Catalyst for Regional Progress

PVPC

2020

Regional Transportation Plan

For the Pioneer Valley Metropolitan Planning Organization

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2020 Update

to the

Regional Transportation Plan

Draft Report – June, 2019

Prepared by the
Pioneer Valley Planning Commission

For the Pioneer Valley
Metropolitan Planning Organization

Pioneer Valley MPO Members

Name	**Title**
Stephanie Pollack	Secretary and CEO of the Massachusetts Department of Transportation
Jonathan L. Gulliver	Administrator of the Massachusetts Department of Transportation Highway Division
Walter Gunn	Chairman of the Pioneer Valley Executive Committee
Mayor David Narkewicz	Chairman of the Pioneer Valley Transit Authority Advisory Board
Mayor Richard Kos	Mayor of Chicopee
Mayor Alexander Morse	Mayor of Holyoke
Mayor Brian P. Sullivan	Mayor of Westfield
Mayor Nicole LaChapelle	Mayor of Easthampton
Carmina Fernandes	Ludlow Board of Selectmen
Roger Fuller	Chesterfield Board of Selectmen
Richard Sullivan	Economic Development Council of Western Massachusetts
Alternates	
Mayor Domenic Sarno	Mayor of Springfield
Mayor William C. Reichelt	Mayor of West Springfield
John Martin	Southampton Board of Selectmen
Ex-Officio (Non-Voting)	
Jeff McEwen	Federal Highway Administration
Peter Butler	Federal Transit Administration
Sandra Sheehan	Administrator of the Pioneer Valley Transit Authority
James Czach	Chairman – Pioneer Valley Joint Transportation Committee

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

Photo: Julia Buxton Bridge

INTRODUCTION

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 2015) and is endorsed by the Pioneer Valley Metropolitan Planning Organization (MPO).

As the Pioneer Valley's blueprint for maintaining a safe and efficient transportation system for all modes of travel, this long range plan identifies the region's goals, strategies, and projects to both enhance and maintain our transportation system. The RTP is developed in concert with the Fixing America's Surface Transportation Act (FAST Act) legislation as well as the recommendations included in statewide transportation planning documents developed by the Massachusetts Department of Transportation (MassDOT).

All projects included as part of the regional Transportation Improvement Program (TIP) must come from a conforming RTP. This is extremely important as most major transportation improvement projects rely on federal transportation funds for construction. The following projects are just a few examples of recent transportation improvements in the Pioneer Valley region that advanced through a conforming RTP.

- Restoration of Springfield's Union Station.
- Repairs to the Interstate I-91 Viaduct in Springfield.
- Expansion of regional passenger rail service from Springfield, MA to Hartford, CT.
- Westfield's Columbia River Greenway Trail.
- A new roundabout at the intersection of Pleasant Street with Conz Street in Northampton.
- State of the art electric buses at the Pioneer Valley Transit Authority.

Although the RTP focuses on transportation, it is a comprehensive planning document that has been developed and coordinated with other planning efforts in the region. The plan recognizes that while we do not know the future, change is inevitable and is important to advocate for change that is beneficial to our residents, workers, economy, and landscape. Changes in land use and development patterns transform the traditional visual character and function of the region and transportation plays a significant role in influencing how the region will grow 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.

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A. VISION, GOALS, AND EMPHASIS AREAS

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

RTP Vision

The Pioneer Valley region strives to create and maintain a safe, dependable, resilient, environmentally sound, and equitable transportation system for all. We pledge to balance performance based strategies and projects that promote sustainable development, reduced use of fossil fuels, healthy and livable communities, provide for efficient movement of people and goods, advance economic vitality and enhance connectivity in 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 the Fast Act. 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.

Goals

1. Safety
2. Operations and Maintenance
3. Environment
4. Coordination
5. Energy Efficiency
6. Cost Effectiveness
7. Intermodal Access
8. Multimodal Choices
9. Economic Productivity
10. Quality of Life
11. Environmental Justice
12. Land Use
13. Climate Change

1. **Safety** - To provide and maintain a transportation system that is safe for users of all travel modes and their property.
2. **Operations and Maintenance** - To provide a transportation system that is dependable, resilient, and adequately serves users of all modes. To give priority to adaptable repair of existing infrastructure.
3. **Environmental** - To minimize the transportation related adverse impacts to air, land, wildlife and water quality and strive to improve environmental conditions at every opportunity and incorporate green infrastructure.

4. **Coordination** - - To facilitate collaborative efforts between the general public and local, state and federal planning and project implementation activities.
5. **Energy Efficient** - To promote the reduction of energy consumption through demand management techniques and increasing the use of energy efficient travel modes.
6. **Cost Effective** - To provide a transportation system that is cost effective to maintain, improve and operate.
7. **Intermodal** - To provide access between travel modes for people and goods while maintaining quality and affordability of service.
8. **Multimodal** - To provide a complete choice of adequate travel options that are accessible to all residents, students, visitors and businesses.
9. **Economically Productive** - To maintain a transportation system that promotes and supports economic stability and expansion.
10. **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.
11. **Environmental Justice** - To provide an equitably accessible transportation system that considers the needs of and impacts on low-income, people of color, elderly and disabled persons.
12. **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.
13. **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

Emphasis Areas

1. Safety and Security
2. Movement of People
3. Movement of Goods
4. Movement of Information
5. Sustainability

A total of five emphasis areas were identified to assist in the achievement of the regional goals. The transportation emphasis areas consist of broad topics related to transportation planning that are related to 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 can meet multiple goals. The emphasis areas connect regional transportation needs, strategies, and projects and will be covered in greater detail in Chapter 14.

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CHAPTER 2

Photo: PVTA Bus Shelter

TRANSPORTATION PLANNING PROCESS

The Pioneer Valley MPO is required by federal law to conduct the metropolitan transportation planning process for the region based on the requirements of the Fixing America's Surface Transportation (FAST) Act. The final rules on Statewide and Nonmetropolitan Transportation Planning and Metropolitan Transportation Planning were published on May 27, 2016 and set the requirements for the transportation planning process. The Pioneer Valley MPO seeks to develop a continuing, cooperative, and comprehensive (3C) transportation planning process in concert with our federal, state and local partners. As the lead planning agency for the Pioneer Valley Metropolitan Planning Organization (MPO), the Pioneer Valley Planning Commission (PVPC) is responsible for the day to day management of this process.

A. REQUIREMENTS

1. Fixing America's Surface Transportation (FAST) Act

The FAST Act was signed into law by President Obama on December 4, 2015. This transportation bill specifically addresses all modes of transportation and enhances many of the existing provisions and programs defined in past transportation legislation.

National goal areas identified as part of the Moving Ahead for Progress in the 21st Century (MAP-21) Act continue to be a priority under the FAST Act and address the following areas:

- **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 on 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.

a) FAST Act Planning Factors

All metropolitan planning organizations are required to incorporate ten factors into their planning process. The Pioneer Valley MPO has taken great strides to incorporate these ten factors into the regional planning process. The Ten Planning Factors are:

- Support the economic vitality of the metropolitan areas, especially by enabling global competitiveness, productivity, and efficiency.
- Increase the safety of the transportation system for motorized and non-motorized users.
- Increase the security of the transportation system for motorized and non-motorized users.

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- Increase the accessibility and mobility of people and for freight.
- 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.
- Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.
- Promote efficient system management and operation.
- Emphasize the preservation of the existing transportation system.
- Improve the resiliency and reliability of the transportation system and reduce or mitigate stormwater impacts of surface transportation.
- Enhancing travel and tourism.

2. Clean Air Act Amendments of 1990

The Regional Transportation Plan must demonstrate compliance with federal Clean Air legislation – the Clean Air Act Amendments of 1990. Specifically, the RTP must demonstrate of how this plan will work to achieve National Ambient Air Quality standards. This compliance is addressed as part of Chapter 16 of the RTP.

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."

Both Title VI and Environmental Justice are covered in greater detail as part of Chapter 4 of the RTP. This also included a self-certification of the MPO's compliance with Title VI and Environmental Justice planning requirements.

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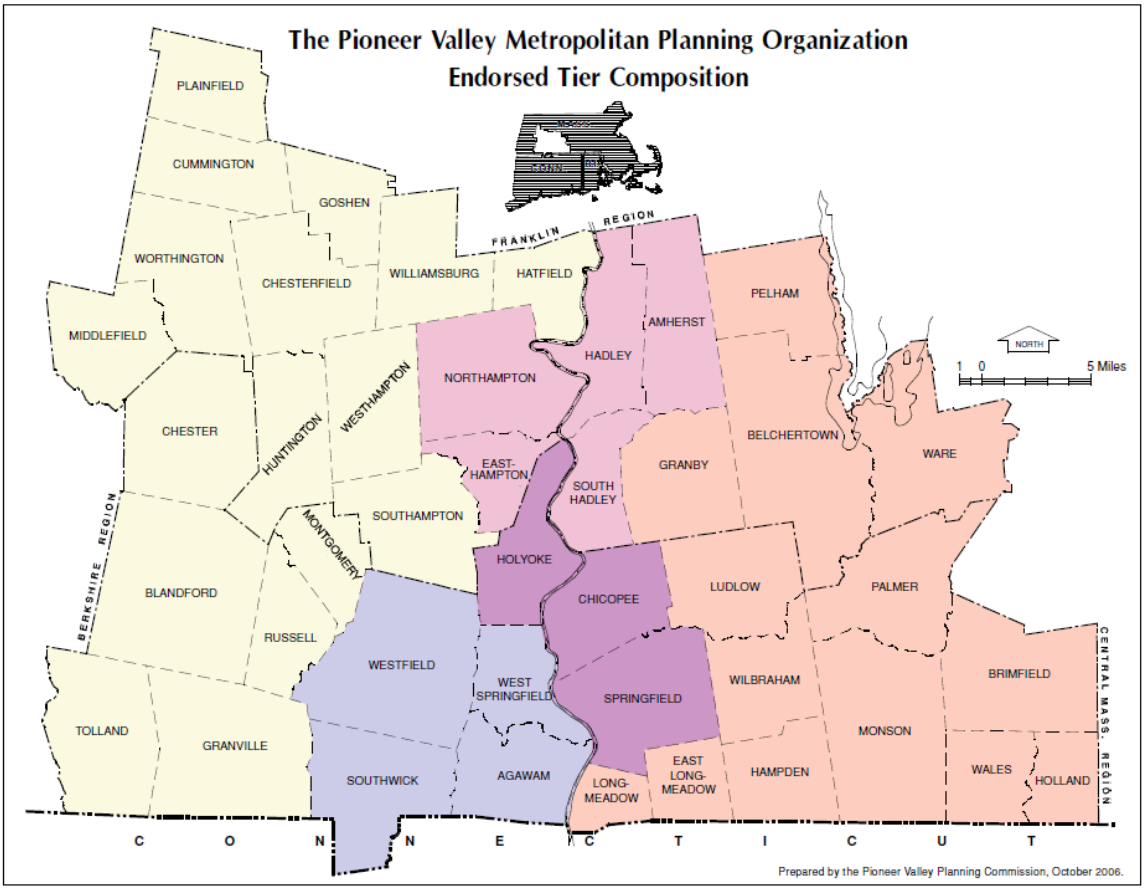
B. THE PIONEER VALLEY METROPOLITAN PLANNING ORGANIZATION (MPO)

The Pioneer Valley Metropolitan Planning Organization (MPO) implements and oversees the 3C transportation planning process to provide an open comprehensive, cooperative, and continuing transportation planning and programming process in conformance with federal and state requirements. 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 sub-regional districts respective to community size and geographic location. A more recent update in 2017 recognized the Western Massachusetts Economic Development Council as a voting member.

Figure 2-1 – Pioneer Valley MPO



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 President and CEO of the Western Massachusetts Economic Development Council (EDC)
- 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 Administrator of the Pioneer Valley Transit Authority, the Joint Transportation Committee (JTC) Chairman, and one representative each from the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), the five (5) alternate community MPO representatives, and one representative each from both the Massachusetts Department of Transportation Highway Division District One and District Two Offices shall be

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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 core planning documents such as the Regional Transportation Plan, Unified Planning Work Program and Transportation Improvement Program. The MPO also oversees all amendments to these core plans and other programs that are required by federal and state laws and regulations.

a) Joint Transportation Committee (JTC)

The Pioneer Valley Joint Transportation Committee (JTC) is the region's transportation advisory group for the Pioneer Valley Metropolitan Planning Organization (MPO). The committee is designed to assist the MPO in incorporating citizen participation in transportation decisions which provides a mechanism for federal, state, and local input into the regional transportation planning process. Each member community is asked to appoint two representatives (a representative and an alternate) to the committee. The Pioneer Valley MPO also appoints other transportation organizations in the region to serve on the JTC.

The JTC convenes monthly meetings open to the public. The planning program and the various functional elements of the planning process are developed cooperatively with the JTC with the purpose of establishing a recommendation for action by MPO. The JTC is responsible for coordination of all regional transportation related plans and programs in cooperation with PVPC staff and Pioneer Valley MPO.

i) Bicycle, Pedestrian and Complete Streets Subcommittee

The Pioneer Valley Joint Transportation's Bicycle, Pedestrian and Complete Streets Subcommittee was established by the JTC in 2000. The subcommittee is responsible for the oversight and coordination of planning activities related to non-motorized modes of transportation.

ii) TIP Subcommittee

The Pioneer Valley Transportation Improvement Program (TIP) Subcommittee was established by the JTC in 2003. 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 project's score from the Pioneer Valley Transportation Evaluation Criteria (TEC), current design status, environmental permitting status, and

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status of any needed right of way acquisition are all used to develop the listing of projects recommended for inclusion in the TIP.

C. KEY PRODUCTS

1. Transportation Improvement Program

The Pioneer Valley TIP is a four-year schedule of priority highway, bridge, transit, and multimodal projects identified by year and location complete with funding source and cost. The TIP is developed annually and is available for amendment and adjustment at any time. Each program year of the TIP coincides with the Federal Fiscal Year calendar, October 1 through September 30. All TIPs and amendments are consistent with the goals and objectives of the Regional Transportation Plan for the Pioneer Valley region and are financially constrained. More information on the TIP can be found here.

2. Unified Planning Work Program

The Unified Planning Work Program (UPWP) is a narrative description of the annual technical work program for the 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 included as part of the UPWP are reflective of issues and concerns originating from transportation agencies at the federal, state, and local levels. More information on the UPWP can be found here.

3. Public Participation Process

The MPO has a proactive public involvement process that provides complete information, timely public notice, and full public access to MPO activities at all key stages in the decision making process. The MPO involves the public early in the planning process, and actively seeks out the involvement of communities most affected by particular plans or projects. The Region's transportation plans and programs are developed in a manner that assures that the public, and affected communities in particular, are consulted and afforded ample opportunity to participate in the development of such plans. The most recent version of the Public Participation plan for the MPO can be found here.

4. RTP Amendment Process

If, during the four year cycle of the adopted long range transportation plan (RTP), it becomes apparent that changes are necessary, the RTP will be amended by redefining the appropriate chapter or section as necessary. All

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changes will be developed in cooperation with MassDOT, the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), the Pioneer Valley Transit Authority (PVTA), and other concerned agencies as appropriate. Typical changes include, but are not limited to:

- Modification of the Financial Constraint Chapter to reflect changes in projected transportation funding as presented in the endorsed RTP.
- Changes required by FHWA or FTA to demonstrate conformity.
- The addition or removal of a regionally significant project that impacts the current Transportation Improvement Program.
- Other actions as defined or requested by the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), or the Pioneer Valley MPO.

Proposed amendments to the RTP will be presented to the Pioneer Valley MPO for release for a minimum 21 day public comment period and require MPO endorsement at the end of the agreed comment period.

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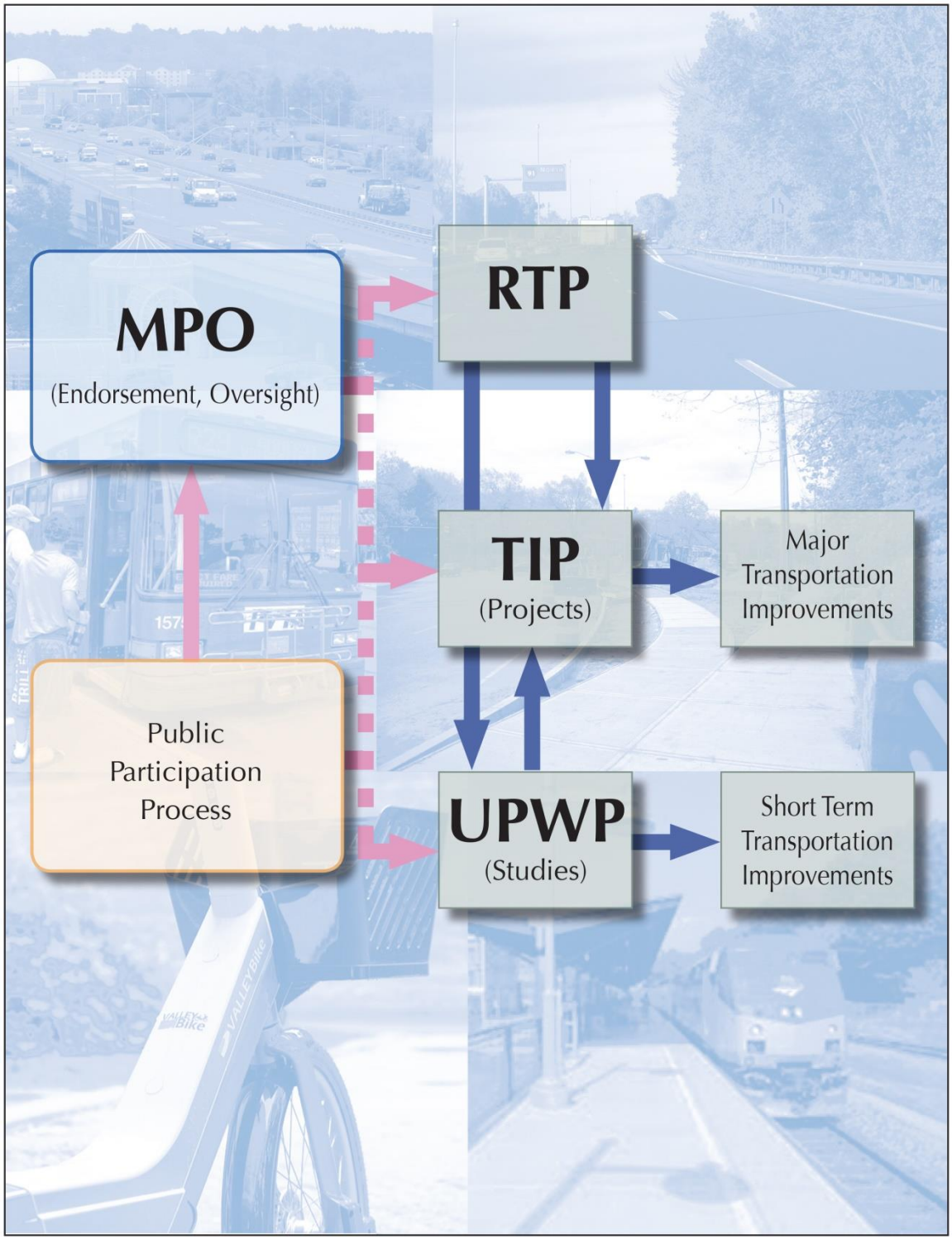
Figure 2-2 – Regional Transportation Planning Process Flowchart



CHAPTER 3

Photo: Public Meeting at South Hadley Town Hall

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 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 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 in the RTP. There were a total of four focus groups on the RTP.

- November 14, 2018 – Bicycle and Pedestrian
- November 14, 2018 – Infrastructure
- December 4, 2018 – Transit
- December 6, 2014 – Environment, Sustainability and Climate Change

To begin each focus group, staff developed a short video describing regional transportation from the viewpoint of the average citizen. This video helped to set the tone for discussion by identifying the regional transportation needs and priorities of a select group of residents. Comments received as part of the focus groups were used to develop a draft vision, goals, needs, strategies and problem statements for the

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RTP. This draft version was distributed to the JTC, MPO, and through the PVPC website in January 2019 to continue to solicit comments.

A series of RTP informational products were developed beginning in the fall of 2018 to begin outreach efforts and education on the RTP process. These products are summarized below:

- RTP Webpage - http://www.pvpc.org/projects/2020-regional-transportation-plan-update
- RTP Article - http://www.pvpc.org/content/lot-can-happen-four-years
- RTP FAQs - http://www.pvpc.org/sites/default/files/RTP%20Frequently%20Asked%20Questions.pdf
- RTP Brochure
- RTP Survey

All of the products were made available on the dedicated webpage for the RTP update. The RTP article also appeared in PVPC's quarterly newsletter. A copy of the RTP brochure and survey have been included as part of the appendix to this document.

A. RTP SURVEY

A brief survey was developed in consultation with the JTC to obtain public input on the content of the RTP. The survey was provided in both English and Spanish. To date, over 100 responses have been received. Significant responses have been summarized below.

Respondents were asked to rank a list of transportation improvement categories from most important to least important. This information is summarized in Table 3-1.

Table 3-1 - What Type of Projects are Important to You?

Transportation Improvement Project Category	Score
Projects that enhance the movement and connectivity of pedestrians and bicycles (ex. on road bike lanes and sidewalks)	6.37
Projects that expand or enhance transit. (ex. express bus service and improved bus stops)	6.22
Projects that improve Safety. (ex. improvements that reduce accidents)	5.64
Projects that improve the roadway surface. (ex. paving streets)	5.17
Projects that protect or enhance Environmental Resources such as Wetlands, Streams, Wildlife, and Air Quality. (ex. upgrades to culverts)	4.63
Projects that promote responsible Economic Growth and Development. (ex. multi-modal transportation centers)	4.4
Bridge Projects (ex. repairing bridges with structural deficiencies and/or weight restrictions)	4.27
Projects that preserve Existing Regional Assets such as Parks, Historic Areas, and Farms. (ex. off road bike paths and trails)	4.23
Projects that reduce Traffic Congestion and Travel Time. (ex. signal timing improvements)	4.08

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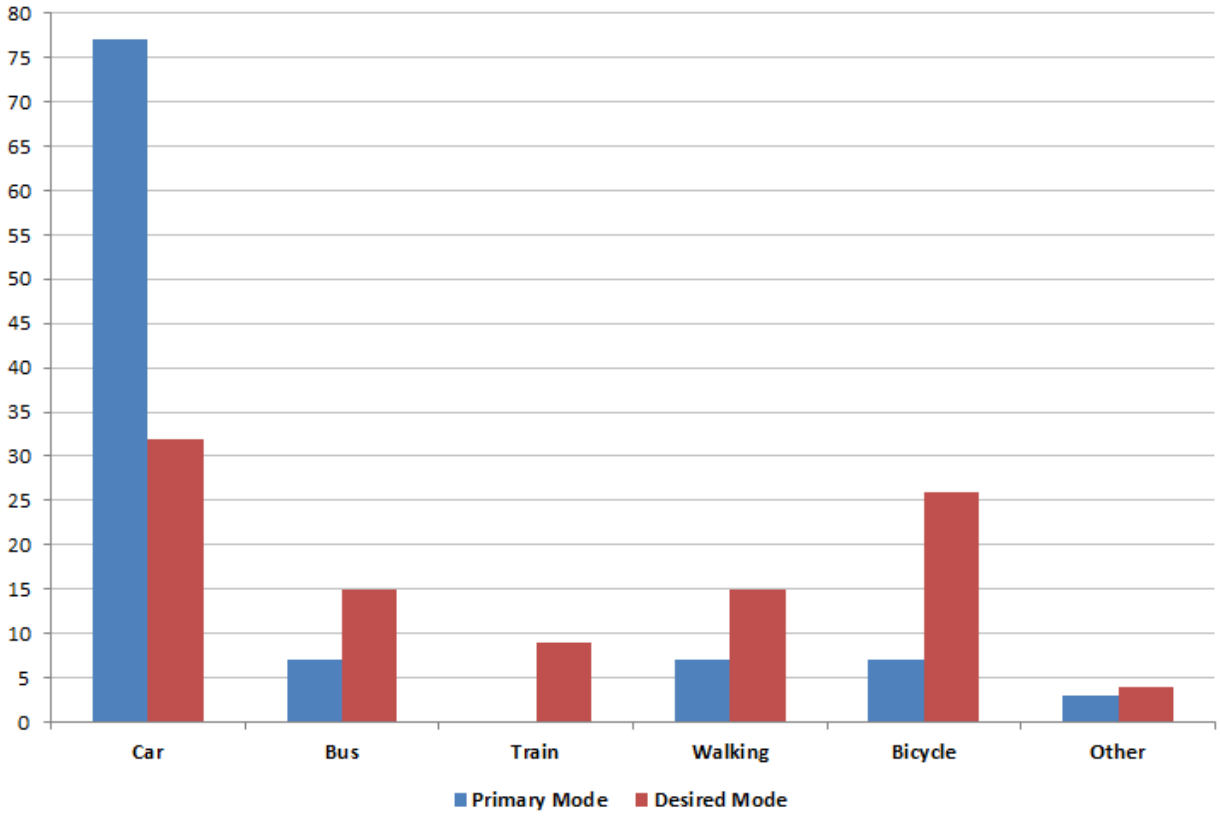
Most respondents selected “projects that enhance the movement and connectivity of pedestrians and bicycles” as their number 1 choice. This was closely followed by transit improvements, and safety improvements. There was not much widespread variation in the weighted scores for each of the nine categories.

