-25-002, SHERMAN'S MILL BRIDGE	$6,926,210	✓			✓	✓
47	WILBRAHAM	607869 - RECONSTRUCTION OF BOSTON ROAD (ROUTE 20)	$1,292,428	✓		✓	✓	✓
48	AGAWAM	607626 - RESURFACING & RELATED WORK ON ROUTE 159	$1,450,000	✓		✓		✓

Table 17-4 – Potential Environmental Impacts of RTP Projects (cont.)

Map Key	Town	Description	Total Cost	Valley Vision	Critical Linkages	Environmental Justice	Wetlands	Flood Plains
49	HOLYOKE	607256 - RESURFACING ON HERITAGE STREET, FRONT STREET & DWIGHT STREET	$2,874,096	✓		✓	✓	✓
50	WESTFIELD	607773 - IMPROVEMENTS ON ROUTE 20, COURT STEET & WESTERN AVENUE	$5,087,934					
51	BELCHERTOWN	604692 - RECONSTRUCTION ON SOUTH MAIN STREET & N WASHINGTON STREET	$3,740,430	✓		✓	✓	
52	AGAWAM	607316 - RECONSTRUCTION OF ROUTE 187	$5,562,610	✓		✓		
53	HOLLAND	604962 - RESURFACING & RELATED WORK ON BRIMFIELD ROAD	$1,500,000				✓	✓
54	SOUTHAMPTON	604653 - REHABILITATION OF EAST STREET	$5,022,200	✓				✓
55	GOSHEN	602888 - ROUTE 9 RECONSTRUCTION	$7,500,000	✓			✓	
56	GOSHEN	605150 - WEST ST RECLAMATION	$2,800,000	✓			✓	✓
57	NORTHAMPTON	607893 - INTERSECTION IMPROVEMENTS	$1,400,000	✓		✓		
58	HOLYOKE	606156 - RECONSTRUCTION OF I-91 INTERCHANGE 17 & ROUTE 141	$2,600,000	✓			✓	✓
59	HOLYOKE /WEST SPRINGFIELD	604209 - REHABILITATION OF ROUTE 5 (RIVERDALE ROAD)	$2,880,000	✓		✓	✓	✓
60	AMHERST	608084 - IMPROVEMENTS AND RELATED WORK ON ROUTE 9 AND 116	$1,255,660	✓		✓		
61	WARE	607987 - INTERSECTION IMPROVEMENTS	$1,950,000			✓		✓
62	GRANBY	606895 - ROUTE 202 INTERSECTION IMPROVEMENTS 2 LOCATIONS	$500,000	✓			✓	✓
63	NORTHAMPTON	605048 - IMPROVEMENTS ON ROUTE 5 (MOUNT TOM ROAD)	$1,200,112	✓		✓	✓	✓
64	HADLEY	605881 - RECONSTRUCTION ON ROUTE 9	$6,900,000	✓		✓	✓	✓
65	CHICOPEE	607736 - SIGNAL & INTERSECTION IMPROVEMENTS AT 11 INTERSECTIONS (RT 33)	$4,016,980	✓		✓	✓	
66	WESTFIELD	603449 - ROUTE 20 ACCESS IMPROVEMENTS ON COURT STREET & WESTERN AVE	$2,702,868					
67	WILBRAHAM	607990 - RESURFACING & RELATED WORK ON ROUTE 20	$5,699,340	✓			✓	✓
68	AGAWAM	607317 - ROUTE 187 RECONSTRUCTION	$7,589,668	✓				
69	SOUTHWICK	606141 - RECONSTRUCTION OF FEEDING HILLS ROAD (ROUTE 57)	$4,080,000	✓				✓
70	SOUTH HADLEY	607735 - SIGNAL & INTERSECTION IMPROVEMENTS AT ROUTE 202	$500,000					
71	WORTHINGTON	606912 - ROUTE 143 RECONSTRUCTION AND RELATED WORK	$12,500,000	✓	✓		✓	✓
72	NORTHAMPTON	607501 - INTERSECTION IMPROVEMENTS @ N ELM ST, ELM ST & WOODLAWN AVE	$1,498,520					
73	HADLEY	602796 - RECONSTRUCTION OF SOUTH MAPLE STREET	$5,000,000	✓			✓	✓
74	BELCHERTOWN /GRANBY	604819 - RESURFACING & RELATED WORK ON ROUTE 202	$4,687,500	✓		✓	✓	✓
75	AMHERST / PELHAM	606230 - RESURFACING & RELATED WORK ON ROUTE 9	$1,800,000	✓		✓	✓	✓
76	BRIMFIELD / STURBRIDGE	608022 - RESURFACING AND RELATED WORK ON ROUTE 20	$3,500,000	✓			✓	✓
77	HADLEY	608089 - BIKE AND PED IMPROVEMENTS @ ROUTES 9, 116 & WESTGATE CTR DR	$1,544,720	✓			✓	
78	PALMER	603873 - RESURFACING & RELATED WORK ON ROUTE 20	$1,200,000	✓		✓		✓
79	WEST SPRINGFIELD	604746 - BRIDGE REPLACEMENT, W-21-006, CSX RAILROAD OVER UNION STREET	$13,616,254			✓		
80	SOUTH HADLEY	606452 - RESURFACING & RELATED WORK ON ROUTE 116 (AMHERST ROAD)	$1,630,070	✓			✓	✓
81	SOUTHWICK	604153 - RESURFACING & RELATED WORK ON ROUTE 10/202 (COLLEGE HIGHWAY)	$2,600,000	✓			✓	✓
82	PALMER	601504 - RECONSTRUCTION OF ROUTE 32	$6,134,080	✓			✓	✓
83	SOUTHWICK	604155 - RESURFACING & RELATED WORK ON ROUTE 10/202, COLLEGE HIGHWAY	$1,440,000	✓		✓		✓
84	HADLEY	606547 - PEDESTRIAN SIGNAL INSTALLATION AT 2 LOCATIONS ALONG ROUTE 9	$134,600	✓		✓		✓
85	WARE	603874 - RESURFACING & RELATED WORK ON ROUTE 9	$1,273,145	✓			✓	✓
86	PALMER	607372 - RECONSTRUCTION OF ROUTE 32	$8,476,770	✓				
87	WILLIAMSBURG	607231 - RECONSTRUCTION OF HIGH STREET AND MOUNTAIN STREET	$3,600,000	✓	✓		✓	✓
88	CHICOPEE	606892 - SLOPE PROTECTION IMPROVEMENTS AT I-391 BRIDGE OVER THE CT RIVER	$282,650	✓		✓	✓	✓
89	CUMMINGTON	606797 - RT 9 RETAINING WALL	$1,660,000	✓				✓
90	LONGMEADOW / SPRINGFIELD	606469 - RETAINING WALL REPLACEMENT/REHABILITATION ON I-91 (SB)	$6,143,750	✓		✓	✓	✓
91	HADLEY	607886 - RESURFACING AND RELATED WORK ON ROUTE 47	$900,000	✓				