Figure 3-1 – Transportation Improvements Word Cloud

A follow up question was included asking why each respondent chose one of the transportation project categories as their number one choice. A Word Cloud was developed using the most common words included in their responses and is shown on Figure 3-1. Common themes in the responses indicated a need for more safety on roadways, improvements to better accommodate bicycles, and a need to reduce the number of cars on the road. Others commented on the necessity of driving a car to get to your destination in the Pioneer Valley and the need for improvements to public transit.

Two questions asked about ones primary mode of transportation versus their desired mode of transportation. In other words, what mode of transportation would you prefer to use if possible. Over 75% of respondents reported that a car was their primary mode of transportation, however just over 30% of respondents indicated that a car was their desired mode of transportation. Respondents also indicated a high desire to travel by bicycle, transit, and rail. A complete comparison of these two questions is shown in Figure 3-2.

Figure 3-2 – Primary Vs. Desired Transportation Modes



Each survey respondent was asked to define what the term “regional transportation” means. This question was included to gain insight on how the average person perceives the regional transportation system. This information was compiled into a Word Cloud that is shown on Figure 3-3. The word “connected” appeared on a large percentage of the definitions. Many responses talked about a transportation system that connects all residents and communities to different transportation modes, areas of employment, schools, and shopping areas. Another common response was that transportation be both safe and accessible.

Figure 3-3 – Regional Transportation Definition Word Cloud

B. RTP OUTREACH

PVPC reached out to local groups and organizations to give a presentation on the RTP. Table 3-2 summarizes the outreach on the RTP that has occurred to date.

Table 3-2 – RTP Outreach Events

Date	Event
Monthly	Pioneer Valley Joint Transportation Committee Meetings
Monthly	Pioneer Valley Metropolitan Planning Organization Meetings
February 12, 2019	West Springfield Rotary Club
February 13, 2019	Transportation Evaluation Criteria Scoring
February 21, 2019	Pioneer Valley Commissioner Meeting
March 20, 2019	Western Massachusetts Historical Commission Coalition
May 20, 2019	Greater Holyoke Chamber of Commerce Meeting
June 6, 2019	MassDOT CIP Public Meeting at Springfield Public Library

C. 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 will be scheduled to allow the opportunity for discussion and comment on the potential environmental impacts of transportation projects included in the regional transportation plan. PVPC will provide large scale maps of transportation improvement projects included in the RTP and invite the public and special interest groups to comment on the Draft RTP.

Three public meetings were scheduled to solicit public comments on the Draft Regional Transportation Plan during the formal public participation process:

- June 25, 2019 – Pioneer Valley Planning Commission, Springfield, MA
- June 26, 2019 – Northampton City Hall, Northampton, MA
- June 27, 2019 – Westfield, City Hall, Westfield, MA

Paper copies of the Draft RTP were made available during the formal public participation process on request. The Draft RTP was also available for download from PVPC's web page at www.pvpc.org.

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Table 3-3 – Comments Received on the Draft RTP

Comment	From	MPO Response

This section will be added after the formal public participation process is completed in July.

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CHAPTER 4

Photo: Maple Street in Holyoke, MA

EQUITY

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.

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

Strategy - *Identifying minority and low-income populations using 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

2. Identification of Low Income Populations

The PVMPO defines "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."

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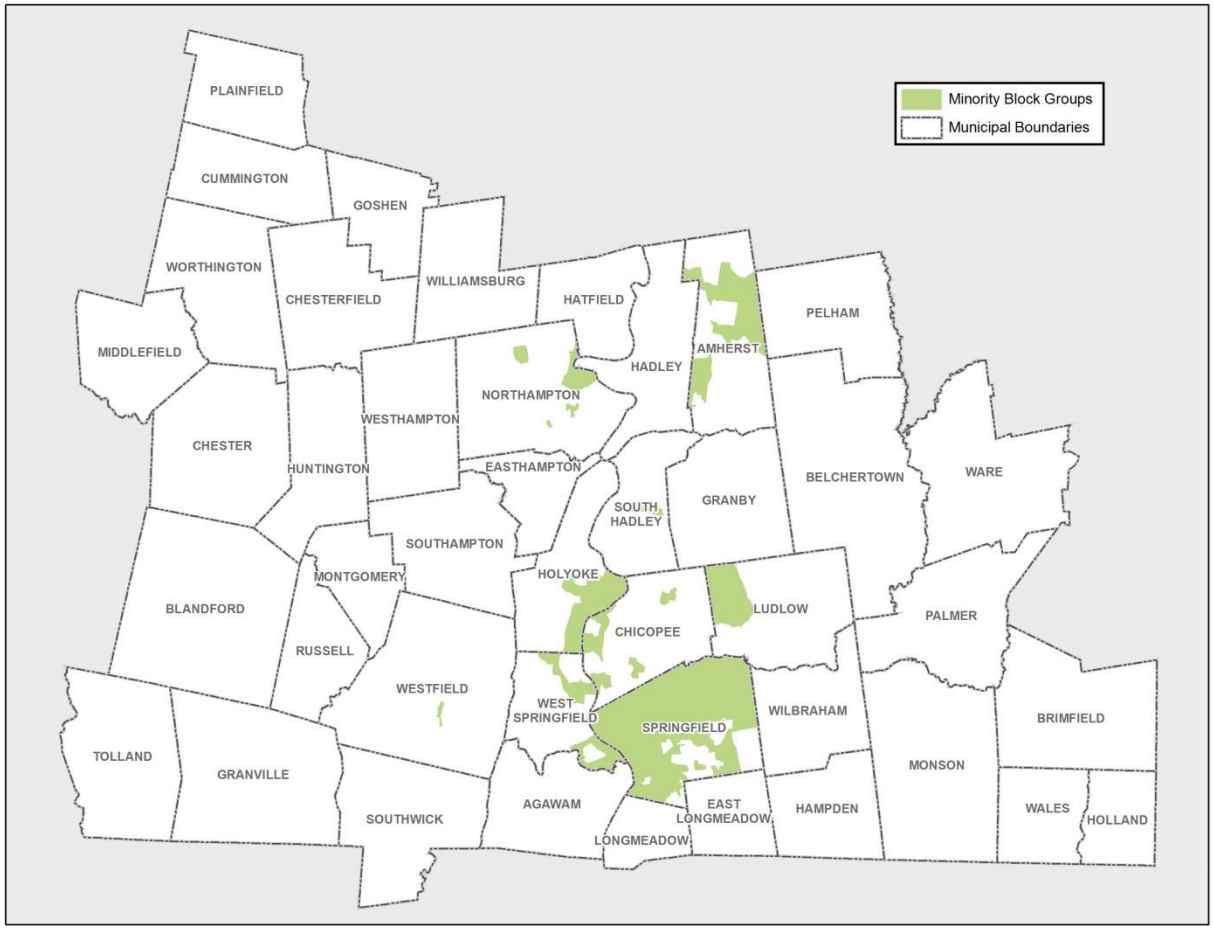
Figure 4-1 – Census Block Groups with Minority Populations Exceeding Regional Average



Source: ACS 2006-10 (2010 based Census)

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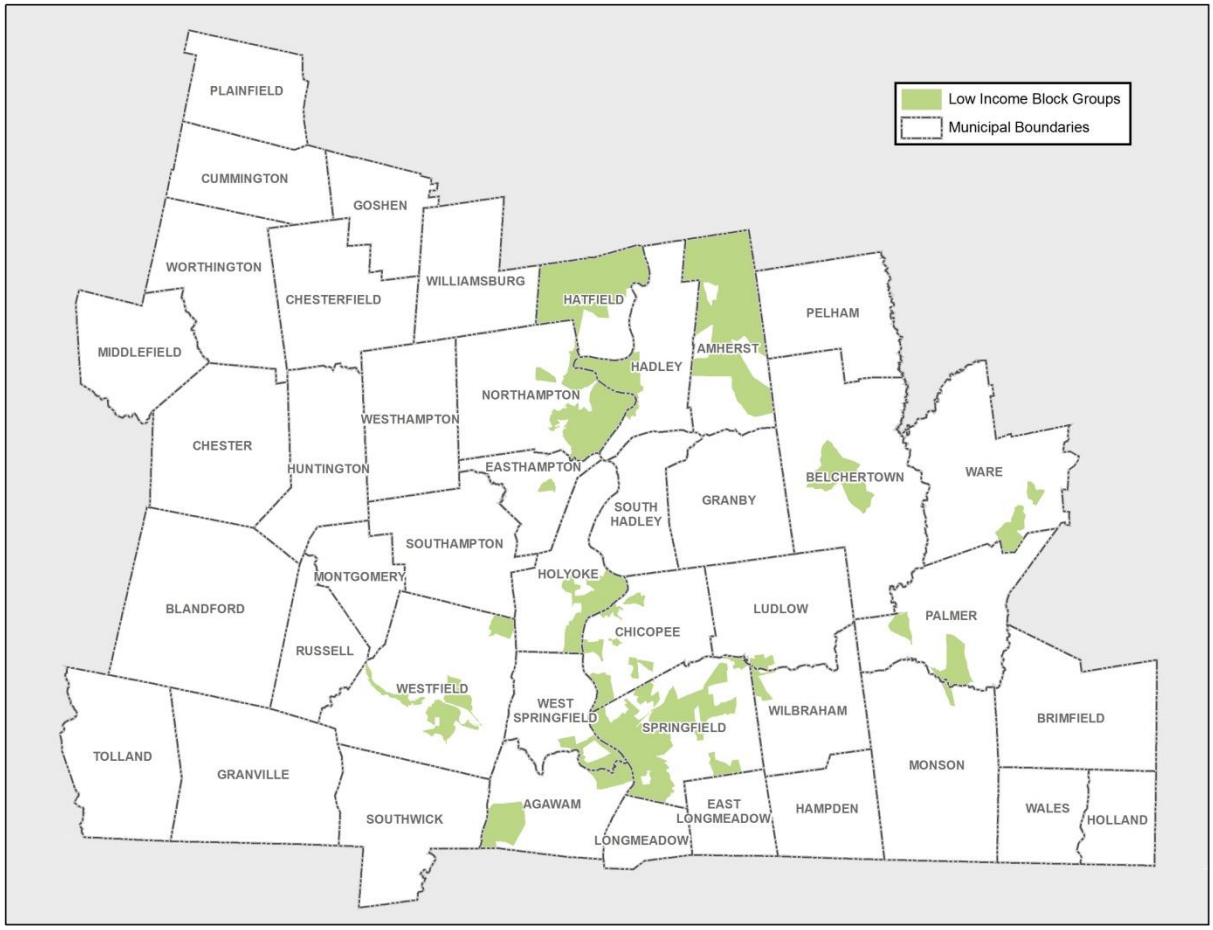
Figure 4-2 – 2010 Census Block Groups with a Poverty Rate above that of the Region



Source: ACS (2010 based Census)

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 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

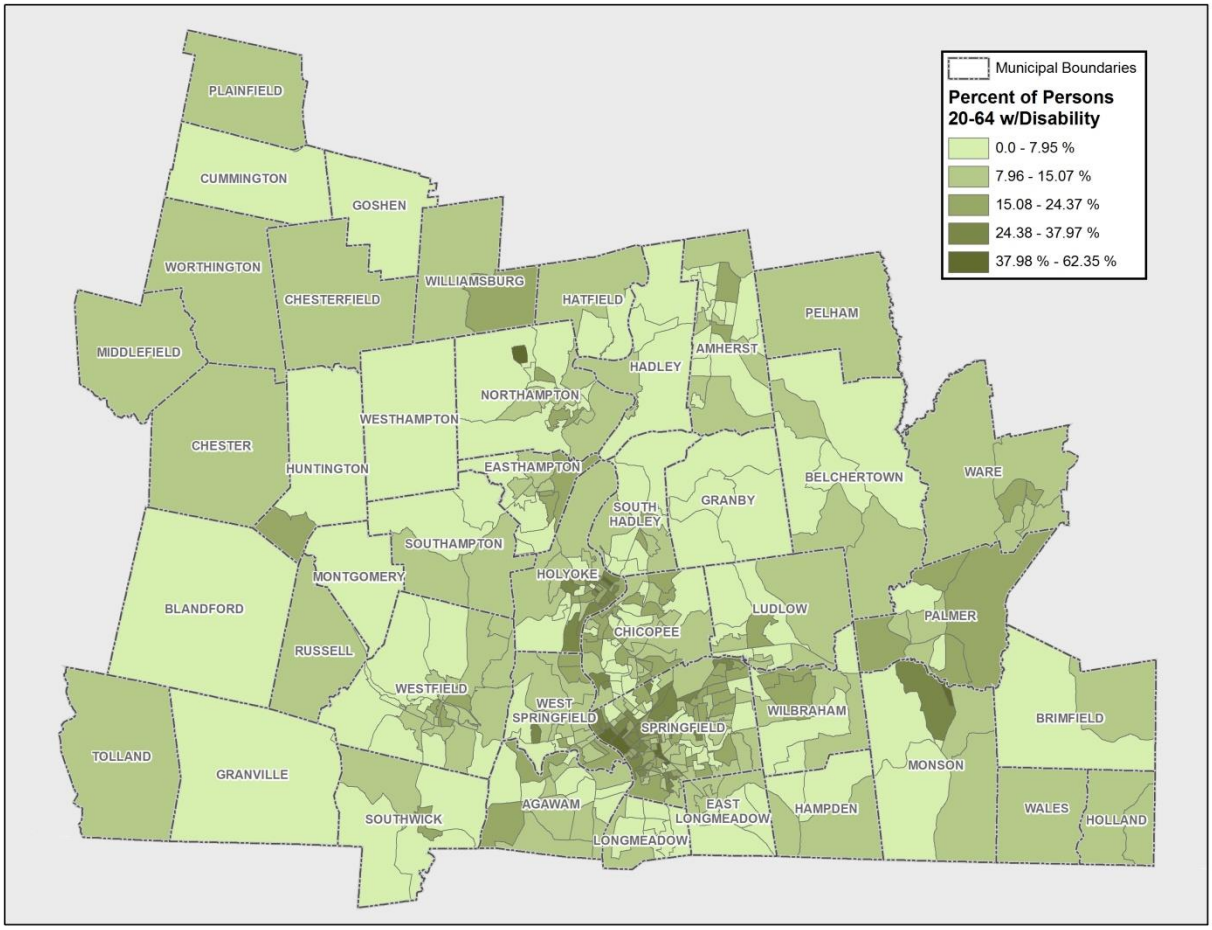


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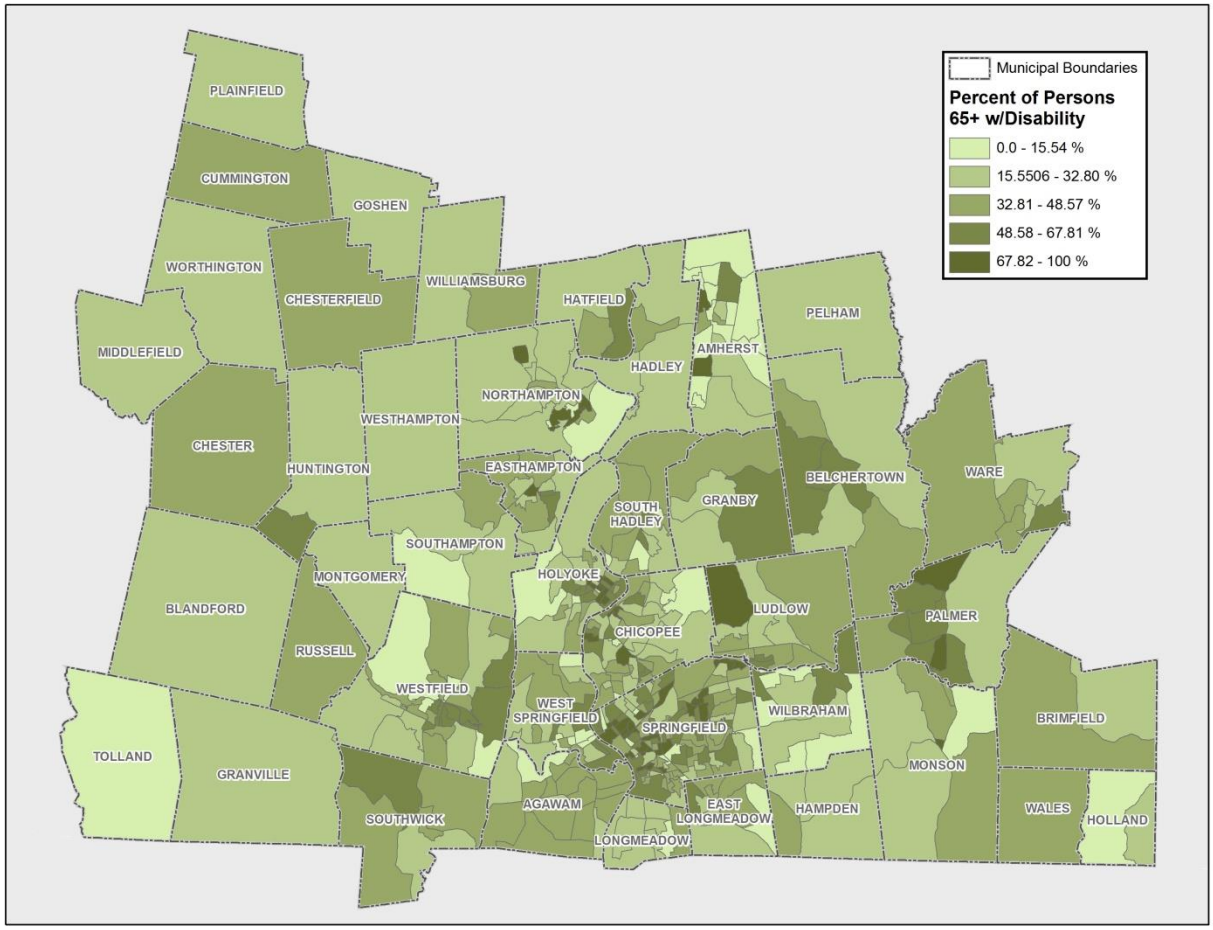
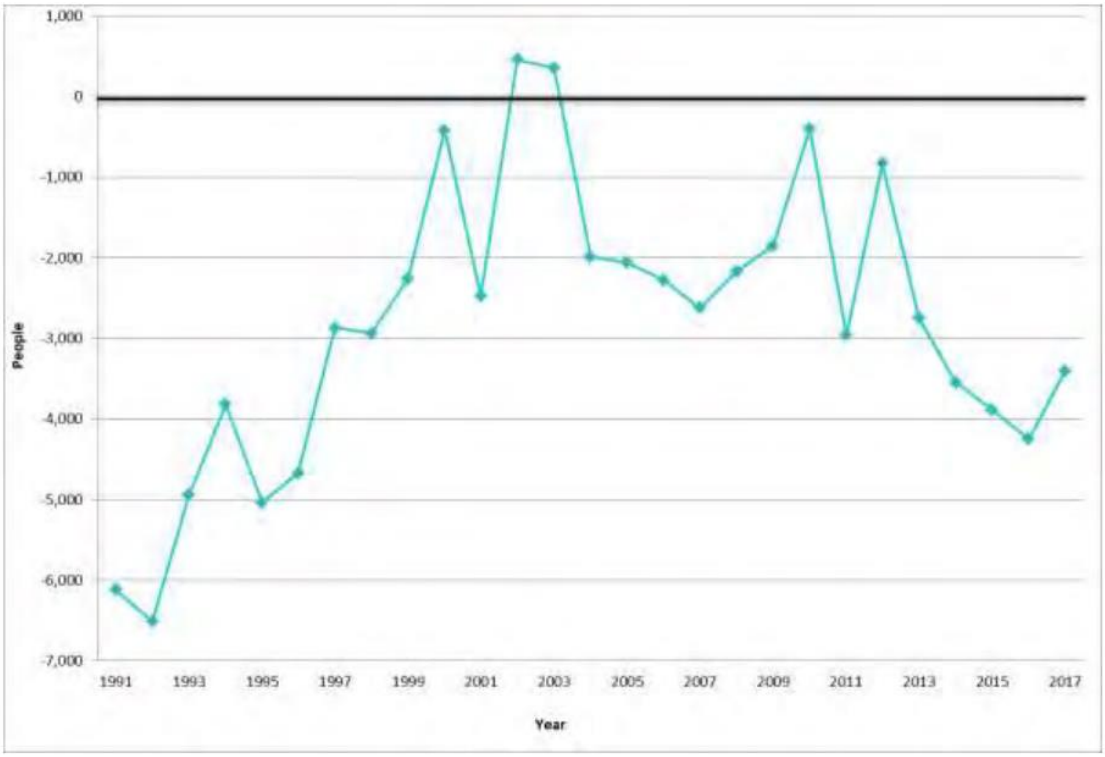
Figure 4-4 – Census Block Groups Individuals in the Pioneer Valley Age 65+ with Disabilities



1. Foreign Born Demographics and Migration

Retaining the population base has been a challenge in the Pioneer Valley region. Although trends of out-migration decreased between 1991 and 2002, it appears that this trend is reversing. During the recession of the 2000s when the housing market crashed, net outmigration decreased significantly, reflecting similar trends to those in previous economic downturns. However, net-out migration has been increasing steadily since then. In 2011, net out-migration was over seven times higher than in 2010. Although this trend reversed between 2016 and 2017, net out-migration in the Pioneer Valley region is overall on the rise.

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



Source: U. S. Census Bureau Population Division, 2017

The Pioneer Valley has always been a destination for foreign immigrants and this continues to be the case. From 2000 to 2009 inclusive, a total of 13,656 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 since 2010, which has seen an additional 14,663 people immigrating to the region from another country.

E. CONSULTATION AND ACTIVE SOLICITATION OF PUBLIC PARTICIPATION

In accordance with state and federal law requirements, and to ensure inclusive and accessible public engagement processes for transportation decision making, the Pioneer Valley MPO developed a Public Participation Plan (PPP) to guide agency public participation efforts to include those populations that have been underserved by the transportation system and/or have lacked access to the decision-making process. The PPP guides the MPO in its efforts to offer early, continuous, and meaningful opportunities for the public to help identify social, economic, and environmental impacts of proposed transportation projects and initiatives. The Plan was developed in collaboration with MassDOT in 2016. The PPP defines how public

participation is incorporated into its transportation decision-making processes, and how the MPO ensures access for people with disabilities and the inclusion of low income and minority stakeholders.

Specifically, the PPP states the methods that MPO will use to reach out to persons who are low-income, minority, Limited English Proficient (LEP), or have a disability, and other traditionally underrepresented populations. Because different transportation decisions to be made require different techniques for reaching the public, this Plan provides a toolbox of techniques to be applied, as appropriate, to achieve effective 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.

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 public engagement process include:

- **Promote Respect:** All transportation constituents and the views they promote should be respected. All feedback received should be given careful and respectful consideration. Members of the public should have opportunities to debate issues, frame alternative solutions, and affect final decisions.
- **Provide Proactive and Timely Opportunities for Involvement:** Avenues for involvement should be open, meaningful, and organized to let people participate comfortably, taking into consideration accessibility, language, scheduling, location and the format of informational materials. Meetings should be structured to allow informed, constructive dialogue, be promoted broadly and affirmatively; and be clearly defined in the early stages of plan or project development. Participation activities should allow for early involvement and be ongoing and proactive, so participants can have a fair opportunity to influence PVMPO decisions.
- **Offer Authentic and Meaningful Participation:** The MPO should support public participation as a dynamic and meaningful activity that requires

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teamwork and commitment at all levels. Public processes should provide participants with purposeful involvement, allowing useful feedback and guidance. Participants should be encouraged to understand and speak with awareness of the many competing interests, issues, and needs that lead to transportation ideas and projects.

- **Provide a Clear, Focused, and Predictable Process:** The participation process should be understandable and known well in advance. This clarity should be structured to allow members of the public and officials to plan their time and use their resources to provide input effectively. Activities should have a clear purpose, the intended use of input received made clear, and all explanations described in language that is easy to understand.
- **Foster Diversity and Inclusiveness:** The MPO should proactively reach out to and engage people with disabilities, as well as low-income, minority, limited English proficient disabled and other traditionally underserved populations.
- **Be Responsive to Participants:** PVMPO meetings should facilitate discussion that addresses participants' interests and concerns. Scheduling should be designed to meet the greatest number of participants possible and be considerate of their schedules and availability.
- **Record, Share and Respond to Public Comments:** Public comments, written and verbal, should be given consideration in the MPO decision making processes and reported in relevant documents.
- **Self-evaluation and Plan Modification**

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,

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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 Tables 4-1 and 4-2.

The analysis shows that 45.13 percent of projects on the RTP are located in low income block groups and that 31.86 percent of projects are located in minority block groups. The table also shows that 77.61 percent of funding was distributed to defined low income block groups compared to 67.59 percent to other block groups in the region.

Table 4-1 – Distribution of Projects in the RTP to Low Income Populations

Low Income Equity Analsysi	PVPC Total	Low Income Block Groups	Other Block Groups	% PVPC Total in Low Income Block Groups	% PVPC Total in Other Block Groups
Transportation Analysis Zones (Block Groups)	442	158	284	35.75%	64.25%
Population	621570	207727	413843	33.42%	66.58%
Minority Population	171475	110607	60868	64.50%	35.50%
Number of Projects	113	51	62	45.13%	54.87%
Projects Not Funded	0	0	0	0	0
Projects	$1,494,243,790	$1,159,644,147	$334,599,643	77.61%	22.39%
Total Project Dollars per Capita	$2,403.98	$5,582.54	$808.52	2.32	0.34
Funded Projects per Capita	$2,403.98	$5,582.54	$808.52	2.32	0.34

Table 4-2 – Distribution of Projects in the RTP to Minority Populations

Minority Equity Analsysi	PVPC Total	Minority Block Groups	Other Block Groups	% PVPC Total in Minority Block Groups	% PVPC Total in Other Block Groups
Transportation Analysis Zones (Block Groups)	442	163	279	36.88%	63.12%
Population	621570	212230	409340	34.14%	65.86%
Minority Population	171475	130808	40667	76.28%	23.72%
Number of Projects	113	36	77	31.86%	68.14%
Projects Not Funded	0	0	0	0.00%	0.00%
Projects	$1,494,243,790	$1,009,927,416	$484,316,374	67.59%	32.41%
Total Project Dollars per Capita	$2,403.98	$4,758.65	$1,183.16	1.98	0.49
Funded Projects per Capita	$2,403.98	$4,758.65	$1,183.16	1.98	0.49

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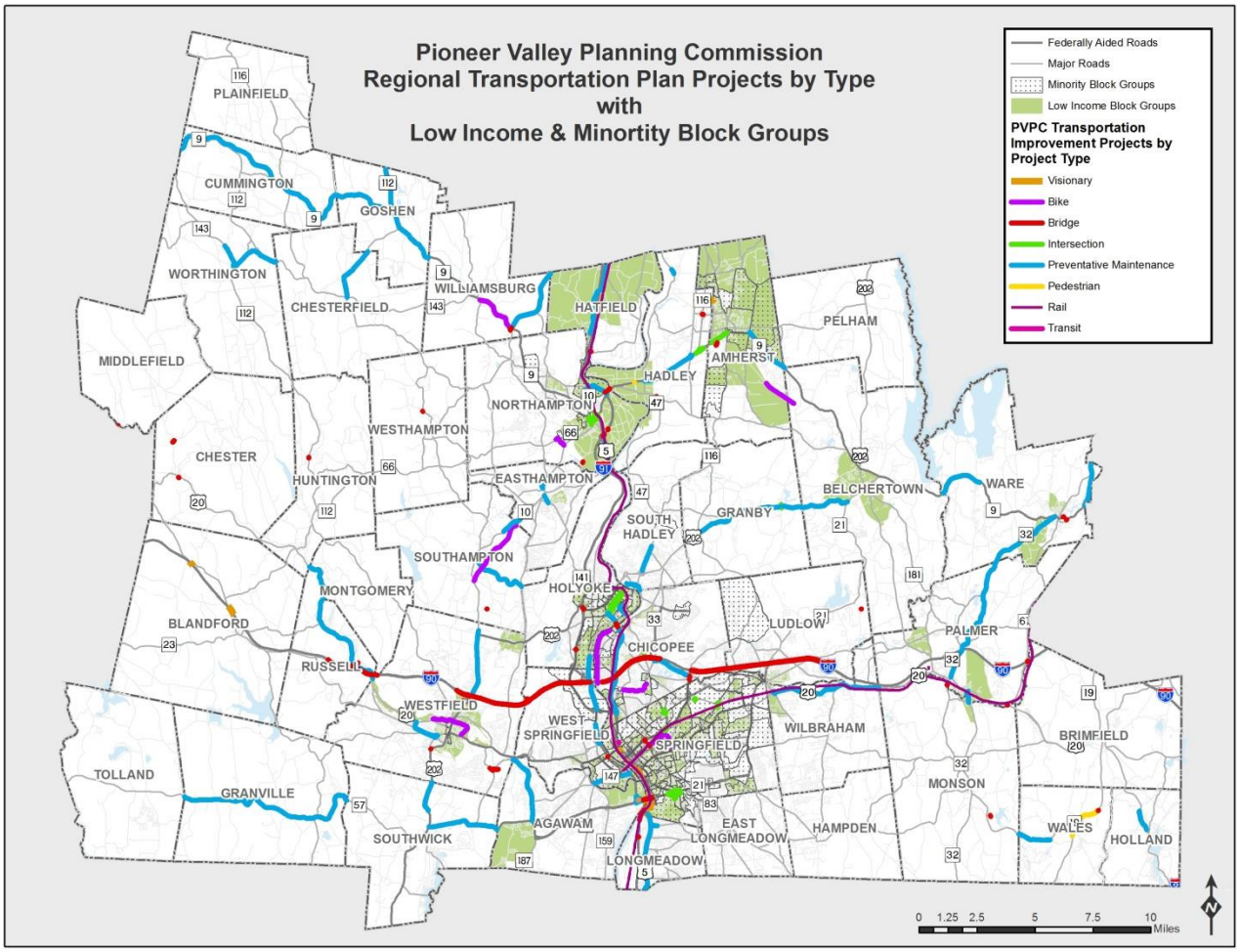
Figure 4-6 – Distribution of Projects in the RTP to Low Income and Minority Populations



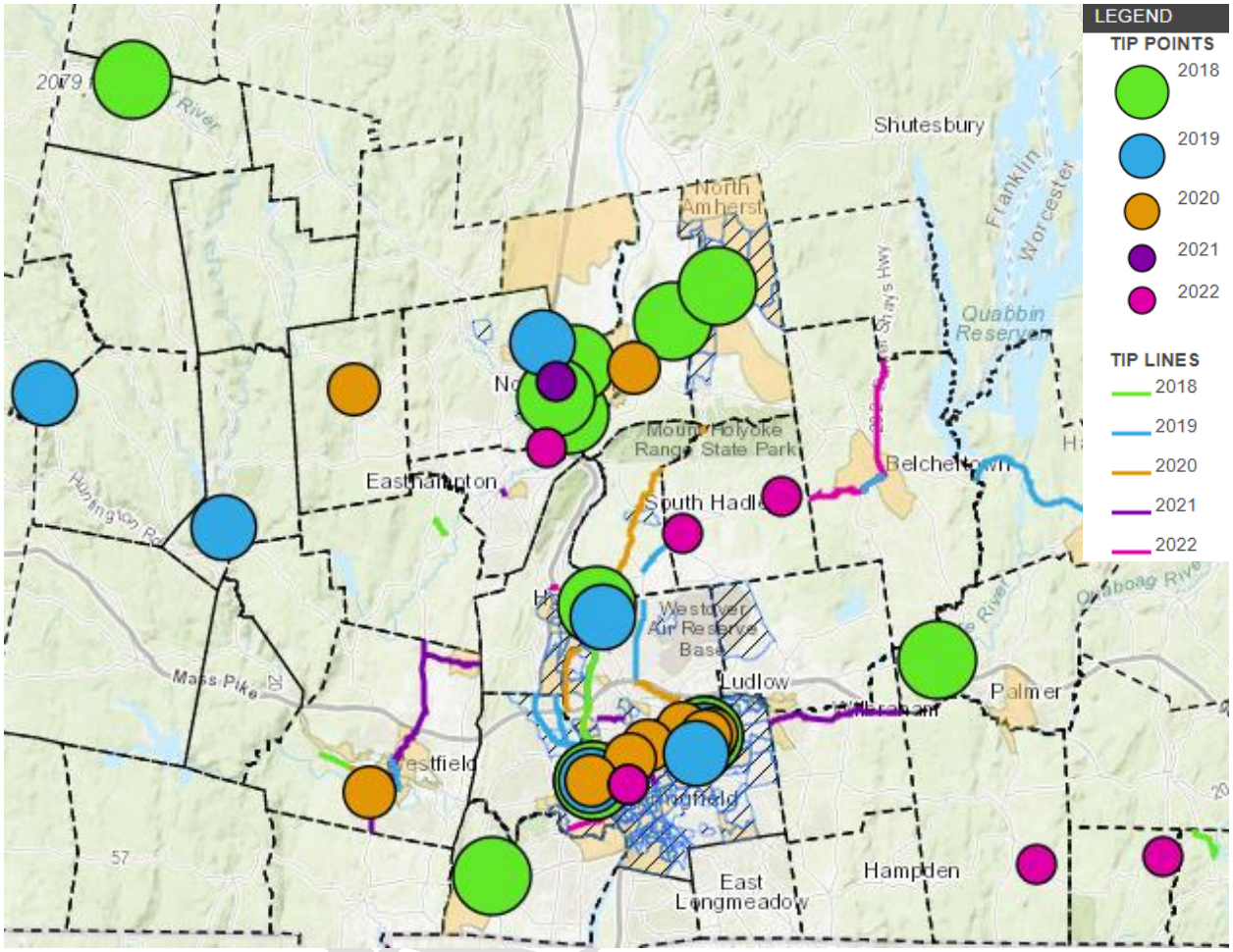
b) Annual Equity Assessment of Distribution of TIP Funding

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

A complete table for all highway and transit projects included as part of the equity assessment is included in the RTP Appendix.

Figure 4-7 – Distribution of Transportation Projects



c) Attainability by Transit

The level of attainability by transit in our region describes regional accessibility by low income, minority, and immigrant populations of the Pioneer Valley. These populations usually depend on local public transit to reach necessary regional amenities such as health care, food stores, education, employment, and housing. Other groups that likely depend on public transit are the elderly and disabled. These groups were mapped against the regional transit network.

This current analysis involves estimating travel times between major activity centers and residential locations of the study populations. Using census data, transportation analysis zones with percentages higher than that of the regional average for minority and low-income populations were identified. The location of major employers the Pioneer Valley region was mapped (Figure 4-8). Major employers were defined as businesses which have 50 or more employees. Accessibility to transit was defined as being within a

quarter of a mile from a bus route. The map shows transit connectivity in our region between major employers and residential locations of low-income and minority zones.

Attainability of goods and services by the low-income and minority groups is analyzed through a comparison between transit and auto-vehicle travel times. Most zones with a high percentage of minority groups also included a high percentage of low-income groups. Communities with high percentages in one of these two categories included Amherst, Northampton, Holyoke, Chicopee, Springfield, West Springfield, Westfield, Palmer, and Ware. Whereas, major employers were concentrated in Springfield, Holyoke, Amherst, and Northampton. (Figure 4-9)

The Pioneer Valley MPO will continue to assess transit travel needs in the region and update this analyses to revise travel times due to changes in bus service times and frequencies. In response to budgetary challenges faced by the regional transit authority due to level funding while costs increased, a change in transit services and fees were deemed necessary. A recent service changes and fare increase analysis study was concluded in 2017 and many of its recommendations have been implemented by September 2018. Changes in bus service since the last RTP 2016 update include a variety of frequency and service hours reductions, combining of existing bus routes, as well as a few discontinuations or modifications to low performing routes. Most of the newer cross town routes introduced in 2014 following the recommendations of the comprehensive system analysis study, were retained. System wide weekend service reduction to Saturday service levels to match Sunday service levels resulted in some Saturday service elimination. The 2018 system changes to transit service will negatively affect attainability by transit due to longer wait time between buses and narrower service windows.

Four scenarios were selected to analyze transit attainability of individuals living in low-income and minority zones. These scenarios represent examples of the regional travel needs of our low-income and minority groups and their associated travel time expenditures. However, these examples are not exhaustive of all regional travel needs. The following four scenarios represent various travel needs across the region. They cover long, medium, and short distance travel to services and activity centers within our region.

i) Travel between Amherst and Springfield represents the furthest destination in the region between zones of higher minority and low-income rates. These two destinations are important activity centers in our region that provide several opportunities for education, employment and entertainment. Springfield additionally provides

opportunities for health and other state aid services. Depending on time of day, a transit traveler between these two locations will spend between 100 to 120 minutes each way using three or two different buses: (B43, B48, and P21) or (R29, and P21). Therefore, a two hour appointment at Baystate Medical Center would necessitate at least a four hour round trip by public transit. In comparison, the same trip by private auto may take 40 minutes each way, a third of the time it takes to travel by bus. This is due to the number of stops en route and the additional time associated with waiting to transfer between buses. In this scenario, public transit offers an alternative to the personal automobile as a travel mode, but at a higher time cost. This may be the only travel mode available for low-income and minority groups who cannot afford auto ownership or are unable to drive for other reasons. Other options like the intercity motor coach carrier or cabs can be cost prohibitive. Public transit bus ticket costs $1.5 each way. Whereas, a bus ticket for the motor coach run by the PeterPan Bus company would cost $9. A ride with Uber costs around $34, while a cab ride costs around $65. This means that the round trip by these three modes of travel would cost $3, $18, $68, $130 respectively. The cost disparity between the three options makes public transit the only viable alternative for the population under study.

ii) Travel between low-income housing in Northampton and state health service providers or employment centers in Holyoke represents a medium length regional travel trip for the population under study. Depending on time of day, a trip between these two locations takes about an hour on average using two buses: R42 or R44 then B48. This is twice as long as it takes to travel by car. In this case, a two-hour appointment would necessitate an additional one-hour time expenditure for travel by bus compared to auto.

iii) Travel between Springfield and major employers at the Holyoke Mall and the adjacent industrial park in Holyoke represent short length travel trips in the region. A Springfield resident seeking employment in the service and retail industry in Holyoke would spend 30 minute on average to commute by bus. Due to the short distance traveled between the two locations, travel time is lower between the two activity centers in this scenario compared to the previous two scenarios. Yet, travel time by bus is three times as long as travel by car.

iv) Within a large city such as Springfield, a trip to the supermarket from Mason Square takes an average of 30 minutes by bus whereas it takes half of that duration by car.

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Public transit provides an important connecting service between major activity centers and residential locations for low-income and minority populations in the Pioneer Valley. The various bus routes connecting these zones have different levels of service ranging from regular to limited on weekdays, weekends, and during academic seasons. Several of the bus routes run on reduced schedule during the summer and the colleges' No School periods. The complexity of the bus route system requires further in-depth analysis to identify transit connection challenges due to schedule and service availability between all identified zones. Transit attainability can be further analyzed in conjunction with Level of Service for all bus routes. Updates to this analysis are required whenever major bus routes changes occur. Many route changes have been implemented during the past year to address budget deficit by the Transit Authority due to level funding by the state and increased costs of operation. Level of Service categories were identified for each of the bus routes in the Pioneer Valley service area ranged from 6 being best to 1 being worst (Table 4-3).

The methodology used to rank the level of service of bus routes includes calculating trip frequency of each bus route during weekdays and weekends. Most bus routes offer service during regular business hours and provide service coverage for 12 hours on weekdays. Some routes provide limited weekend service as well. Regular business hour service is assumed to be from 6am to 6pm. The number of service trips provided by a bus leaving its starting point towards its main destination is divided by 12 to calculate the bus route's service rate (number of trips per hour). The trip rate is then adjusted to incorporate any additional service provided after regular business hours. An adjustment factor is calculated by counting the number of trips occurring at 6pm and beyond then dividing that number by 12. Some bus routes offer service on Saturdays while others offer service on both Saturdays and Sundays. Therefore, another adjustment factor is required for the trip rate. An addition of bus service for one day out of the seven days of the week is factored as 1/7 = 0.14. This factor is added to represent each Saturday or Sunday service. The total bus route trip rate includes the sum of all four measures: business hours weekday trip rate, after business hours weekday trip rate, Saturday service factor, and Sunday service factor. The majority of bus routes provided by the Regional Transit Authority service were analyzed according to this methodology. The calculated total trip rates ranged from 0.5 to 5.6. A constant value of 0.5 was added to all totals to arrive at the current ranking integers ranging from 6 best to 1 lowest Level of Service.

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Figure 4-8 - Transit Access to Major Employers for Zones of High Percentages of Minority and Low-Income Populations

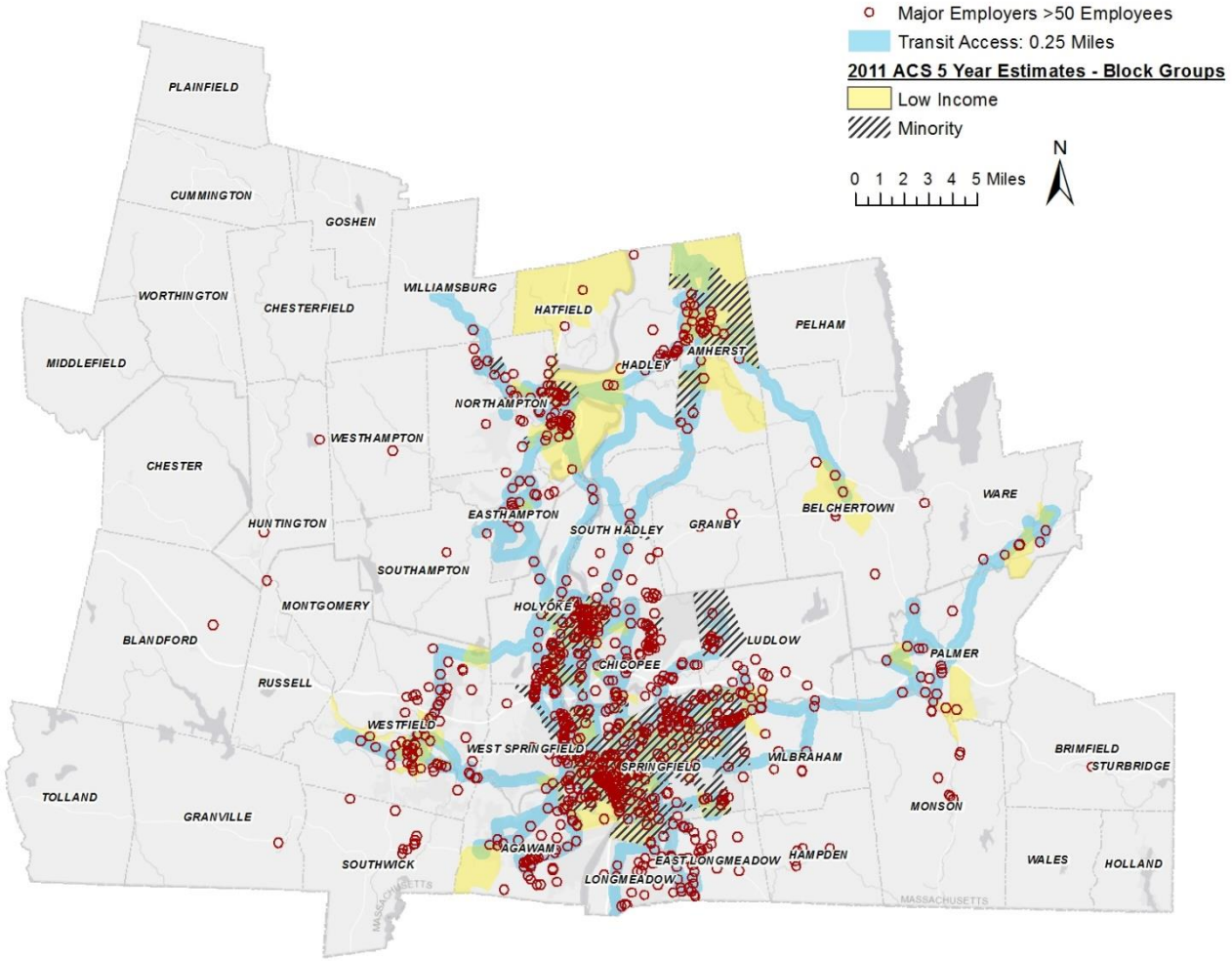
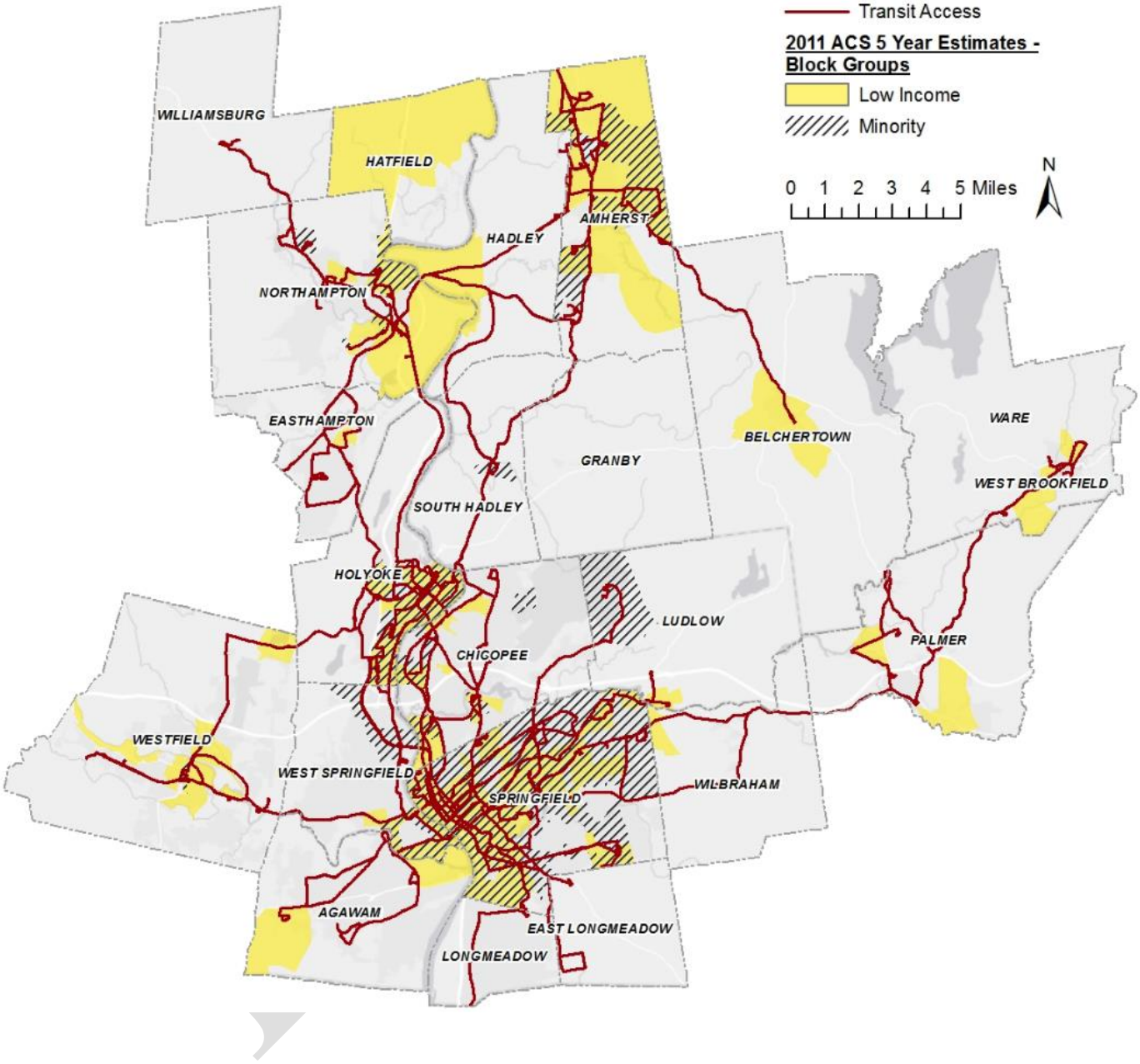