Table 17-4 – Potential Environmental Impacts of RTP Projects (cont.)

Map Key	Town	Description	Total Cost	Valley Vision	Critical Linkages	Environmental Justice	Wetlands	Flood Plains
92	GOSHEN	608126 - RESURFACING AND RELATED WORK ON ROUTE 9	$3,500,000	✓			✓	✓
93	AGAWAM / WEST SPRINGFIELD	605384 - RT 147 OVER WESTFIELD RIVER AND INTERSECTION IMPROVEMENTS	$13,336,000	✓		✓		✓
95	CHESTER	605207 - BRIDGE BETTERMENT, C-11-033, ROUTE 20 OVER WALKER BROOK	$268,750		✓			✓
97	CUMMINGTON	605452 - ROUTE 9 AND ROUTE 112 OVER THE WESTFIELD RIVER	$3,500,000	✓			✓	✓
98	CUMMINGTON	607939 - BRIDGE MAINTENANCE, C-21-025, ROUTE 9 OVER THE WESTFIELD RIVER	$300,000	✓	✓		✓	✓
101	HADLEY	604049 - BRIDGE REPLACEMENT, H-01-017, NORTH HADLEY ROAD OVER ROUTE 116	$3,864,000	✓			✓	✓
102	HATFIELD	603608 - BRIDGE REPLACEMENT, H-11-025, ELM STREET OVER THE B&M R.R.	$497,628	✓			✓	
	HOLYOKE	600935 - BRIDGE REPLACEMENTS, H-21-014, ROUTE 141 (APPLETON STREET)	$9,545,000					
103	HOLYOKE	600936 - LYMAN STREET OVER FIRST LEVEL CANAL	$2,575,000	✓		✓	✓	✓
104	HOLYOKE / WEST SPRINGFIELD	606467 - SUPERSTRUCTURE REPLACEMENT	$29,668,750			✓		
105	LONGMEADOW / SPRINGFIELD	607644 - STRUCTURAL STEEL GIRDER PAINTING	$2,420,940	✓		✓		✓
106	LUDLOW / WILBRAHAM	605618 - EAST STREET OVER CHICOPEE RIVER	$950,000	✓				✓
107	LUDLOW/SPRINGFIELD	601156 - ROUTE 21 (CENTER STREET) OVER CHICOPEE RIVER (PUTTS BRIDGE)	$21,168,000	✓		✓		✓
108	MONSON	607688 - BRIDGE REHABILITATION, M-27-022, BRIMFIELD ROAD (US 20)	$3,396,525	✓			✓	✓
109	MONSON	602178 - HOSPITAL HILL ROAD OVER QUABOAG STREET	$1,504,800	✓				
110	MONSON / PALMER	604136 - STATE AVENUE OVER THE QUABOAG RIVER	$4,342,377	✓			✓	✓
111	NORTHAMPTON	602381 - I-91 NB/SB OVER ROUTE 5, BM RR, AND HOCKANUM ROAD	$12,075,000					
112	NORTHAMPTON	606552 - BRIDGE RECONSTRUCTION, N-19-059, I-91 OVER US 5/BMRR & N-19-060, I-91	$52,001,028	✓		✓	✓	✓
113	RUSSELL	606499 - BRIDGE STREET OVER WESTFIELD RIVER	$9,494,400	✓			✓	✓
114	SOUTHAMPTON	603024 - VALLEY ROAD OVER MOOSE BROOK	$1,352,400	✓				
115	SPRINGFIELD	607643 - STRUCTURAL STEEL GIRDER PAINTING, PAINT REMOVAL & REPAIR	$5,018,740			✓		
116	SPRINGFIELD / WEST SPRINGFIELD	605417 - BRIDGE PRESERVATION ON I-91 CORRIDOR	$9,500,150			✓		✓
117	SPRINGFIELD / WEST SPRINGFIELD	603278 - SCOUR COUNTERMEASURES, ROUTE 20 (PARK AVENUE) OVER CT RIVER	$5,750,000			✓		
118	WARE	601701 - MASS CENTRAL RR OVER ROUTE 9/32 EAST MAIN STREET	$10,532,000	✓			✓	✓
119	WARE	604212 - ROUTE 9 (EAST STREET) OVER THE WARE RIVER	$1,725,000	✓				
120	WARE	605126 - ROUTE 32 (PALMER ROAD) OVER THE WARE RIVER	$3,846,232	✓			✓	✓
121	WEST SPRINGFIELD	607526 - BRIDGE RECONSTRUCTION, W-21-011, PROSPECT AVENUE OVER PVRR	$660,625				✓	
122	WEST SPRINGFIELD	607443 - BRIDGE REHABILITATION, BRIDGE W-21- 27, ROUTE 20 (PARK AVENUE)	$3,719,240			✓		
123	WESTFIELD	400103 - ROUTE 10/202 SOUTHWICK STREET OVER LITTLE RIVER	$9,000,000	✓		✓	✓	✓
124	WESTFIELD	607646 - SUPERSTRUCTURE REPLACEMENT, W-25-021, LOCKHOUSE ROAD OVER PVRR	$1,725,000	✓		✓		
125	WILLIAMSBURG	607675 - BRIDGE REPLACEMENT, W-36-011, BRIDGE STREET OVER THE MILL RIVER	$5,411,670	✓			✓	✓
126	WESTFIELD	400103 - ROUTE 10/202 SOUTHWICK STREET OVER LITTLE RIVER	$20,000,000					