Table 4-3 - Evaluation of Transit Service by Route

Route	Level of Service Rank (6-1) Highest to Lowest Level of Service	Service Area
G30	3, 6	Amherst
P31	3, 6	Amherst
B7	6	Springfield
B35	6	Amherst
B34	5	Amherst
G1	5	Springfield
P20	4	Holyoke/West Springfield/Springfield
G2	4	Springfield
B6	4	Springfield
B43	3, 4	Northampton/Hadley/Amherst
P38	4	Amherst/ South Hadley
X90	3	Holyoke/Chicopee/Springfield
P21	3	Springfield/Chicopee/Holyoke
OWL	3	Westfield
G3	3	Springfield
P39	3	Northampton/Hadley/South Hadley
R10s	3	Westfield
R10	2	Westfield/West Springfield/Springfield
B48	2	Northampton/Holyoke
B33	2	Amherst
B4	2	Springfield
R14	2	Agawam/West Springfield/Springfield
G5	2	Longmeadow/Springfield
B17	2	Springfield
P21e	2	Holyoke/Springfield
R44	2	Northampton
R42	2	Northampton/Williamsburg
P11	2	Holyoke/Springfield
R41	2	Northampton/Easthampton/Holyoke
X92	2	Springfield
G36	2	Amherst
B23	2	Holyoke/Westfield
LOOP	2	Springfield
R29	1	Holyoke/South Hadley/Amherst
R24	1	Holyoke
P39e	1	Northampton/South Hadley
NE	1	Easthampton/Northampton
P20e	1	Holyoke/Springfield
G45	1	Belchertown/Amherst
B12	1	Ludlow/Springfield
WP-C	1	Ware/Palmer
S	1	Northampton
WP-E	1	Ware/Palmer/Springfield
G46	1	South Deerfield/Sunderland/Amherst
	Operates during school breaks only	No service during school breaks
	Reduced service during school breaks	

Figure 4-9 - Attainability by Transit for Low Income and Minority



The six previously identified communities that contain a high percentage of low-income and minority populations in our region are serviced by transit routes of varying levels of service. In general, shorter trips between two adjacent locations can maintain a high level of service throughout the day. On the other hand, longer trips connecting three or more locations are subject to a combination of levels of service from each of the connecting transit routes. This can result in a lower overall level of service due to travel constraints posed by the lowest level of service

category of a trip segment. Whenever a bus route schedule includes variations in frequency and coverage during summer or "No School" season, the reduced schedule is entered into the analysis because most transit users continue to travel to work and other destinations regardless of season. This is an important factor to keep in mind when analyzing the overall transit attainability of individuals living in these locations because it affects their ability to engage in activities, acquire needed services, or seek employment.

The following tables analyze the effects of various levels of service on transit trips between the five identified locations: Amherst, Northampton, Holyoke, Chicopee, Springfield, and West Springfield (Tables 4-4 – 4-9). Each table looks at all transit options, including local and express routes, connecting each location as an origin of a trip to the other five destinations. Such information is indicative of the overall accessibility via transit.

Average travel time spent along each route to complete a trip is also of interest. Travel times durations may fluctuate at varying times of the day or days of the week due to variations in schedules. Variation in a route schedule can increase wait time between bus connections. There is also the potential increase in travel time due to traffic congestion on certain portions of the route during lunch time, on Friday afternoon, and other traditional rush hour times. This makes taking a bus trip more time efficient during certain times of the day or on certain days of the week. While this complexity is difficult to analyze, calculating an average travel time between the identified origins and destinations will help reveal the need for schedule or service changes to improve attainability by transit.

Table 4-4 - Travel Service between Origins and Destinations for Amherst

Origin	Destination	Bus Number	Route Level of Service	Trip Level of Service
Amherst	Northampton	B43	3	3
Amherst	Holyoke	B43/B48	3,2	2
		R29	1	1
Amherst	Chicopee	B43/B48/P21	3,2,4	2
		B43/B48/X90	3,2,3	2
		R29/X90	1,3	1
Amherst	Springfield	B43/B48/P20	3,2,3	2
		B43/B48/P21	3,2,3	2
		B43/B48/P21E	3,2,2	2
		R29/P21	1,3	3
Amherst	W. Springfield	B43/B48/P20	3,2,4	2

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Table 4-5 - Travel Service between Origin and Destinations for Northampton

Origin	Destination	Bus Number	Route Level of Service	Trip Level of Service
Northampton	Amherst	B43	3	3
Northampton	Holyoke	B48	2	2
Northampton	Chicopee	B48/X90	2,3	2
		B48/P21	2,3	2
Northampton	Springfield	B48/P20	2,3	2
		B48/P21	2,3	2
		B48/P21E	2,2	2
		B48/X90	2,3	2
Northampton	W. Springfield	B48/P20	2,4	2

Table 4-6 - Travel Service between Origins and Destinations for Holyoke

Origin	Destination	Bus Number	Route Level of Service	Trip Level of Service
Holyoke	Amherst	B48/B43	2,3	2
		R29	1	1
Holyoke	Northampton	B48	2	2
Holyoke	Chicopee	X90	3	3
		P21	3	3
Holyoke	Springfield	X90	3	3
		P20	4	4
		P21	3	3
		P21E	2	2
Holyoke	W. Springfield	P20	4	4

Table 4-7 - Travel Service between Origins and Destinations for Chicopee

Origin	Destination	Bus Number	Route Level of Service	Trip Level of Service
Chicopee	Amherst	P21/R29	3,1	1
		X90/R29	3,1	1
		P21/B48/B43	3,2,3	2
		X90/B48/B43	3,2,3	2
Chicopee	Northampton	P21/B48	3,2	2
		X90/B48	3,2	2
Chicopee	Holyoke	P21	3	3
		X90	3	3
Chicopee	Springfield	P21	3	3
		X90	3	3
		G1	5	5
Chicopee	W. Springfield	G1/P20	5,4	4
		G1/R10	5,2	2
		X90/G3/R10	3,3,2	2
		X90/G3/P20	3,3,4	3
		X90/B7/R10	3,6,2	2
		X90/B7/P20	3,6,4	3

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Table 4-8 - Travel Service between Origins and Destinations for Springfield

Origin	Destination	Bus Number	Route Level of Service	Trip Level of Service
Springfield	Amherst	P20/B48/B43	4,2,3	2
		P21/B48/B43	3,2,3	2
		P21/R29	3,1	1
Springfield	Northampton	P20/B48	4,2	2
		P21/B48	3,2	2
		P21E/B48	2,2	2
Springfield	Holyoke	P20	4	4
		P21	3	3
		P21E	2	2
		X90	3	3
Springfield	Chicopee	X90	3	3
		G1	5	5
		P21	3	3
Springfield	W. Springfield	P20	4	4
		R10	2	2

Table 4-9 - Travel Service between Origins and Destinations for West Springfield

Origin	Destination	Bus Number	Route Level of Service	Trip Level of Service
W. Springfield	Amherst	P20/B48/B43	4,2,3	2
		P20/R29	4,1	1
W. Springfield	Northampton	P20/B48	4,2	2
W. Springfield	Holyoke	P20	4	4
W. Springfield	Chicopee	P20/P21	4,3	3
		P20/X90	4,3	3
		R10/P21	2,3	2
W. Springfield	Springfield	P20	4	4
		R10	2	2

TAZ's that have a proportion of seniors that exceeds that of the regional average are highlighted by the yellow color in the following Figure. Communities with areas that do not fall within 3/4 of a mile from transit route while housing more seniors compared to the region as whole include: Hadley, Hatfield, Westfield, Granby, Ludlow, Wilbraham (Figure 4-10).

The proportion of residents who are disabled is mapped according to two age categories. The first group combines all disable residents of working age between ages of 20 to 64 years old. Figure 4-11 shows that zones with higher proportions of working aged disabled persons are serviced by the regional fixed route buses. On the other hand, some of the zones with disabled elderly, 65 and over, are not

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serviced by the regional fixed route transit network. Those areas are located in the communities of Hatfield, Granby, and Westfield.

Figure 4-10 - Attainability by Transit for the Elderly

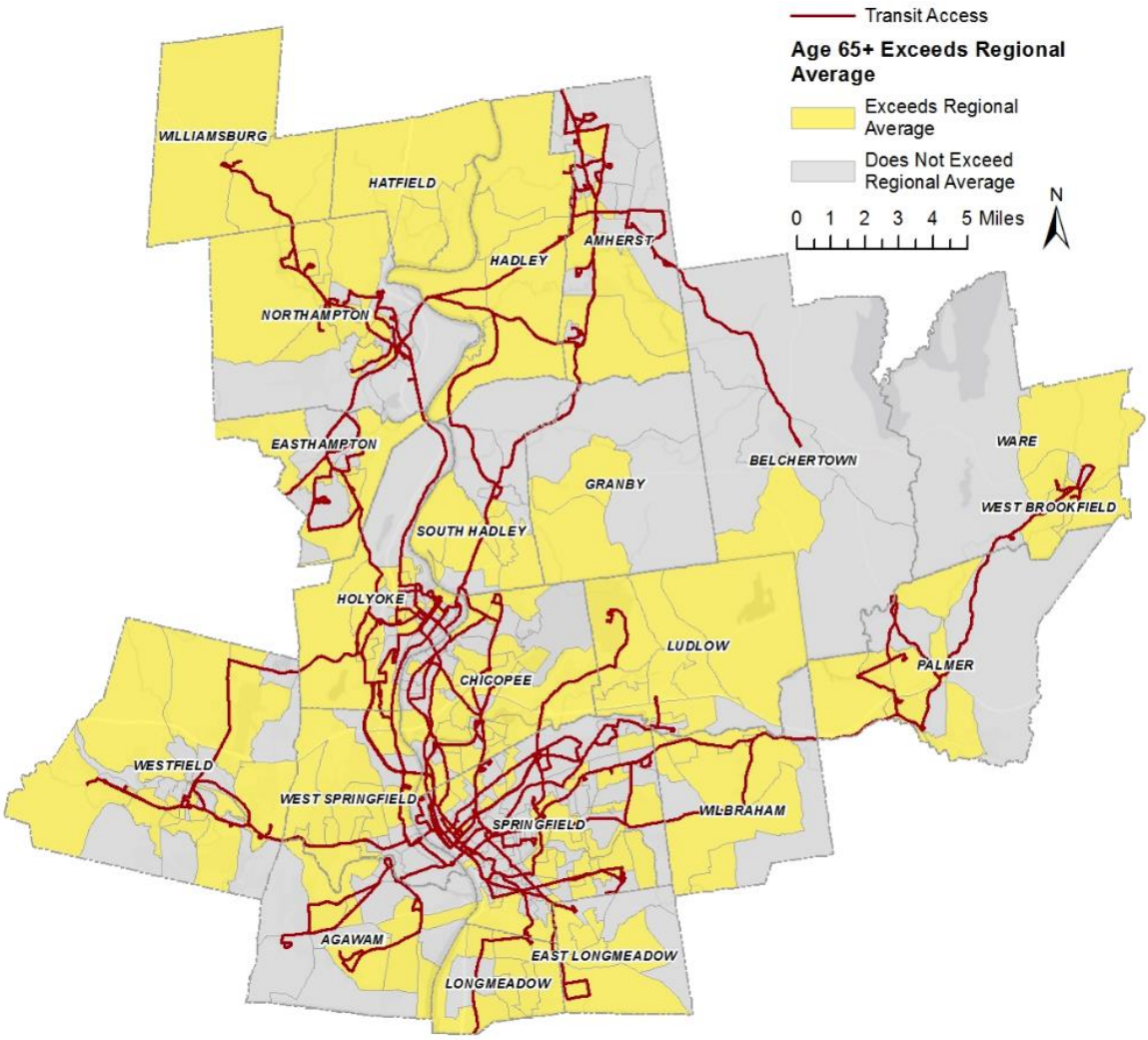


Figure 4-11 - Attainability by Transit for the Disabled Working Age Group

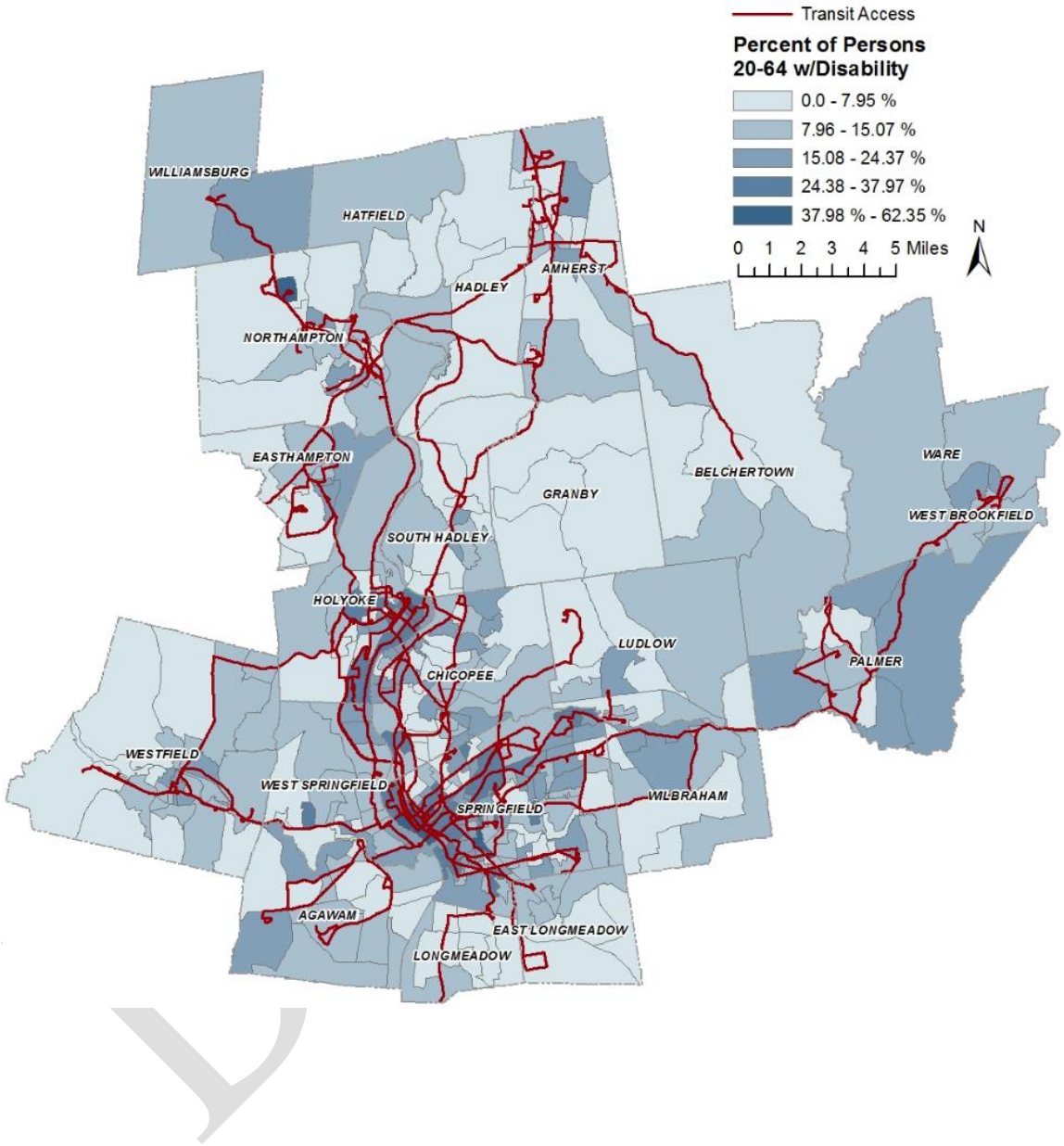
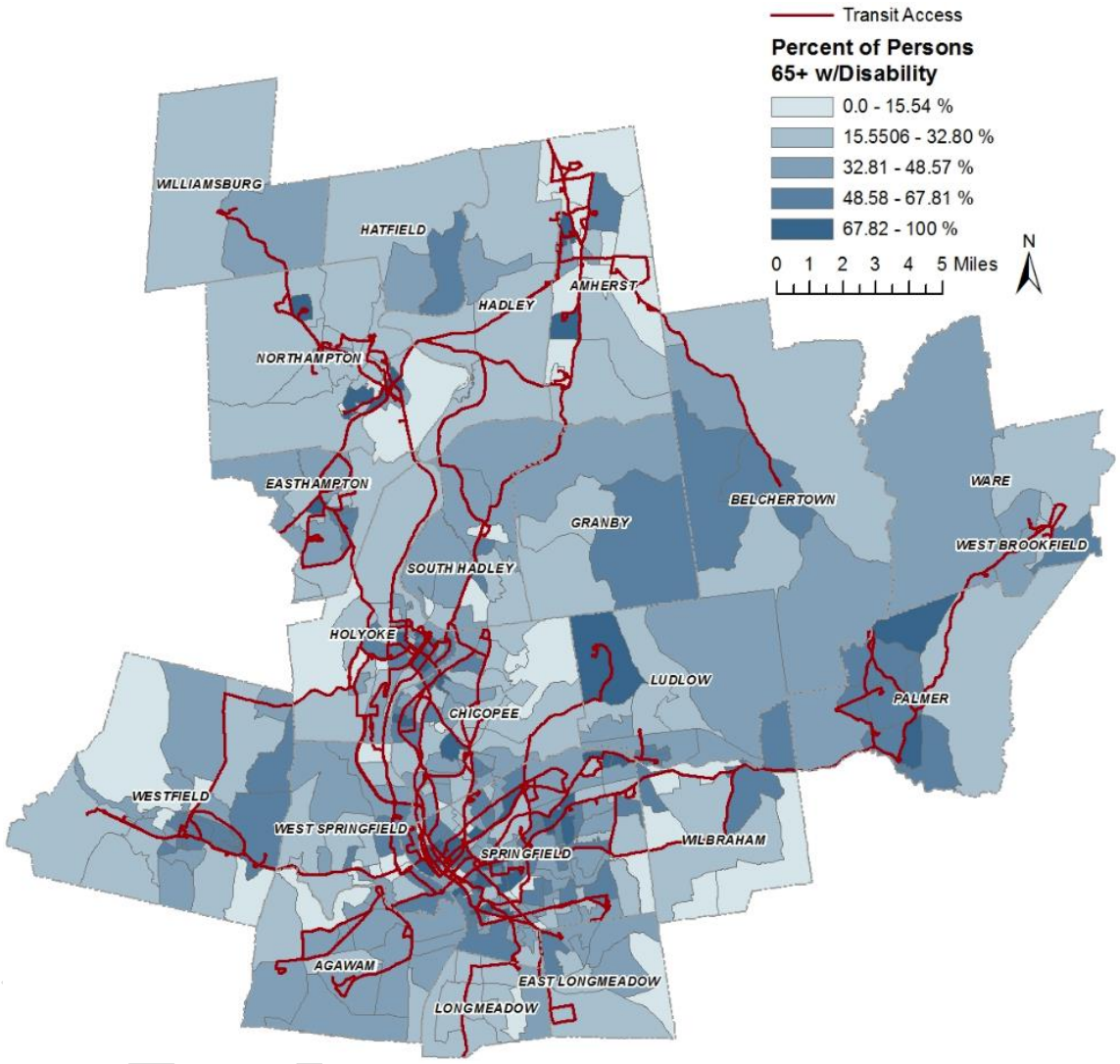


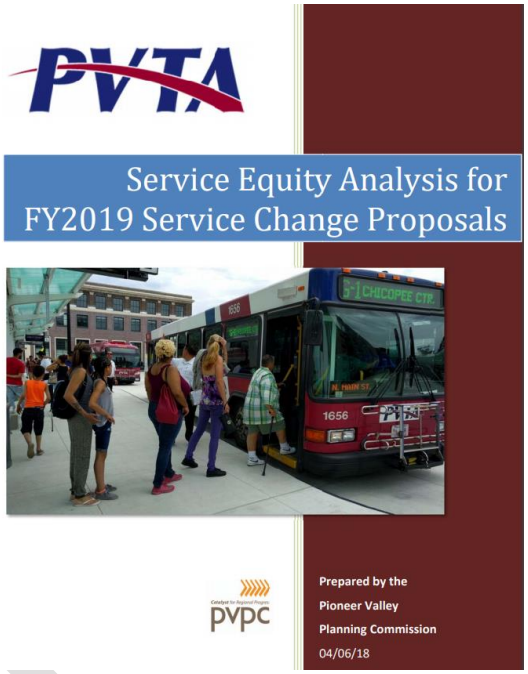
Figure 4-12 - Attainability by Transit for the Disabled Elderly



d) Equity Analysis of PVTA Comprehensive Fare/Service Changes

In 2018 PVPC conducted an equity analysis of proposed changes to the PVTA transit service in the region. This service equity analysis was prepared to meet the requirements of Title VI of the Civil Rights Act of 1964 in 49 CFR Section 21.5(b)(2), 49 CFR Section 21.5(b)(7), and Appendix C Section 3 to 49 CFR part 21, and in accordance with the guidance in Federal Transit Administration Circular 4702.1B of October 1, 2012.

Changes to PVTA's fixed route bus services were necessary to reduce operating costs and balance the agency's FY2019 budget. The equity analysis was designed to determine whether proposed service changes would have a discriminatory impact with regard to race, color, income, or national origin. A demographic analysis of PVTA customers affected completed to determine whether or not there are adverse or disproportionate burdens on minority or low-income populations in the PVTA service area, as well as the types of measures that are likely to be effective and appropriate in mitigating adverse impacts on those transit customers.



A separate Title VI Fare Equity Analysis was completed and presented to the PVTA Advisory Board in April 2018 as required by federal guidelines and PVTA policies.

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 eleven 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 970 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 4-10.

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Table 4-10 – Distribution of UPWP Task by Community by Year

Community	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019*	2020*	Total
Agawam	2	2	2	1	3	1	3	5	5			24
Amherst	4	2	4	4	1	1	1	2	2			21
Belchertown	1	3	1		1	3	2	2	2			15
Blandford	1	1		1		1					1	5
Brimfield		2	3	2	1			1	3	1		13
Chester	1	2	1	1	1			3	1			10
Chesterfield	1						1		1			3
Chicopee	4	1	3	3	3	3	1	2	3	1		24
Cummington	1		1		1		1	1	2	1		8
East Longmeadow	2	2		1	1	1	1	3	3	1		15
Easthampton	3	3	2	1	3	1	1	5	4			23
Goshen	1	1	1		1	1	1	1	2	1		10
Granby		2		3				1			1	7
Granville		1	1	1	1		1		3	1		9
Hadley	1	3	4	2	1	2	1	2	2		1	19
Hampden	1		2		1		1	1	1		1	8
Hatfield				1			1					2
Holland	1	1				1	2	1	2			8
Holyoke	3	5	6	3	3	3	6	6	4	1		40
Huntington	1	1	1	2	1		1		1			8
Longmeadow	3		1	4	2	1	4	2	1	1		19
Ludlow	7	1			2		1	2				13
Middlefield		1										1
Monson	1	1		1				1	1		1	6
Montgomery			1	2	1			1				5
Northampton	7	6	5	7	3	4	5	6	6			49
Palmer	1					3	3	2	2			11
Pelham	1	1		1				1				4
Plainfield	1	1	1	1	1				1	1		7
Region Wide	38	29	33	34	28	30	26	24	26	25	25	318
Russell	1	1	1	1		1						5
South Hadley	3	1	2	4	3	2	1	4	2			22
Southampton	1	1	2	1		1	2	1	1			10
Southwick	6	2	1	2	3	1	2	3	1		1	22
Springfield	8	12	10	6	6	10	14	11	8	3		88
Tolland			1	1	1		1	1	2			7
Wales			1	1			1	2	2			7
Ware	5	2	1	2	2	3	2	2	1		1	21
West Springfield	4	3	2	2	1	1	3	9	2			27
Westfield	1	1	3	3	1		2	5	6			22
Westhampton	2			1	1			1				5
Wilbraham	1		1	1	1		2	1	4			11
Williamsburg	1		3	1	1	1	2	1	2			12
Worthington	1						1	1	2	1		6
Grand Total	121	95	101	102	80	76	97	117	110	38	32	**970**

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3. Pioneer Valley Language Access Plan and Analysis of Language-related U.S. Census Data

The Pioneer Language Access Plan (LAP) Plan was been developed by the Pioneer Valley Planning Commission (PVPC) in consultation with FHWA, FTA and MassDOT. The 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 LAP 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.

The Pioneer Valley Metropolitan Planning Organization (PVMPO) is committed to making the metropolitan transportation planning process as accessible as possible to all people who live within the region. The PVMPO programs the transportation projects that utilize federal and state sources of operating assistance for transit, as well as and capital assistance for transportation and transit projects. Support for LEP outreach and related services are integrated with the planning and development of these projects. The PVMPO actively works to identify programs, activities, and services provided by the MPO that are of importance to the general public, and take reasonable steps to overcome language barriers to these, at no cost to the limited English proficient (LEP) individual. The MPO currently strives to accomplish the following:

- Translate our most vital documents into Spanish, including our notice of civil rights, compliant procedures, and complaint form. We will make a concerted attempt translate any of these documents into other languages upon request.
- Provide flyers, meeting notices, and other announcements in the languages spoken in the affected area.
- Offer to translate meeting materials, upon request.
- Post notices in non-English community newspapers when appropriate.
- Incorporate Google Translate in our website which may be used to translate site materials into multiple languages.
- Provide interpreters, upon request, at public meetings.
- Translated our transit map into Spanish.
- Provided information about PVTA service changes in Spanish.
- Provide information about projects that impact a neighborhood or that may have a significant impact in the languages spoken in the area.
- Translate consent forms, and letters containing information regarding participation in a program when needed.

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The PVMPO has prioritized the following documents considered vital, and has begun the task of providing translations:

- Notice to Beneficiaries (Notice of Civil Rights)
- Title VI Complaint Procedures
- Complaint Form
- Consent Form
- Statement advising of the availability of free language assistance services for LEP individuals in materials routinely disseminated to the public
- Notices of proposed public hearings regarding proposed transportation plans and programs.

The 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.

The PVMPO maintains a database of a written translation and oral interpreter service provider. 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. The staff to the MPO also works to ensure that PVMPO members are aware of the USDOT LEP guidance and support related LEP planning activities

Analysis of demographic data related to the ability to speak English from the 2013-17 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.

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

Total Population	# of People *	% of Total Population
Spanish	26994	4.51%
Other Indo-European Languages	4963	0.83%
Russian, Polish, or other Slavic languages	4449	0.74%
Chinese (incl. Mandarin, Cantonese)	2047	0.34%
Other Asian and Pacific Island languages	1499	0.25%
French, Haitian, or Cajun	1133	0.19%
Vietnamese	1033	0.17%
Arabic	552	0.09%
Korean	552	0.09%
Other and unspecified languages	542	0.09%
German or other West Germanic languages	151	0.03%
Tagalog (incl. Filipino)	107	0.02%

*Speaks English Less than Very Well ACS 2013-17

4. Recommendations from the Language Access Plan (LAP) 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.
- Continue public participation efforts related to the RTP and TIP to include local presentations at special group meetings, neighborhood council meetings, and community activities.
- Continue to follow recommendations related public outreach to LEP populations included in the 2106 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?

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- 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). Based on the measures used for

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the EJ Analysis, the RTP does not have disproportionately high and adverse impacts on low-income and minority populations. 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 2016 the Public Participation Process was modified to 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 Title VI and environmental justice and social equity issues as part of its transportation planning process. PVPC has identified goals to enhance the existing public participation process, 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 all residents in meaningful discussion around transportation issues continues to be a priority of the MPO.

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CHAPTER 5

Photo: North Pleasant Street, Amherst, MA

REGIONAL PROFILE

The Pioneer Valley Region is located in the Midwestern section of Massachusetts. Encompassing the fourth largest metropolitan area in New England, the region consists of 43 cities and towns covering 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.

Unique within the Commonwealth of Massachusetts, the Pioneer Valley region contains a diverse economic base, internationally known educational institutions, and limitless scenic beauty. Prime agricultural land, significant wetlands, and scenic rivers are some of the region's premier natural resources. 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.

A more comprehensive version of Chapter 5 is presented in the Appendix to the RTP.

A. HIGHWAY

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 and Interstate 91, 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.

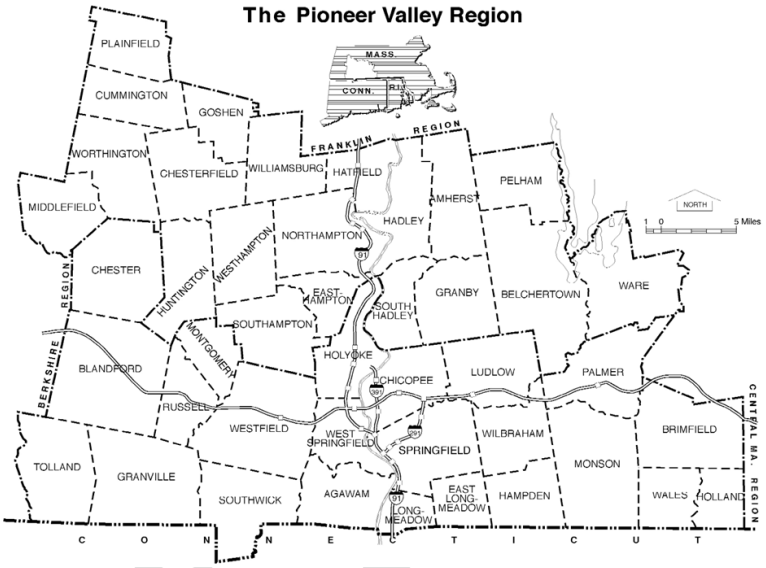


Figure 5-1 – Pioneer Valley Region Map

Regional Highway Statistics

- 4387 Roadway Miles
- 1,360 Federal Aid Eligible Roadway Miles
- 685 Bridges
- 15,331,000 Estimated Daily Vehicle Miles Travelled in 2020.
- 4 Designated Scenic Byways

There are just over 4,387 miles of roadway in the Pioneer Valley region. Roadway functional classification is a framework for identifying the role of a roadway in moving vehicles through the network of highways. Functional classification is based in part on roadway design, speed, capacity and its relationship to existing and future land use development. It is also used to establish funding eligibility. A total of 1,360 miles of regional roads are eligible for federal aid. Local roads, which are not eligible for federal aid comprise approximately 66% of the regional roadway mileage. Cities and towns are responsible for the maintenance of 82% of regional roadway miles.

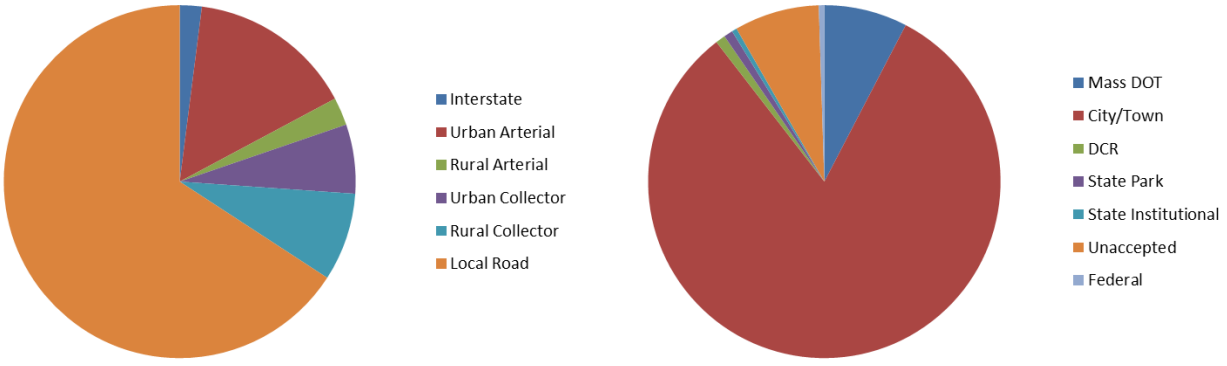


Figure 5-2 – Pioneer Valley Roadway Functional Classification and Jurisdiction

B. PASSENGER TRANSPORTATION

The Pioneer Valley provides an extensive transit system that offers many different modes of public transportation. Intra-county and Intercity buses, passenger rail service, van service for seniors and disabled riders, ridesharing, and park and ride lots are all vital to the mobility of the regions residents.

1. Pioneer Valley Transit Authority (PVTA)

- Largest regional transit authority in Massachusetts
- Serves 24 communities
- 189 vehicle fixed route fleet
  - 3 electric
- 42 fixed bus routes
- 2018 fixed route ridership of 10,902,207 (down 4.9%)
- 142 van paratransit fleet
- 2018 paratransit ridership of 291,932 (down 1.9%)

PVTA's service area begins at the Connecticut state line and stretches north to Leverett, MA. PVTA serves 24 communities with a total population of 561,952 (2017 U.S. Census estimate). A 2015/16 passenger survey found that 55.1% of PVTA riders use the bus to commute to work or school. A total of 71.5% of riders report earning less than $20,000 per year and 68% of riders say they have no other way to make their trip other than using PVTA.

Figure 5-3– PVTA Communities and Bus Routes

a) Paratransit Service

Paratransit is demand response door-to-door van service that is scheduled by the rider. 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.

In addition to the PVTA, the Franklin Regional Transit Authority (FRTA) provides paratransit service under contract to 14 towns in the region. Councils on Aging (COAs) and Senior Centers in

the region also provide transportation to their senior residents. Days, hours of operations, fares and service frequency vary by town. Massachusetts has 3 Regional Coordinating Councils (RCC) formed under Executive Order 530 to enhance the efficiency of community and paratransit transportation services, raise awareness, report unmet needs, and develop regional priorities.

- Services providers:
  - PVTA
  - FRTA
  - COAs/Senior Centers
- 3 Regional Coordinating Councils
  - Pioneer Valley
  - Hilltown
  - Quaboag Valley

2. Other Transit Services

The Pioneer Valley is served by a number of other providers such as 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 four bus terminals and other stops in the region. The Pioneer Valley also has a number of facilities, organizations and programs to help people share rides. The region has 3 designated and many informal park and ride lots where people may leave their car to board a bus or join a carpool.

Bus Terminals
- Springfield Union Station
- Northampton Bus Terminal
- Holyoke Transportation Center
- Olver Transit Pavilion

Commercial Carriers
- Peter Pan Bus Lines
- Greyhound Lines, Inc.
- Private Van Service
- Charter Tour Service
- Taxis
- Uber/Lyft

Ridesharing
- Bay State Commute
- UMass Rideshare
- Private ride matching sites
- ZipCar

Park and Ride
- Sheldon Field, Northampton
- Veteran's Administration, Northampton
- Massachusetts Turnpike Exit #7 - Ludlow

3. Passenger Rail

The Springfield Union Station is currently served by 24trains daily providing service in the northeastern U.S. and connections nationwide. Passenger rail service is provided on both East-West routes and North-South routes in the region.

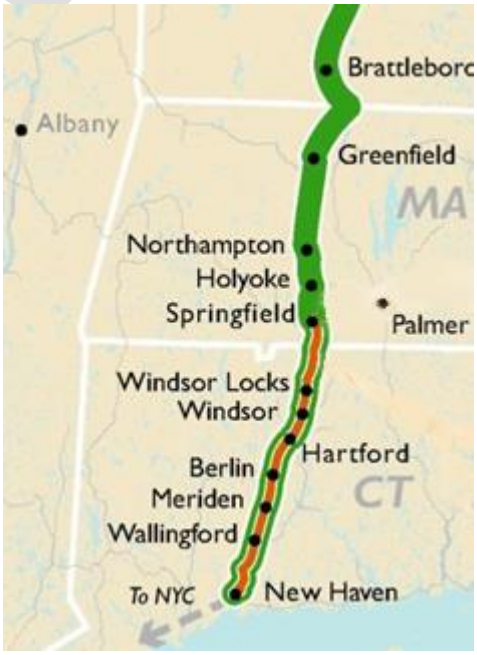
Photo: Springfield Amtrak Service

North/South Rail Service
- Amtrak and CTRail
- 11 arrivals/11 departures
  - 4 CTRail
  - 6 Amtrak
  - 1 Vermonter
- 28,000 riders in 2017

East/West Rail Service
- Lake Shore Limited
  - Chicago to Boston
- MassDOT Study examining service from Boston to Springfield and Pittsfield

Passenger Rail Terminals
- Springfield Union Station
- Holyoke
- Northampton

Most trains in Springfield operate south to New Haven as either Amtrak or CTRail trains. Amtrak provides daily through service on the Vermonter between St. Albans Vermont and Washington D.C., with major stops at Springfield, Hartford, New York City and Philadelphia. The highest ridership origin-destination pair along the Vermonter route is Northampton, MA to New York City, NY averaging over 900 riders per year.



Map: Connecticut River Line

Service on the Connecticut River Line is very successful with a 2017 annual ridership of nearly 28,000. Based off this success, 4 new trips per day are planned between Greenfield and Springfield. This new service will debut as a pilot program in the summerof2019.

A long distance train, the *Lake Shore Limited* serves Springfield by providing daily service between Chicago and Boston. The Pioneer Valley's East-West service is limited by control over the track by the host freight railroad CSX.

In December of 2018, MassDOT began a study to examine the feasibility of implementing passenger rail service from Boston to Springfield and Pittsfield. The study will assess up to six alternatives, including high speed rail and potential infill stations.

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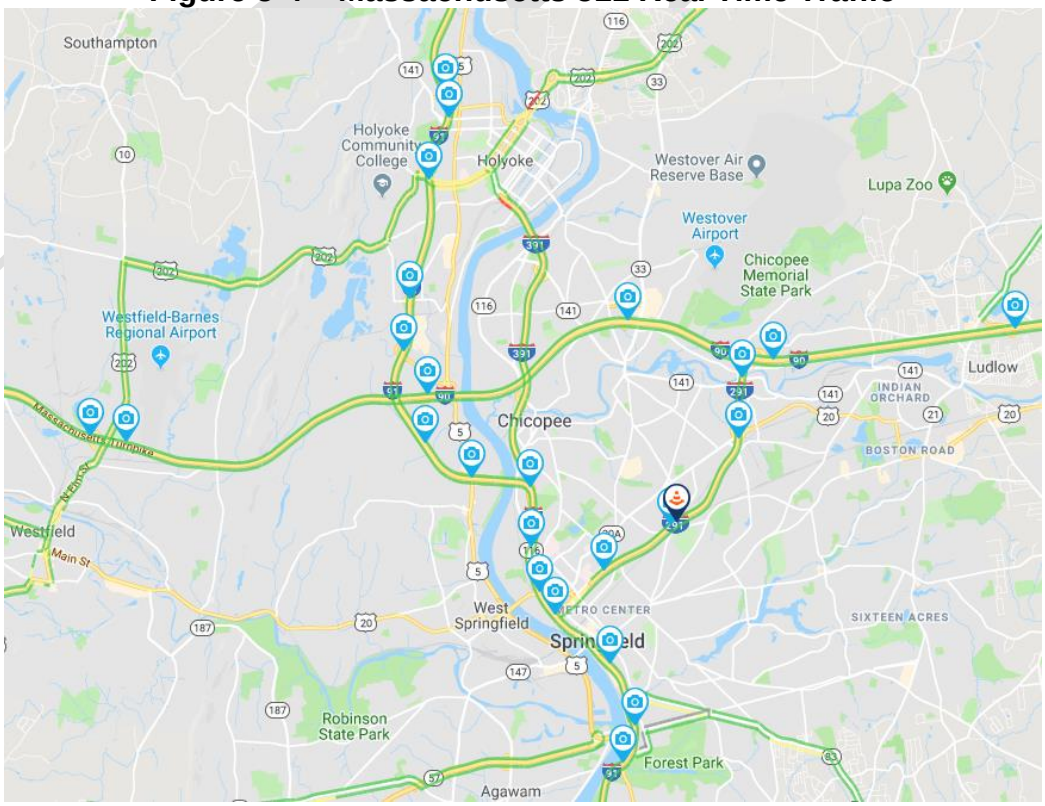
C. INTELLIGENT TRANSPORTATION SYSTEMS

Intelligent Transportation Systems (ITS) utilizes technology in traffic control, communications, computer hardware and software to improve the performance of an existing transportation system. The dissemination of real-time travel information improves safety and efficiency while reducing congestion.

The ITS infrastructure is continually expanding in the region. Interstate 90, 90 and 291 have a network of cameras and variable message signs to assist in incident management. PVTA vehicles are equipped with technology to allow real time tracking of the fleet. The Massachusetts Turnpike converted to all electronic tolling in October of 2018. MassDOT also works with communities to include ITS technology in future roadway improvement projects.

- I-91/I-90
  - Closed circuit cameras
  - Variable message signs
  - Linked to MassDOT and Mass State Police
- PVTA
  - ITS equipped vehicles
  - Automatic counters
  - Automatic announcements
  - Real-time bus tracker
- Massachusetts 511
- Real Time Traffic Management
  - Live travel time information
- Smart Work Zones
  - Efficient construction areas
- EZDriveMA
  - All electronic tolling

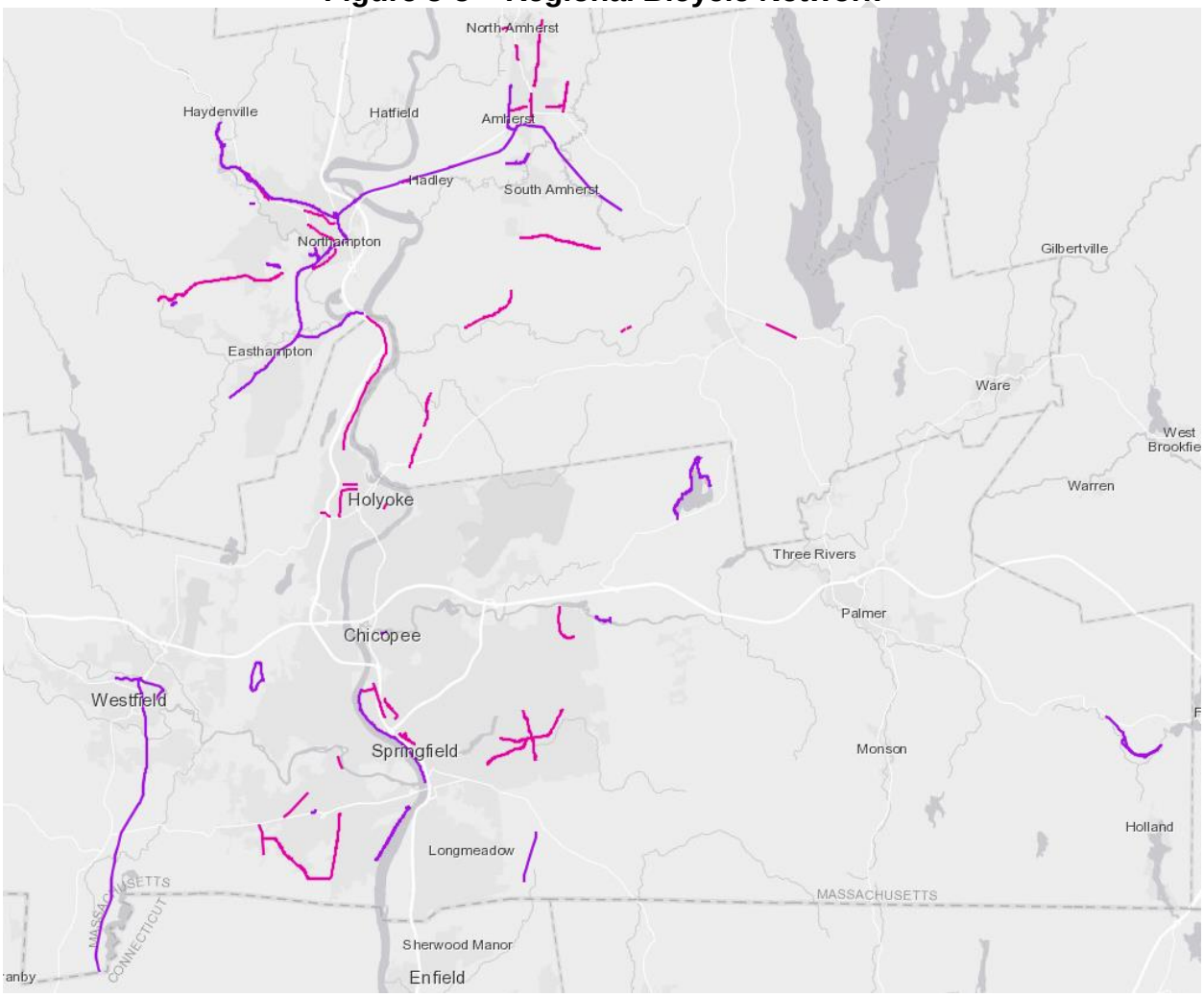
Figure 5-4 – Massachusetts 511 Real Time Traffic



D. 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 the 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.

Figure 5-5 – Regional Bicycle Network



Currently seventeen communities provide over 90 miles of bicycle lanes, multi-use paths or “rail trails” in the region. Eleven communities provide 45 miles of designated on-road bicycle facilities. The Pioneer Valley Transit Authority supports a popular “Rack and Roll” bikes-on-buses program for the entire region. All fixed route buses are equipped with bicycle racks.

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

Bicycle Network

- 90+ mile network across 17 communities.
- 45 miles of on-road lanes
- 2019 = 20th year of Bike Week
- ValleyBike regional bike share
  - 55 Stations
  - 6 communities
  - 550 electric assist bikes
  - 26,353 trips in 2018
- Bike racks on all fixed route transit vehicles
  - 62,778 uses in 2017

Pedestrian Network

- Varies by community
- More comprehensive in downtown and village centers
- Massachusetts Safe Routes to School Program
  - 83 participating schools

Complete Streets Program

- 38 communities participating
- 18 advancing requirements
- 12 adopted policies

are generally clustered together and connected by a pedestrian network which is often more accessible and efficient than the vehicle network. Sidewalks are the most common infrastructure feature devoted to pedestrian circulation. The provision of sidewalks in the region varies with respect to location, quality and function.

Photo: South Maple Street crossing in Hadley, MA

The Massachusetts Safe Routes to School program promotes healthy alternatives for children and parents in their travel to and from school. A total of 83 schools in the Pioneer Valley activity participate in the program. Benefits include education on the value of walking and bicycling and funding for sidewalks, crosswalks, and traffic calming measures.