CHAPTER 18

PIONEER VALLEY MPO ENDORSEMENT

PIONEER VALLEY MPO ENDORSEMENT SHEET

The signatures below signify that all members of the Pioneer Valley Region's Metropolitan Planning Organization, or their designees, have met on July 28, 2015 and discussed the following item for endorsement: The Pioneer Valley Region's Federal Fiscal Year 2016 Regional Transportation Plan (RTP) Update

Massachusetts Department of Transportation (Mass DOT)
I, Secretary of the Massachusetts Department of Transportation, hereby
☑ Endorse ☐ Do Not Endorse the above referenced item.

for
Stephanie Pollack
Secretary &CEO Mass DOT

7/28/15
Date

Massachusetts Department of Transportation Highway Division
I, Acting Administrator of the Highway Division of MassDOT, hereby
☑ Endorse ☐ Do Not Endorse the above referenced item.

for Thomas Tinlin
Acting Highway Administrator, Mass DOT

7-28-2015
Date

Pioneer Valley Planning Commission (PVPC)
I, Chair of the Pioneer Valley Planning Commission, hereby
☒ Endorse ☐ Do Not Endorse the above referenced item.

Walter Gunn
Chair - PVPC

7/28/15
Date

Pioneer Valley Transit Authority (PVTA)
I, Administrator of the Pioneer Valley Transit Authority, hereby
☐ Endorse ☐ Do Not Endorse the above referenced item.

Mary MacInnes
Administrator - PVTA

Date

City of Chicopee
I, Mayor of the City of Chicopee, hereby
■ Endorse ❑ Do Not Endorse the above referenced item.

Richard Kos
Mayor-Chicipee

7-28-15
Date

Town of Agawam
I, Mayor of the Town of Agawam, hereby
☒ Endorse ❑ Do Not Endorse the above referenced item.

Richard Cohen
Mayor-Agawam

28 July 2015
Date

Town of Belchertown
I, Board of Selectmen member of the Town of Belchertown, hereby
❑ Endorse ❑ Do Not Endorse the above referenced item.

George Archible
Selectman-Belchertown

Date

Town of Hatfield
I, Board of Selectmen member of the Town of Hatfield, hereby
☑ Endorse ❑ Do Not Endorse the above referenced item.

Marcus Boyle
Selectman-Hatfield

28 JUL 15
Date