The Pioneer Valley MPO funded $1.3 million using the federal Congestion Mitigation and Air Quality program in 2017 for Valley Bike, a docked bicycle sharing system in Amherst (including the University of Massachusetts), Holyoke, Northampton, South Hadley, and Springfield. Valley Bike launched in the spring of 2018 and will expand into the City of Easthampton in 2019. All total, 550 electrically assisted bicycles are deployed at 55 stations.

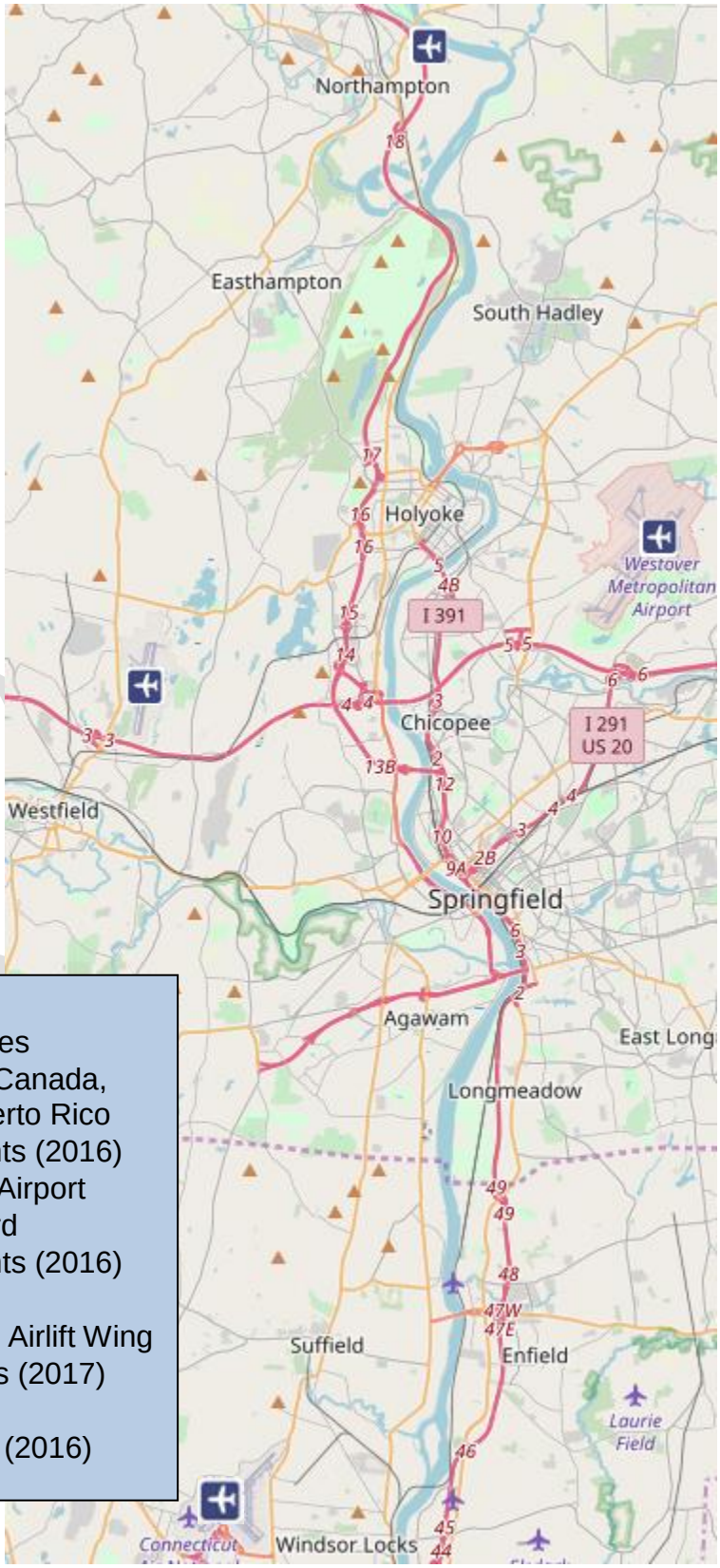
Month	Rides	Avg. Distance	Avg. Rides/Bike
June	98	2.2	1.0
July	2836	3.6	30.2
August	7369	3.8	31.1
September	9889	3.0	65.1
October	4404	2.3	29.2
November	1757	2.0	8.7
Total	26353	3.1	157.8

Table 5-1 – ValleyBike Monthly Ridership

E. 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. The largest airport the Pioneer Valley region is the Westover Air Reserve Base and Metropolitan Airport facility in Chicopee and Ludlow. The Westfield-Barnes Airport is located in the City of Westfield and is a general aviation facility that also houses the Air National Guard 104th Tactical Fighter Group. The Northampton Airport is a small privately owned airport serving both business and recreational uses.

- Bradley International Airport
  - Served by 9 major airlines
  - International service to Canada, Ireland, Mexico and Puerto Rico
  - Averaged 256 daily flights (2016)
- Westfield Barnes Municipal Airport
  - Mass. Air National Guard
  - Averaged 113 daily flights (2016)
- Westover Air Reserve Base
  - Air Force Reserve 439th Airlift Wing
  - Averaged 54 daily flights (2017)
- Northampton Airport
  - Averaged 85 flights/day (2016)



Map: Pioneer Valley Airports

F. TRANSPORTATION OF GOODS

Trucking
- Dominant mode for freight
- Small, private carriers
- Shortage of truck rest areas

Rail Carriers
- CSX Transportation
  - Terminal in West Springfield
- Pan AM Southern Railways
- New England Central
- Pioneer Valley Railroad
- MassCentral Railroad

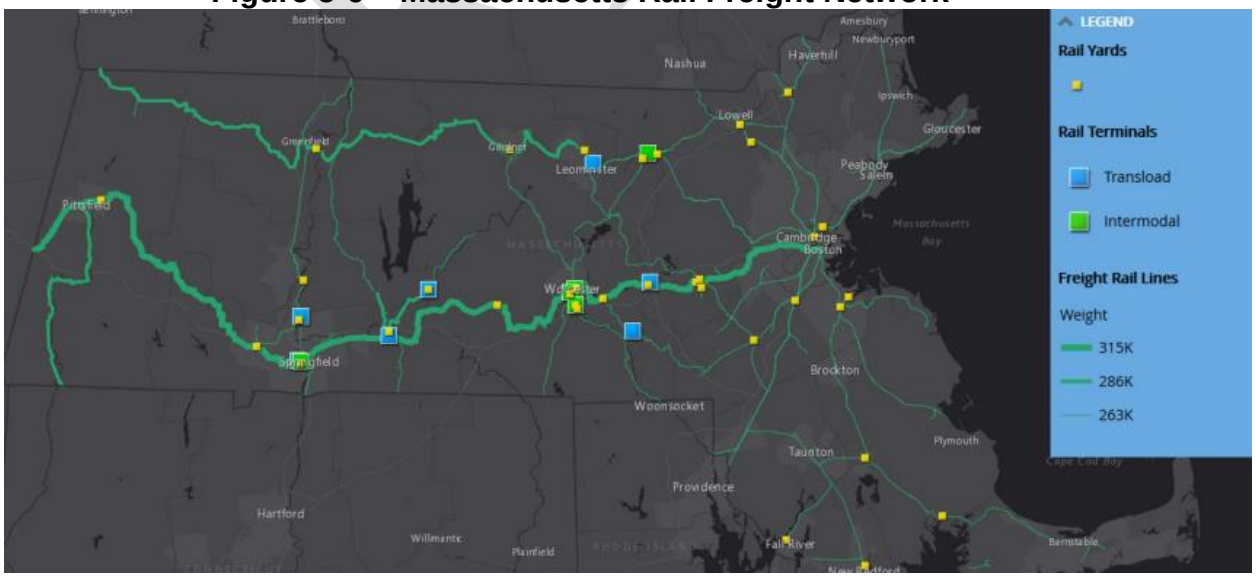
Air Freight
- No major regional facilities
  - Typically shipped through Logan and Bradley airports

Pipeline
- Natural Gas
- Jet Fuel
- Gas, Kerosene, Distillates

The major interstates and rail lines in the Pioneer Valley Region enable the quick delivery of goods to some of the nation's largest cities. The proximity of the region to major and middle sized cities allows goods from the Pioneer Valley to be quickly transported to competitive markets. Freight is moved in and out of the Pioneer Valley primarily by truck with rail, air and pipeline carrying the remaining goods.

Map: 2011 Freight Flows

Figure 5-6 – Massachusetts Rail Freight Network



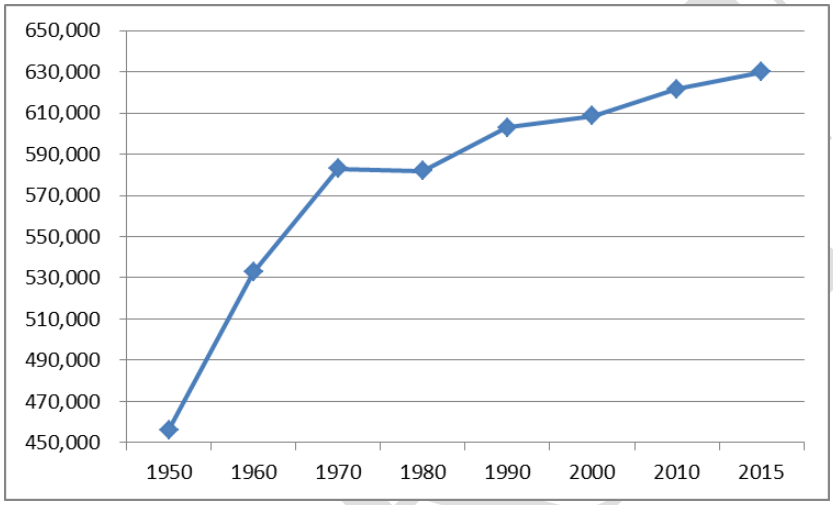
Source: Massachusetts Freight Plan

G. DEMOGRAPHICS

Demographic data was developed for the RTP by the PVPC Data section using the latest information available from sources such as the US Census Bureau, American Community Survey (ACS), U.S. Bureau of Economic Analysis, Massachusetts Department of Revenue, and Massachusetts Department of Employment and Training. For more information, please visit the Pioneer Valley Data Portal at http://pioneervalleydata.org/.

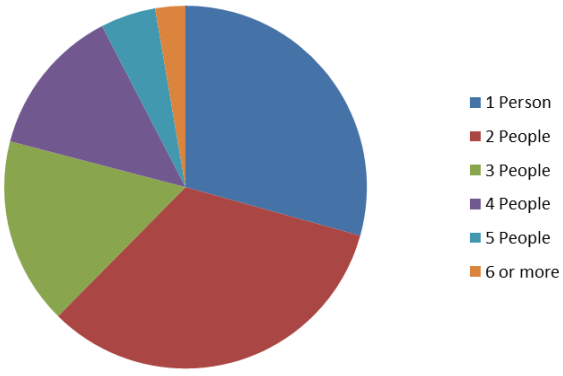
- 2017 population = 630,385
  - Up 1.4% from 2010
- 2017 regional households = 237,713
- 2017 total employment = 273,376
- Median household income = $55,666
- 2015 registered vehicles = 489,999

Figure 5-7 - Population Change 1950 - 2015



The regional population continues to grow at a steady rate. Between 2000 and 2010, the region's population grew by 2.4%. Population growth is a direct result of foreign immigration as the region has steady trend of domestic migration to other parts of the country the last several years.

Figure 5-8 – 2017 Households by Size



Information from the US Census shows a total of 237,713 households in the region in 2017, nearly a 1% increase from 2010. Overall household size is decreasing. Only 20% of all households report a size of four or more. Over 62% of all households are comprised of 1 or 2 occupants.

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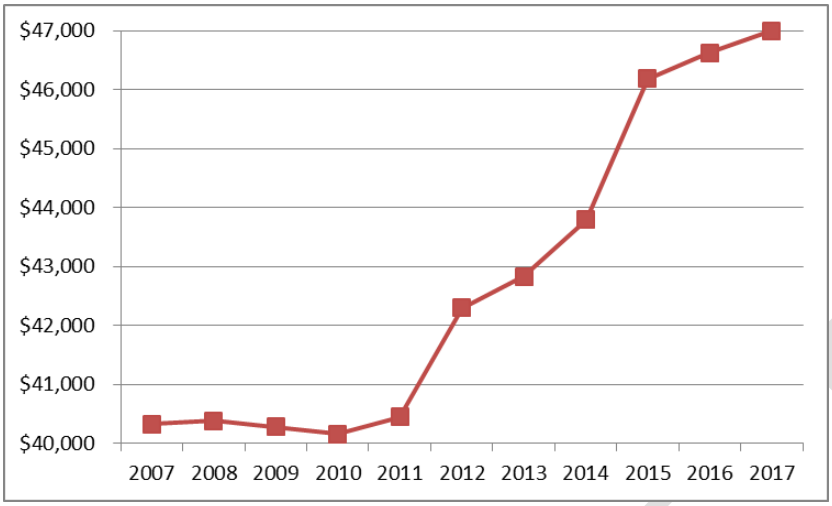
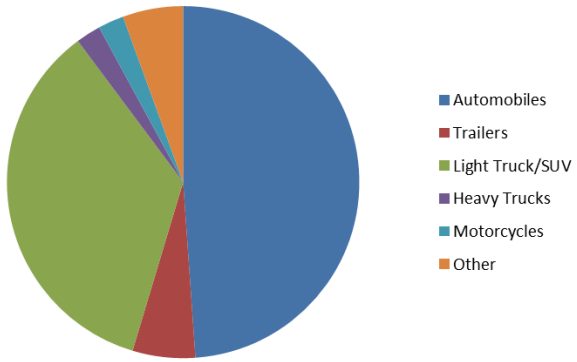
Figure 5-9 - Per Capita Income Change 2007 - 2017



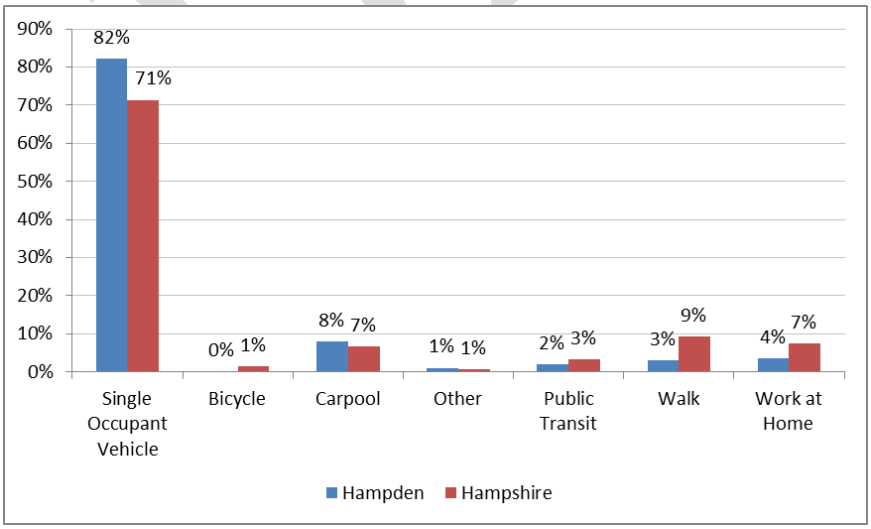
Per capita income in the Pioneer Valley region, has been increasing steadily. Despite two recessions in the 2000s, per capita wages continue to increase. The largest increases occurred between 2011 and 2012 and 2014 and 2015. All total, per capita income has grown by nearly $7,000 since 2011.

Figure 5-10 – 2015 Vehicle Registration



Based on 2015 data, a total of 489,999 vehicles, or approximately 0.78 vehicles per person were registered in the Pioneer Valley. Between 2000 and 2015, automobile registrations dropped by over 23 percent. Light trucks and SUVs registrations continue to grow and comprise over one-third of registered vehicles. The City of Springfield has the most registered vehicles with 90,493. This translates to 18.5 percent of all registered vehicles.

Figure 5-11 –Employment Mode of Travel by County



The mode share differences between Hampden and Hampshire Counties are significant but both skew towards single occupant vehicles. More commuters walk, bicycle or take public transit in Hampshire County potentially due to the large student population in the Five College area.

CHAPTER 6

Photo: East Longmeadow Rotary

SAFETY

Transportation Safety is one of the primary emphasis areas of the Pioneer Valley Metropolitan Planning Organization. The Pioneer Valley Planning Commission works in cooperation with MassDOT to identify and prioritize transportation projects that improve traffic safety in the region. The PVPC also provides assistance to local communities to increase safety at locations with a history of crashes.

A. HIGHWAY SAFETY IMPROVEMENT PROGRAM

The Highway Safety Improvement Program (HSIP) is a core Federal-aid program which aims to reduce traffic fatalities and serious injuries on all public roads. The HSIP was established under the SAFETEA-LU legislation and continued under MAP-21. It consists of three main components, the Strategic Highway Safety Plan (SHSP), State HSIP or program of highway safety improvement projects and the Railway-Highway Crossing Program (RHCP).

To receive HSIP funds, a State must:

- Produce a program of projects or strategies to reduce identified safety problems.
- Develop, implement, and update a SHSP.
- Evaluate the SHSP on a regular basis.

Table 6-1 – Projects Advertised under HSIP

Year	Community - Project Description
2015	Hadley- Signal & Intersection Improvements at Route 9 (Russell Street) & Route 47 (Middle Street)
2016	Springfield- Signal & Intersection Improvements at Roosevelt Avenue, Island Pond Road, and Alden
2017	Ludlow- Reconstruction of Center Street (Route 21)
2019	Chicopee- Signal & Intersection Improvements at 13 Intersections along Route 33 Memorial Drive
2019	Springfield- Intersection Improvements at Bay Street and Berkshire Avenue

Source MassDOT

B. STRATEGIC HIGHWAY SAFETY PLAN

A Strategic Highway Safety Plan (SHSP) is a major component and requirement of the Federal Highway Safety Improvement Program (HSIP). It is a statewide-coordinated safety plan that provides a comprehensive framework for reducing highway fatalities and serious injuries on all public roads. The SHSP identifies a State's key safety needs and guides investment decisions towards strategies and countermeasures with the most potential to save lives and prevent injuries.

MassDOT developed the Massachusetts SHSP in a cooperative process with Federal, State, local, private, and public sector safety stakeholders. The SHSP is a data-driven, strategic plan that integrates the four E's: engineering, education, enforcement and emergency medical services (EMS).

Since the first Massachusetts SHSP was prepared in 2006, highway fatalities have dropped by 19% and serious injuries have dropped by 44%. Massachusetts updated the Plan in 2013, completed a second revision in December 2018 and is now actively implementing the strategies included in the SHSP. The Pioneer Valley Planning Commission works in cooperation with MassDOT to achieve the regional targets and goals set in the SHSP.

1. 2018 Update to the SHSP

The latest update to the SHSP has the:

Vision: A roadway system with zero roadway deaths and serious injuries.

Mission: To work collaboratively on strategies that will reduce roadway fatalities and serious injuries.

Goal: Zero roadway fatalities and serious injuries gradually. By year 2022, the SHSP interim goal is to reduce the five-year average fatalities by 12% and serious injuries by 21%.

a) Emphasis Areas

In order to meet these SHSP target, a multidisciplinary team of policymakers, advocates and practitioners has prioritized a set of data-driven strategies associated with 14 emphasis areas (EAs) to address the causes of crashes in Massachusetts. These EAs are outlined by annual fatality average:

- Lane Departure Crashes [198]
- Impaired Driving [124]
- Occupant Protection [102]
- Speeding and Aggressive Driving [97]
- Intersection Crashes [96]
- Pedestrians [80]
- Older Drivers [74]
- Motorcycle Crashes [49]
- Younger Drivers [41]
- Large Truck-Involved Crashes [34]
- Driver Distraction [30]
- Bicyclists [10]
- Safety of Persons Working on Roadways [2]
- At-Grade Rail Crossings [1]

b) Legislative Policies

The SHSP proposes that Massachusetts consider six high-leverage policies to reduce the frequency and severity of roadway fatalities. These legislative measures target the most predominant types of crashes and address the contributing factors such as speeding, driver distraction, and impaired driving.

Hands Free: Would allow police to stop and issue citations to motorists using mobile electronic devices while operating a vehicle.

Primary Seat Belt: Would enable law enforcement to stop motorists who appear to not be wearing seatbelts while operating a vehicle.

Work Zone Safety: Would enable variable speed limits in work zones and increase penalties for motorists who strike roadway workers.

Ignition Interlock for All Offenders: Would statutorily allow judges to order ignition interlock devices for first time Operating Under the Influence offenders.

Truck Side Guards: Would require that trucks registered in Massachusetts, meeting certain criteria, have side guards.

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Automated Enforcement: Would give municipalities "opt in" authority to issue citations through the use of cameras and radar technology.

c) Overview of the Plan

The SHSP reflects the efforts of 250 stakeholders from more than 50 partner agencies. The outcome of their work is an implementation plan that includes 61 specific strategies, 283 direct actions and 5 legislative proposals to move Massachusetts closer towards zero deaths and to an interim goal of a 12% drop in five-year average fatalities and a 21% drop in five-year average serious injuries.

The latest update to the SHSP can be downloaded at:

https://www.mass.gov/files/documents/2019/01/18/dot_SHSP_2018.pdf

2. Role of Pioneer Valley Metropolitan Planning

The Pioneer Valley Metropolitan Planning Organization is responsible for providing support to MassDOT to achieve the SHSP targets. Regional Planning Agencies (RPAs) and MPOs are identified as responsible agencies for 23 strategies included in the SHSP.

PVPC has developed specific safety criteria as part of its Transportation Evaluation Criteria (TEC) in compliance with the goals and objectives set forth in the SHSP. More information is available through this link:http://www.pvpc.org/projects/transportation-evaluation-criteria-information-center. The regional needs and strategies for the RTP Emphasis Area of Safety are also based on the Action Plans proposed in the SHSP and included in Chapter 14.

a) Roadway Safety Audit

A Road Safety Audit (RSA) is a formal safety review of an existing, or planned road or intersection. During the audit, an independent, multidisciplinary team identifies potential safety issues and opportunities for safety improvements.

RSAs have become an important part of the HSIP. An RSA is required for HSIP eligible projects. PVPC participates in all RSAs in the region. 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. Since 2015, 30 RSAs have been conducted in the Pioneer Valley Region. Copies of RSA reports can be obtained from the MassDOT website at: https://gis.massdot.state.ma.us/roadsafetyaudits/.

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Table 6-2 –Roadway Safety Audits by Community

No.	Community	Number of RSAs
1	Agawam	1
2	Amherst	1
3	Chicopee	2
4	Holyoke	3
5	South Hadley	1
6	Springfield	15
7	Ware	1
8	West Springfield	2
9	Westfield	4
	Total	**30**

Source: MassDOT

C. EXISTING CONDITIONS

The following section provides an update to the existing traffic safety condition in the region.

1. Massachusetts Crash Data

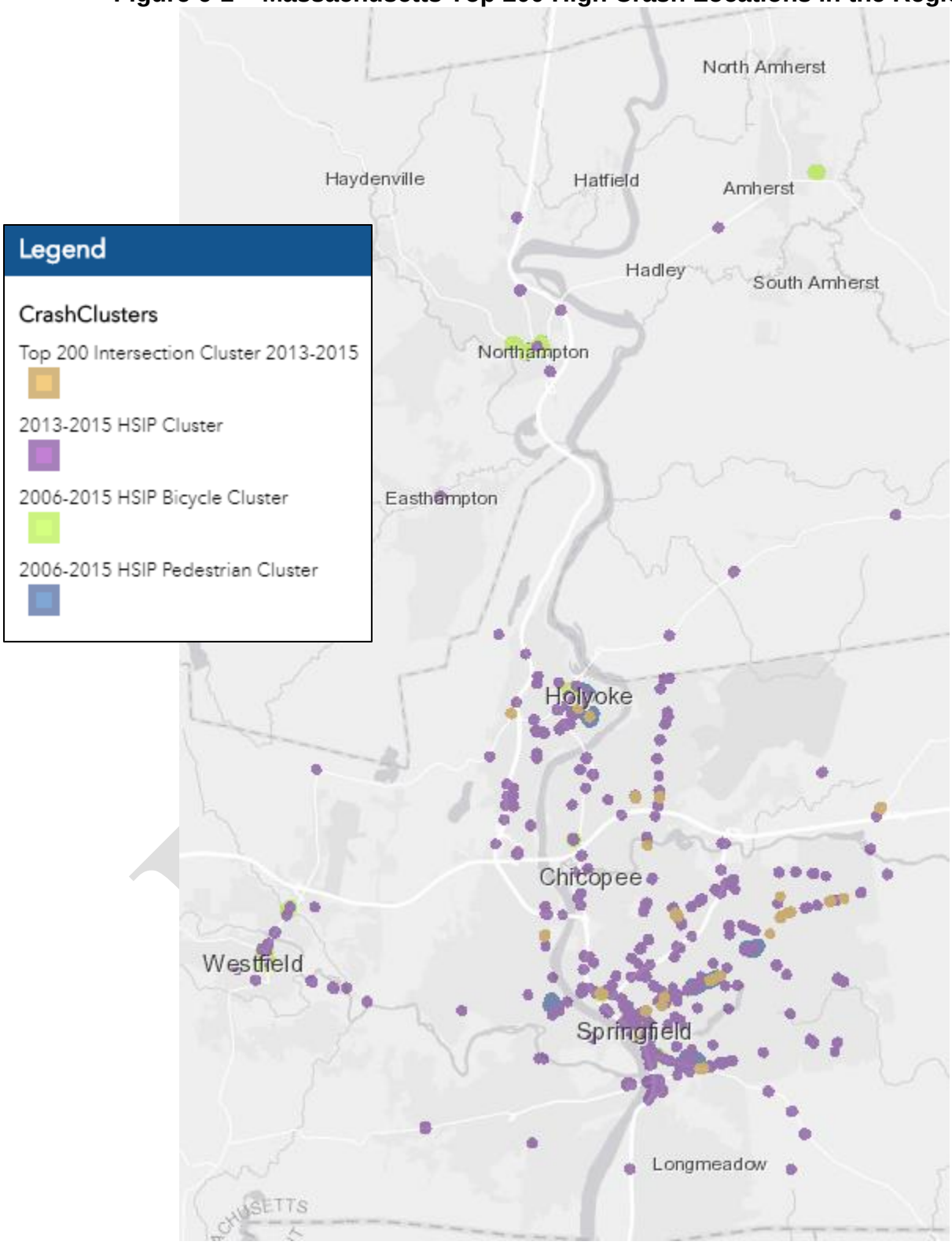
MassDOT publishes and updates a report which summarizes the top 200 high crash locations in the state. The most recent report is based on reported crashes from 2014 – 2016. This report is based on aa new methodology of ranking the crash clusters. The report can be accessed at: https://www.mass.gov/files/documents/2019/03/01/dot-2016TopCrashLocationsRpt.pdf

A total of 28 locations from Hampshire and Hampden counties were included in the most recent version of this report. The City of Springfield has 21 of the 28 locations. A large crash cluster identified in the document in the vicinity of the Holyoke Mall in the City of Holyoke is likely a result of crashes occurring on private property that are incorrectly assigned to a local intersection.

2. Regional 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 police departments to analyze and evaluate safety problems at different locations in the region. 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 6-3. 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.

Figure 6-1 – Massachusetts Top 200 High Crash Locations in the Region



Source: MassDOT

The City of Springfield experienced the highest number of crashes (29,371) over the ten year period while the City of Holyoke experienced the highest number of average annual crashes per roadway mile (9.8). The City of Springfield was under reporting its crash data until the year 2011. As a result the number of crashes in the city increased significantly after that period. The Pioneer Valley experienced a 3.2% increase in the number of reported crashes between the calendar years of 2015 and 2016.

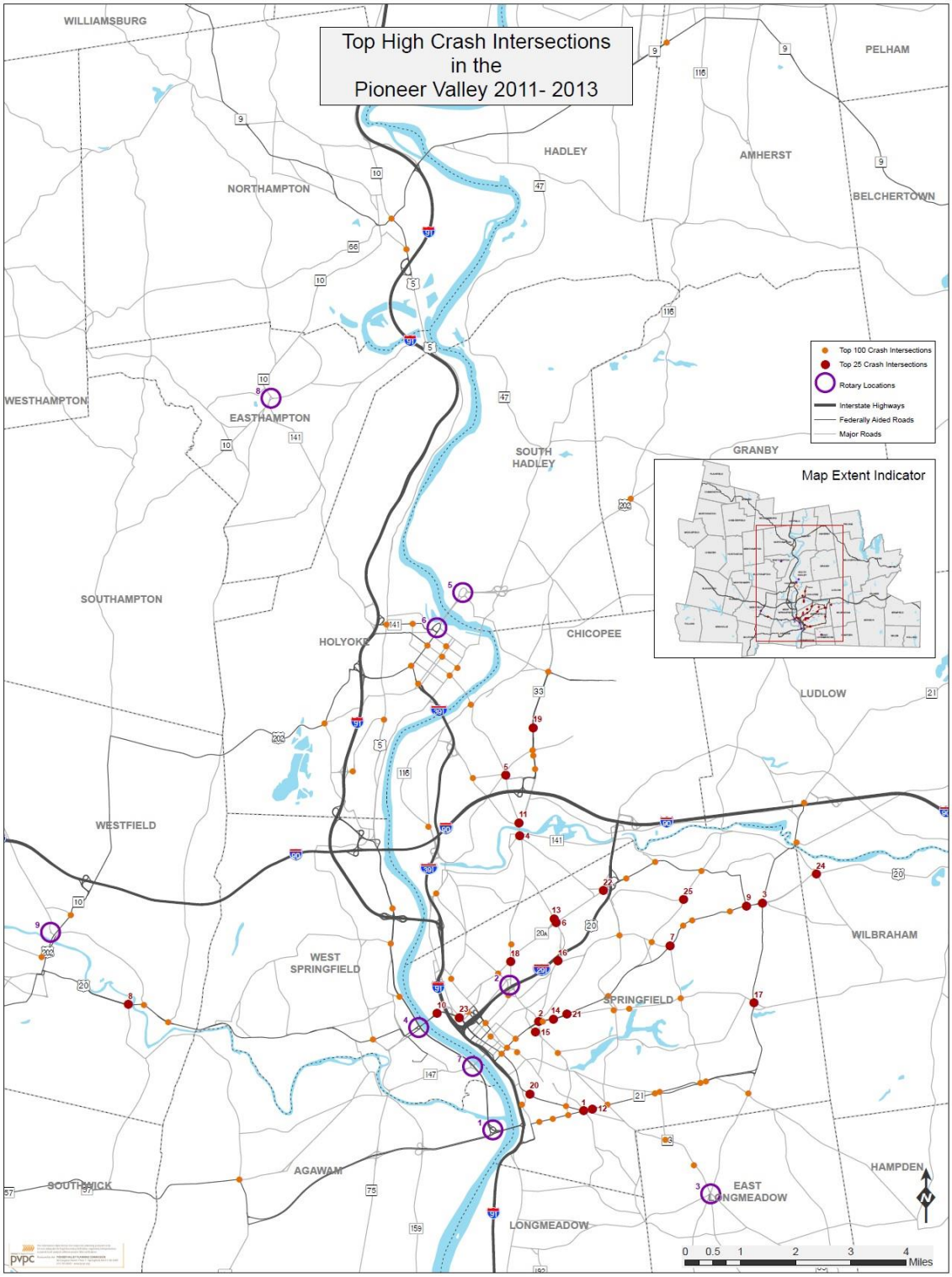
Table 6-3 – Ten Year Community Crash History

No.	Community	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total Crashes	Average Crashes per year	Average Crashes per mile
1	AGAWAM	603	586	513	564	541	494	480	505	554	589	**5,429**	**543**	**3.61**
2	AMHERST	218	182	92	443	450	390	276	368	430	407	**3,256**	**326**	**2.40**
3	BELCHERTOWN	215	221	259	229	228	230	208	261	254	226	**2,331**	**233**	**1.50**
4	BLANDFORD	72	70	58	76	76	77	55	67	53	66	**670**	**67**	**0.75**
5	BRIMFIELD	68	85	43	57	74	77	55	46	58	114	**677**	**68**	**0.85**
6	CHESTER	17	16	9	18	13	12	15	15	17	13	**145**	**15**	**0.22**
7	CHESTERFIELD	11	9	9	3	11	19	17	9	5	17	**110**	**11**	**0.19**
8	CHICOPEE	1,624	1,471	1,445	1,437	1,502	1,390	1,351	1,425	1,854	1,908	**15,407**	**1,541**	**5.92**
9	CUMMINGTON	11	9	3	3	0	4	2	4	7	3	**46**	**5**	**0.07**
10	EAST LONGMEADOW	452	452	444	388	446	384	384	402	391	375	**4,118**	**412**	**4.38**
11	EASTHAMPTON	135	124	78	286	274	303	277	293	282	334	**2,386**	**239**	**2.70**
12	GOSHEN	23	17	6	11	18	14	10	18	20	13	**150**	**15**	**0.34**
13	GRANBY	150	165	136	116	138	166	168	154	173	210	**1,576**	**158**	**2.33**
14	GRANVILLE	18	22	10	22	18	12	10	9	10	6	**137**	**14**	**0.19**
15	HADLEY	388	318	324	266	256	290	267	263	399	461	**3,232**	**323**	**3.88**
16	HAMPDEN	55	63	39	55	47	37	68	59	57	54	**534**	**53**	**0.99**
17	HATFIELD	50	32	19	35	36	29	25	23	18	30	**297**	**30**	**0.50**
18	HOLLAND	5	7	10	12	6	9	10	9	7	8	**83**	**8**	**0.22**
19	HOLYOKE	1,342	1,654	1,702	1,705	2,054	1,636	1,673	1,707	1,771	1,783	**17,027**	**1,703**	**9.81**
20	HUNTINGTON	13	19	21	22	19	21	14	12	28	25	**194**	**19**	**0.36**
21	LONGMEADOW	284	238	244	185	212	216	224	187	194	187	**2,171**	**217**	**2.20**
22	LUDLOW	479	449	457	433	454	448	409	395	589	599	**4,712**	**471**	**3.64**
23	MIDDLEFIELD	7	5	0	2	1	3	1	5	1	3	**28**	**3**	**0.07**
24	MONSON	117	110	87	51	65	50	62	61	51	53	**707**	**71**	**0.63**
25	MONTGOMERY	9	8	15	18	16	17	11	9	9	12	**124**	**12**	**0.40**
26	NORTHAMPTON	706	670	606	623	630	565	573	577	605	628	**6,183**	**618**	**3.42**
27	PALMER	429	379	288	417	436	347	409	210	344	379	**3,638**	**364**	**3.18**
28	PELHAM	20	11	13	7	6	17	6	13	6	11	**110**	**11**	**0.24**
29	PLAINFIELD	9	7	9	4	7	10	9	4	2	6	**67**	**7**	**0.14**
30	RUSSELL	36	45	30	39	46	50	44	43	53	32	**418**	**42**	**1.16**
31	SOUTH HADLEY	289	276	245	283	254	261	241	246	251	225	**2,571**	**257**	**2.48**
32	SOUTHAMPTON	60	50	53	46	51	44	51	52	58	73	**538**	**54**	**0.73**
33	SOUTHWICK	192	202	189	97	234	179	154	144	141	146	**1,678**	**168**	**2.19**
34	SPRINGFIELD	911	805	561	470	4,643	4,501	4,330	4,139	4,347	4,664	**29,371**	**2,937**	**5.90**
35	TOLLAND	3	1	2	2	4	5	3	3	3	2	**28**	**3**	**0.07**
36	WALES	6	12	8	8	7	5	7	6	8	9	**76**	**8**	**0.26**
37	WARE	181	162	192	211	233	196	188	197	198	234	**1,992**	**199**	**1.70**
38	WEST SPRINGFIELD	150	145	527	611	850	823	727	662	782	630	**5,907**	**591**	**4.13**
39	WESTFIELD	850	755	725	812	813	778	735	623	780	786	**7,657**	**766**	**3.10**
40	WESTHAMPTON	17	20	17	14	18	20	15	19	18	19	**177**	**18**	**0.37**
41	WILBRAHAM	334	308	287	353	363	317	304	313	336	349	**3,264**	**326**	**2.93**
42	WILLIAMSBURG	65	67	61	39	64	54	57	41	56	50	**554**	**55**	**1.11**
43	WORTHINGTON	9	14	6	1	5	4	6	10	12	5	**72**	**7**	**0.11**
	TOTAL	10,633	10,261	117,762	10,474	120,631	122,645	125,285	130,233	139,050	143,474	**930,448**	**12,985**	**3.00**

Source: MassDOT

The PVPC also develops and updates its own list of top 100 crash intersections. The latest report utilized the crash data between the calendar years of 2011 – 2013.

Figure 6-2 – Top 100 High Crash Intersections in the Pioneer Valley

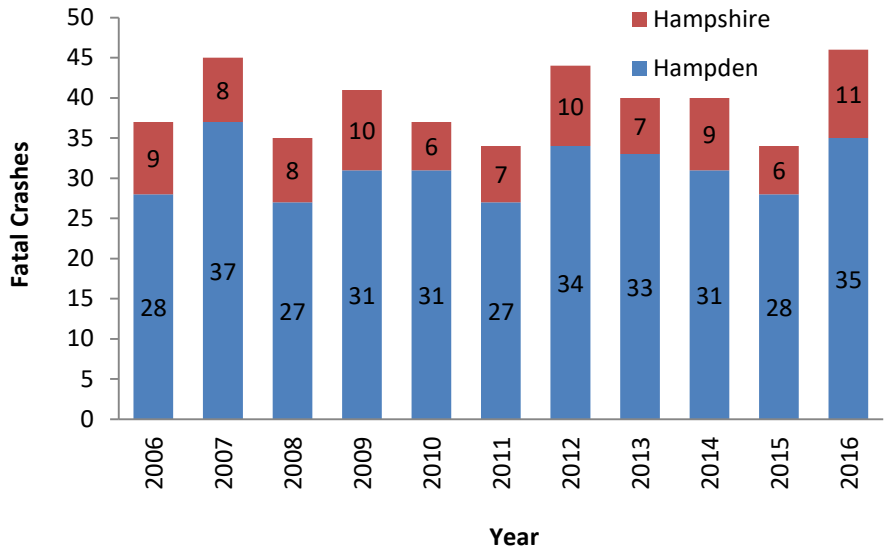


The top locations depicted in this report differ from the MassDOT report because of the different crash data time periods and due to a recent change by MassDOT in its ranking system. PVPC will review this change as part of a future update to the regional Top 100 report.

a) Fatal Crashes

The Pioneer Valley experienced a total of 46 fatal crashes in 2016. This increase from 2015 and follows current state trends. Figure 6-3 depicts the fatal crashes in Hampshire and Hampden counties over the past decade. More information on fatal crashes is presented in Chapter 12 of the RTP.

Figure 6-3 – Fatal Crashes in Hampshire and Hampden Counties



Source: MassDOT

3. Bridges

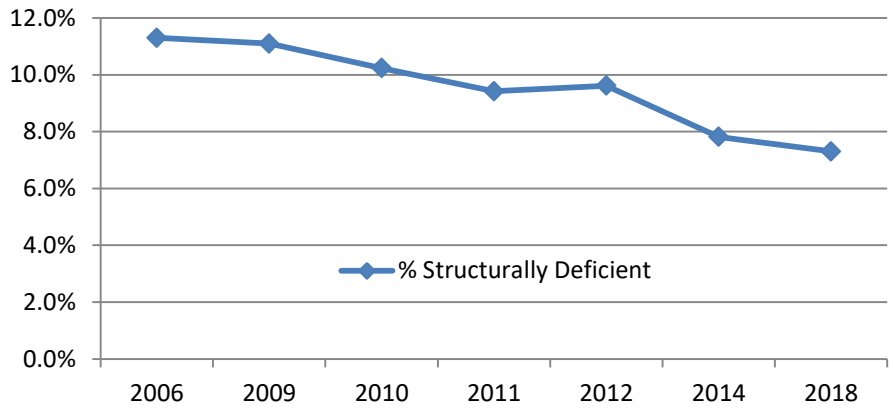
All bridges throughout the state undergo routine structural inspection. Previously the State utilized a generally accepted rating system developed by the American Association of State Highway and Transportation Officials (AASHTO) to ascertain the condition of the bridges. Beginning in 2018, that system was updated to a new 100 point scale system which measures the Bridge Health Index (BHI).

BHI is a weighted average of the health indices of all bridge elements (e.g. trusses, decks, bridge rails, etc.) to provide a comprehensive overview of bridge condition. A value of zero indicates that all of the bridge elements are in the worst condition, and a score of 85 or greater indicates that the bridge elements are in good condition.

Under this new system, a 'structurally deficient bridge' is defined as a bridge with a deck, substructure, or superstructure that requires attention. Table 6-4 summarizes the status of bridge conditions within the Pioneer Valley Region by community.

The percentage of structurally deficient bridges in the region has steadily declined over past decade by almost 4%. This trend is shown in Figure 6-4. There is a gap in data from 2014 and 2018 as a result of the transition to the new bridge classification system and scoring method.

Figure 6-4 – Structurally Deficient Bridges in the Pioneer Valley



4. At-grade Railroad Crossings

The Federal Railroad Authority's (FRA) rail crossing inventory summarizes at-grade rail road crossings in the region. There are currently 295 at-grade crossings in the region. Approximately two-thirds of these crossings are located in Hampden County. Many of the crossings are located on non-operational rail road tracks. A total of 31 crossings are gated. While safety gates are not present at most crossings, other supplemental warning devices such as flashing lights, warning signs, and pavement markings are present and require routine maintenance to provide maximum effectiveness. Figure 6-5 depicts the at-grade railroad crossings in the region.

Table 6-4 – Bridge Condition in the PVPC Region

Community	Total No. of Bridges	Average BHI	Jurisdiction				Structurally Deficient	
			Municipal		State			
			No.	Avg. BHI	No.	Avg. BHI	No.	Avg. BHI
Agawam	18	85.51	1	64.30	17	86.76	1	48.80
Amherst	15	76.47	10	71.13	5	87.16	1	11.40
Belchertown	12	87.68	8	92.45	4	78.15	1	43.90
Blandford	12	88.16	6	92.22	6	84.10	0	0
Brimfield	27	86.63	17	89.32	10	82.05	0	0
Chester	25	86.83	16	85.68	9	88.88	1	53.50
Chesterfield	10	76.17	7	75.01	3	78.87	2	58.00
Chicopee	50	77.68	5	86.12	45	76.74	2	53.20
Cummington	13	74.91	6	76.80	7	73.29	0	0
Easthampton	19	83.00	10	83.53	9	82.41	1	67.50
Goshen	4	95.48	2	97.15	2	93.80	0	0
Granby	8	84.13	7	83.21	1	90.50	0	0
Granville	7	85.44	4	83.78	3	87.67	0	0
Hadley	10	87.09	4	91.40	6	84.22	0	0
Hampden	8	86.16	8	86.16	0		1	100.00
Hatfield	15	81.43	5	79.82	10	82.24	2	74.05
Holland	2	0.00	2	0.00	0		0	0
Holyoke	49	77.48	9	81.97	40	76.47	4	33.23
Huntington	8	84.83	2	77.00	6	87.43	1	92.10
Longmeadow	4	73.98	0		4	73.98	0	0
Ludlow	23	67.26	8	55.48	15	73.54	2	66.05
Middlefield	9	72.54	9	72.54	0		1	51.50
Monson	23	77.71	13	77.82	10	79.63	4	56.53
Montgomery	5	81.54	4	87.08	1	59.40	0	0
Northampton	44	80.27	21	85.52	23	75.47	8	67.09
Palmer	30	76.92	8	83.38	22	74.58	3	78.33
Pelham	3	97.57	3	97.57	0		0	0
Plainfield	2	87.50	2	87.50	0		0	0
Russell	15	83.07	4	80.30	11	84.08	1	99.70
South Hadley	11	84.21	4	80.30	7	86.44	0	0
Southampton	11	76.14	9	71.42	2	97.35	0	0
Southwick	3	84.20	1	55.90	2	98.35	0	0
Springfield	61	75.75	13	67.40	48	78.00	5	50.70
Wales	1	93.20	1	93.20	0		1	93.20
Ware	16	84.62	9	80.57	7	89.83	3	74.37
West Springfield	26	73.40			26	73.40	1	12.10
Westfield	36	80.68	13	73.43	25	81.03	1	60.30
Westhampton	14	73.76	11	79.89	1	78.10	1	31.50
Wilbraham	4	83.23	2	84.00	2	82.45	0	0
Williamsburg	17	87.50	10	84.02	7	92.47	1	51.80
Worthington	15	77.85	10	74.06	5	85.44	1	90.30
Grand Total	**685**	**79.67**	**284**	**79.81**	**401**	**79.55**	**50**	**60.35**

Source: MassDOT

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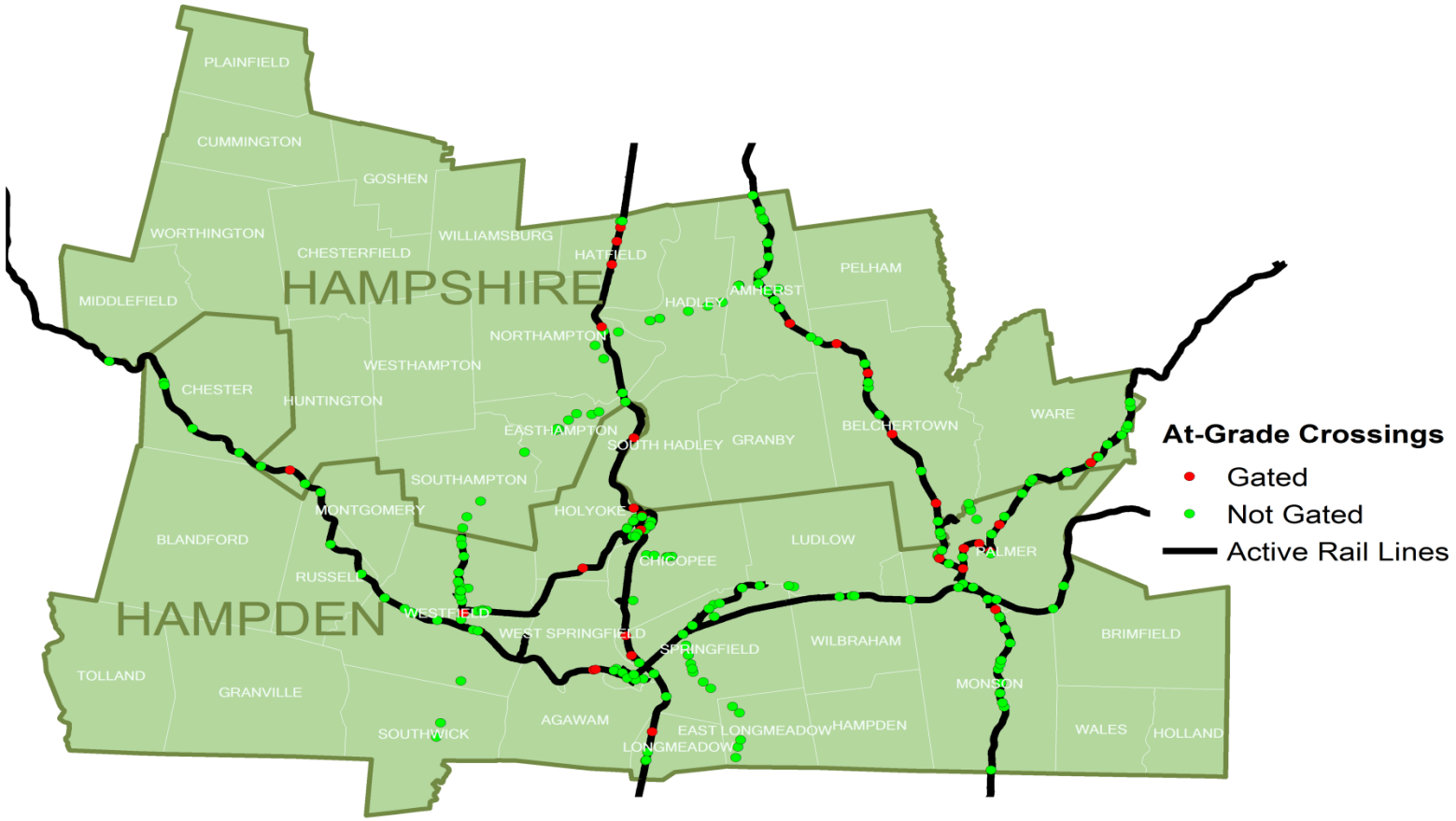
Figure 6-5 – At-grade Railroad Crossings



Data Sources: FRA Rail Crossing Inventory - April 2019 and MassGIS.

Prepared by: Pioneer Valley Planning Commission, April 2019.

5. Dams in the Pioneer Valley Region

There are approximately 260 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, approximately:

- 40 have a hazard index rating of high,
- 130 are rated significant hazard, and
- 90 are rated low hazard[1]

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.[2]

Under dam safety regulations owners have significant responsibilities for their dams. 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.

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.

While it appears high hazard dams in poor and unsafe condition in the region have been either repaired or removed, there are still 13 significant hazard dams in such condition. There are an additional 26 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 6-5 for a listing of specific dams.

[1] These numbers are estimates based on periodic and partial updates to PVPC's dams data base from the Massachusetts Office of Dam Safety.

[2] 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.

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Table 6-5 – Dams in the Pioneer Valley in Poor or Unsafe Condition

Dam name	Town	Hazard index code rating	Condition
Nine Lot Dam	Agawam	Low	Poor
Rising Dam	Agawam	Low	Poor
Robinson Pond Dam	Agawam	Low	Poor
Factory Hollow Dike	Amherst	Significant	Poor
Owens Farm Pond Dam	Amherst	Low	Poor
Wetstone Tobacco Co. #3 Dam	East Longmeadow	Low	Poor
Forge Pond Dam	Granby	Significant	Poor
Forge Pond Dike	Granby	Significant	Poor
Quenneville Dam	Granby	Low	Unsafe
Dufrense Farm Pond Dam	Granby	Low	Poor
D.F. Riley Grist Mill Dam	Hatfield	Significant	Poor
Mountain Street Reservoir Dikes	Hatfield	Low	Poor
Clear Pond Dam	Holyoke	Low	Poor
Clear Pond West Dike	Holyoke	Low	Poor
Virginia Lake Shore Dam	Middlefield	Low	Poor
Church Manufacturing Co. Dam	Monson	Low	Poor
Boulder Hill Pond Dam	Monson	Significant	Poor
Springfield Sportsman Club Dam	Monson	Significant	Unsafe
Shepard Upper Pond Dam	Monson	Low	Poor
Rocky Hill Pond Dam	Northampton	Low	Poor
Queensville Pond Dam	South Hadley	Significant	Poor
Alder Pond Dam	Southampton	Low	Poor
Lyman Mill Pond Dam	Southampton	Significant	Unsafe
Dr. Logie Pond Dam	Southwick	Low	Poor
Porter Lake Dam	Springfield	Significant	Poor
Breckwood Pond Dam	Springfield	Significant	Poor
Putnam's Puddle Dam	Springfield	Low	Unsafe
Upper Van Horn Reservoir Dam	Springfield	Significant	Poor
Forest Park Middle Pond Dam	Springfield	Low	Poor
Camp Kinderland Dam	Tolland	Low	Poor
Vinica Pond Dam	Wales	Low	Poor
Norcross Pond #2 Dam	Wales	Low	Poor
Norcross Pond #3 Dam	Wales	Low	Poor
Beaver Lake Dam	Ware	Significant	Unsafe
Skowron Dam	Ware	Low	Poor
O'Brien Pond Dam	Ware	Significant	Poor
Horse Pond Dam	Westfield	Low	Poor
Lyman Pond Dam	Westhampton	Low	Unsafe
Brass Mill Pond Dam	Williamsburg	Low	Poor

Source: Massachusetts Office of Dam Safety, May 2019.

In Table 6-5, 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

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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.[3] 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 failure.

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 50 dam removal projects in the past 10 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.

[3] 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.

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D. TRANSPORTATION SAFETY PLANNING PROJECTS IN THE REGION

The PVPC conducts studies at the regional and local scale in cooperation with MassDOT and local communities to improve safety. The following summarizes some of the studies performed to assist in the advancement of the SHSP objectives to reduce traffic-related fatalities and injuries.

1. Top 100 High Crash Intersections

PVPC develops its own independent listing of high crash locations based on MassDOT data. This regional study identifies the regional intersections with the highest Equivalent Property Damage Only (EPDO) scores. EPDO places a weight on each crash based on the severity of the crash. Crashes that result in an injury or fatality received a higher weight. PVPC uses the regional GIS system to properly identify crash locations and group closely linked intersections into clusters. The first version of this report was completed in 2008. Two updates have since been completed with the most recent one released in 2016.

This report can be accessed at:https://www.pvpc.org/sites/default/files/files/Top%20100%20High%20Crash%20Intersections%20draft%20II.pdf

2. Bicycle and Pedestrian Crash Clusters in the Region

PVPC began summarizing the top 10 high crash bicycle and pedestrian clusters in the region beginning in 2016 as part of the Top 100 High Crash Intersections report. This data was used to assist local communities in their sustainability and livability planning as well as advance Complete Streets planning in the region. Figure 6-6 shows the top 10 regional non-motorist crash clusters.

3. SafetyCompass

The PVPC developed the SafetyCompass in 2017 to respond to concerns from the JTC and local communities that the Top 100 High Crash Intersections report did not provide safety data outside of the urban core. SafetyCompass summarizes crash data trends for every community in the region. In addition, the SafetyCompass identifies crash data and trends differently for rural and urban communities, recognizing that the total number of crashes is not the sole indication of a safety problem. Each community also received a digital version of the crash data included in the SafetyCompass to incorporate into their local GIS system. The SafetyCompass can be downloaded from:http://www.pvpc.org/sites/default/files/Final%20Report%20Safety%20Compass.pdf

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Figure 6-6 – Top 10 Bicycle and Pedestrian Crash Clusters in the Region

4. Transportation Safety Studies

As a part of PVPC's Unified Planning Work Program (UPWP), locations in the region that have a history of safety related issues are identified for proposed traffic studies. Crash data obtained from both MassDOT's crash database and local police departments is used in this analysis. PVPC also works with the local community to develop a series of recommendations to improve safety. Past studies have been helpful to advance short term safety improvements and provide documentation to apply for funding to implement long term improvements. The PVPC utilizes information from products such as the Top 100 High Crash Intersections report and SafetyCompass to identify potential locations for safety studies and all studies are coordinated with MassDOT and the JTC.

5. Local Technical Assistance

PVPC helps member communities as part of the Local Technical Assistance (LTA) program to provide short term safety analysis and guidance. This assistance is performed at the request of the community and typically consists of the review of historic crash data and a brief in-field assessment. PVPC develops a technical memo to summarize the problem and propose a series of short term recommendations

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CHAPTER 7

Photo: CSX Railyard in West Springfield, MA

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

The region works in collaboration with the Massachusetts Executive Office of Public Safety (EOPS) and the Massachusetts Emergency Management Agency (MEMA) to improve the security of the regional transportation system. 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

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) 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

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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.

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 participates in regional emergency drills and has provided extensive emergency training for their staff. PVPC has also worked in cooperation with the PVTA to develop videos for emergency responders on how to access PVTA vehicles and provide information on the configuration of the different buses in their fleet.

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 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. 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;

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- 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 in Northampton, MA between King Street and Woodmont Road to access the Norwottuck Rail Trail and businesses along King Street. A new pedestrian underpass was constructed in 2018 to deter pedestrians from illegally crossing 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 are shown by county in Figures 7-1 and 7-2.

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Figure 7-1 – Evacuation Routes and Water Hazards in Hampden County

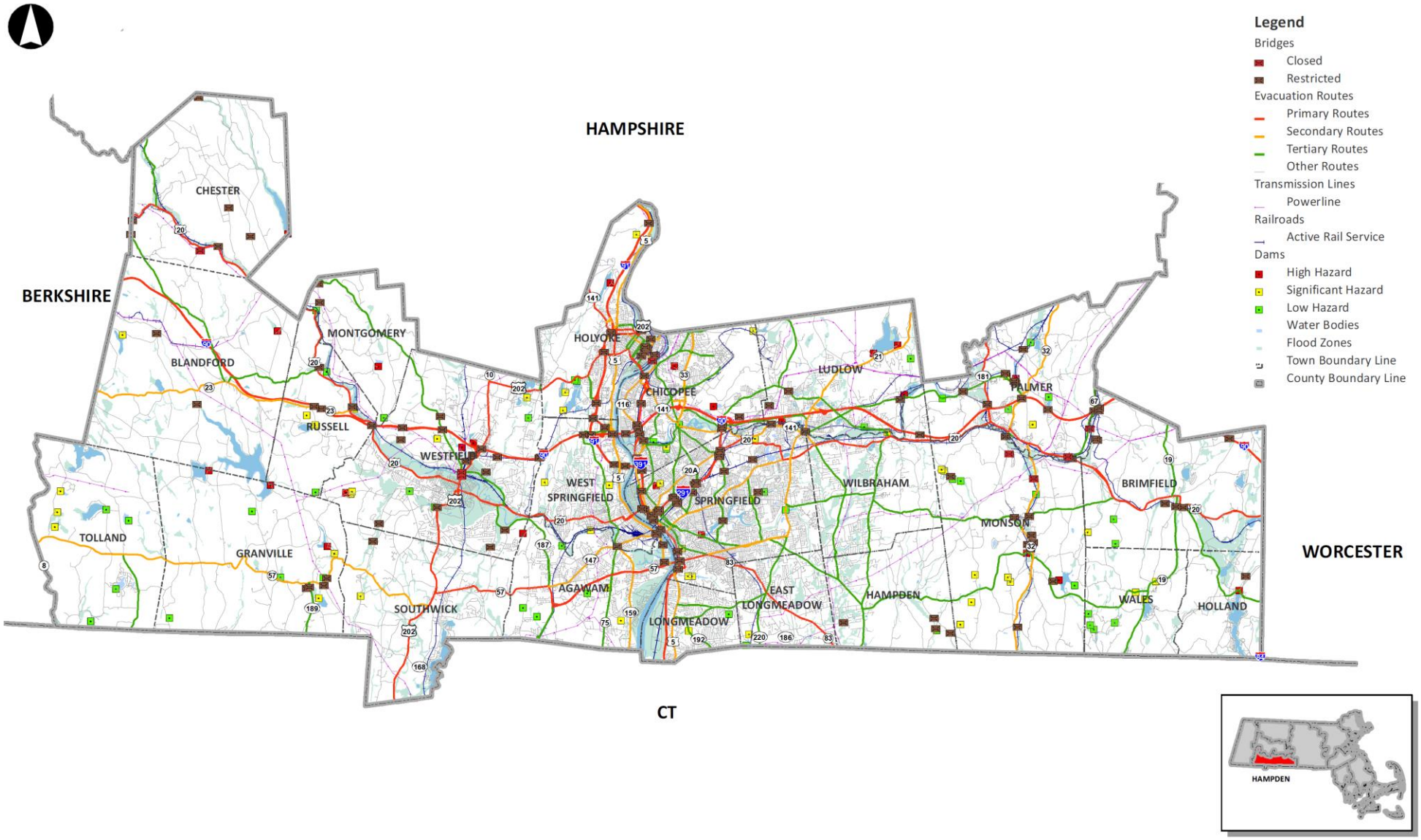
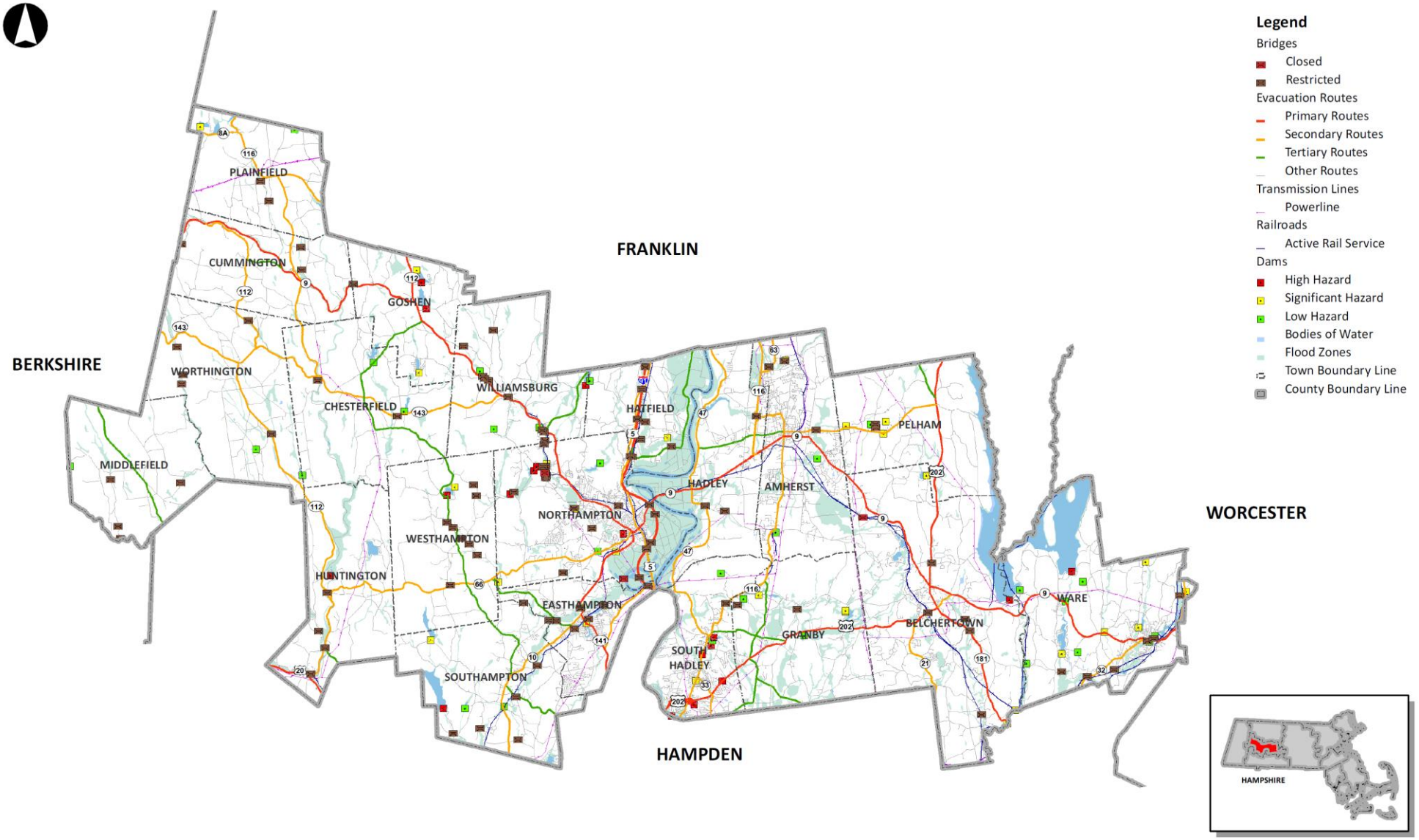


Figure 7-2 – Evacuation Routes and Water Hazards in Hampshire County



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. It also identifies and assigns specific areas of responsibility for coordinating resources to support the Commonwealth's response to an emergency or disaster. Last updated in January of 2019, the CEMP is maintained by the Massachusetts Emergency Management Agency (MEMA).Link to the CEMP Base Plan.

1. Massachusetts Emergency Support Function 1 Transportation

The Massachusetts Emergency Support Function 1 (MAESF-1) Transportation provides a framework for coordination and cooperation across state agencies regarding transportation needs for a disaster, emergency, or planned event. An annex to the CEMP, it describes how the Commonwealth will provide transportation related support and assistance to local jurisdictions in the event local needs exceed available local resources during an emergency. Link to MAESF-1 Transportation.

The primary state agency for the MAESF-1 is MassDOT. As the primary regional transit agency, PVTA has a supporting role in MAESF-1 including:

- Provide information on the status of PVTA facilities and operations, including any service restrictions or cancellations.
- Provide buses or other transportation assets as requested to facilitate evacuations or other movements of large numbers of people.
- Provide resources to assist in the movement and/or staging of commodities as needed.

2. Local Hazard Mitigation Planning

PVPC assists its member communities with developing new and updating existing Hazard Mitigation Plans. Hazard mitigation is any action taken to reduce or eliminate the long-term risk to human life and property from hazards. Common mitigation strategies include minor localized flood reduction projects, culvert improvements, wildfire mitigation, and infrastructure retrofits. FEMA requires the plans to be updated every 5 years to maintain eligibility for Hazard Mitigation funding.

The Hazard Mitigation planning process involves an assessment of the risks faced from natural hazards, a review of existing mitigation capabilities currently implemented, identification of action steps that can be taken to prevent damage to property and loss of life, and prioritization of future mitigation efforts to implement. The plans are developed with assistance from MEMA and funding provided by the Federal Emergency Management Agency (FEMA).

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D. IMPROVING REGIONAL SECURITY

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 goals have been identified as part of the SHSS.

- Engage Stakeholders to Maintain, Enhance, Formalize, and Integrate the Various Components of the Homeland Security System into a Structure that Identifies and Guides Implementation of Homeland Security Strategy.
- Increase the ability to effectively provide prompt and accurate public information and alerts.
- Protect the Commonwealth from Intentional Acts of Violence and Terrorism.
- Enhance Resilience across the Commonwealth by Preparing for & Mitigating Against Acts of Terrorism, and Natural, Technological, & Intentional Hazards.
- Increase Capacity across the Commonwealth to Effectively Respond to Acts of Terrorism, and Natural, Technological, & Intentional Hazards.
- Enhance Capacity across the Commonwealth to Recover from Acts of Terrorism, and Natural, Technological, & Intentional Hazards.

Link to the Massachusetts State Homeland Security Strategy.

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CHAPTER 8

Photo: Route 9 in Northampton, MA

CONGESTION

A. INTRODUCTION

Congestion means different things depending on where you are and what mode of transportation you are using. In any case, the consequences of excessive 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) works toward identifying the major traffic congested locations within the Pioneer Valley 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 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 strategies that enhance the safety and efficiency of the movement of people, goods, and information.

1. Regulatory Context

The current transportation reauthorization bill Fixing Americas Surface Transportation Act (FAST - Act) retains the CMP requirement of the Safe Accountable Flexible Efficient Transportation Equity Act – a Legacy for Users (SAFETEA-LU) and MAP-21. In addition, FAST- Act features 8 steps framework for CMP.

- 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.

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.

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 implementation strategies for all transportation modes;
- Engage agency participants and stakeholders in review of the strategies;
- Identify timeframe for availability;
- Data collection and analysis;
- Public review of preliminary findings.

3. Implementation Strategies

The goal of the CMP is to identify, evaluate, and implement transportation implementation strategies 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 strategies necessary to obtain the data needed to fulfill this goal. Implementation Strategies included in the CMP are summarized in Table 8-1. The status of each strategy is based on the availability of existing data. Ongoing strategies have data which is currently collected by the PVPC or available from partner agencies. Immediate strategy data is not currently available but is anticipated to be available in the near future. Future strategy data is also not available but is highly desirable for use in future CMP activities.

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Table 8-1 – CMP Implementation Strategies

Strategy	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 using NPMRDS data	Ongoing
Inventory and monitor pavement conditions for all federal 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 system wide transportation alternatives and monitor, update, and increase the number of intermodal transfer points.	Future
Decrease the number of structurally deficient 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 system wide.	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 Region	Ongoing
Continue to utilize car based GPS travel time data collection as appropriate	Ongoing
Improve access to advance information on ongoing construction activity.	Immediate
Data sharing with regional public and private partners.	Immediate
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 as Unreliable	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	Immediate
Identify data to increase coverage outside the NHS / Interstate system covered by NPMRDS data	Immediate

4. 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 considered congested based on our CMP process. See appendix for latest CMP report.

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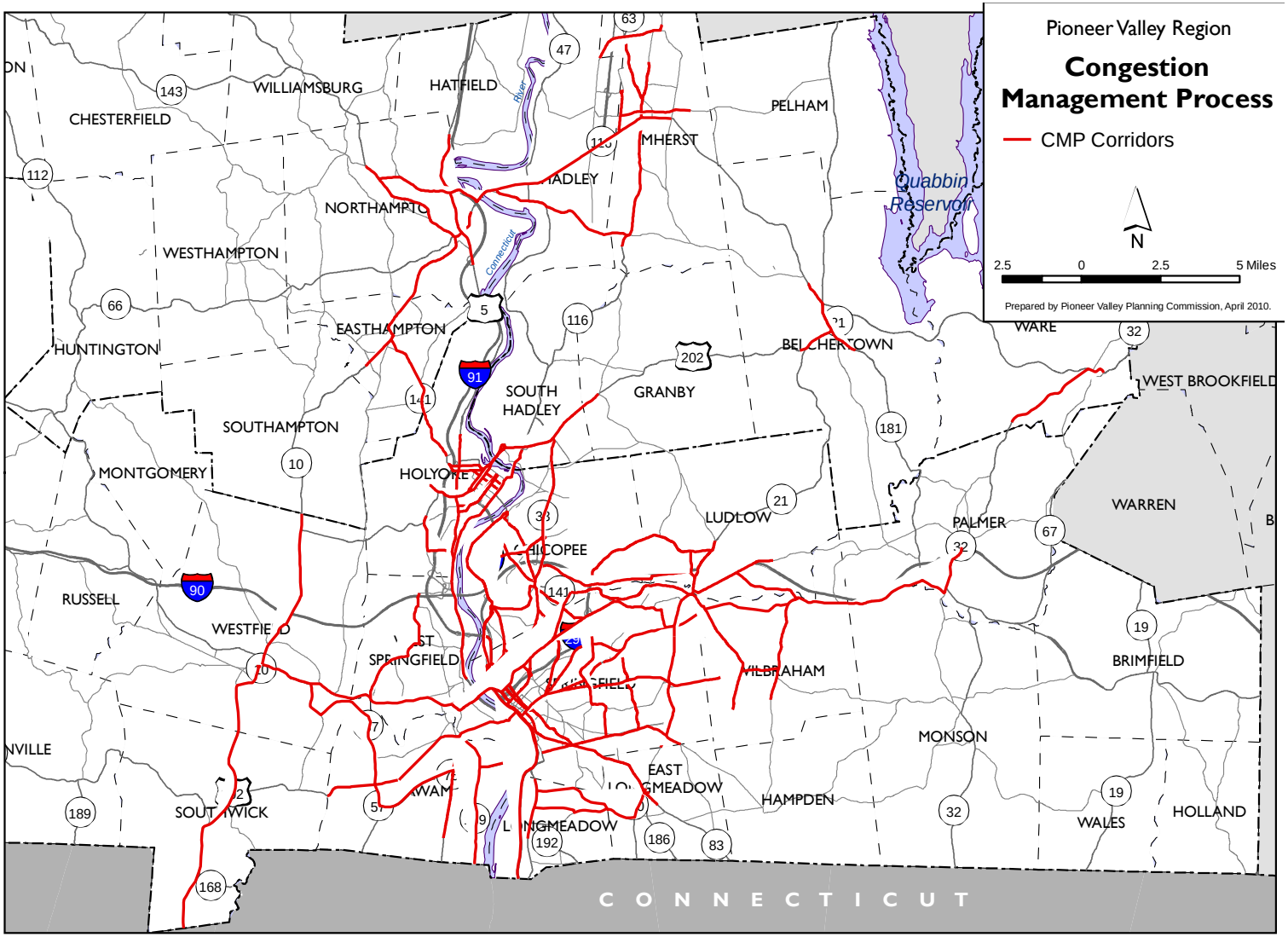
Figure 8-1 – CMP Corridors

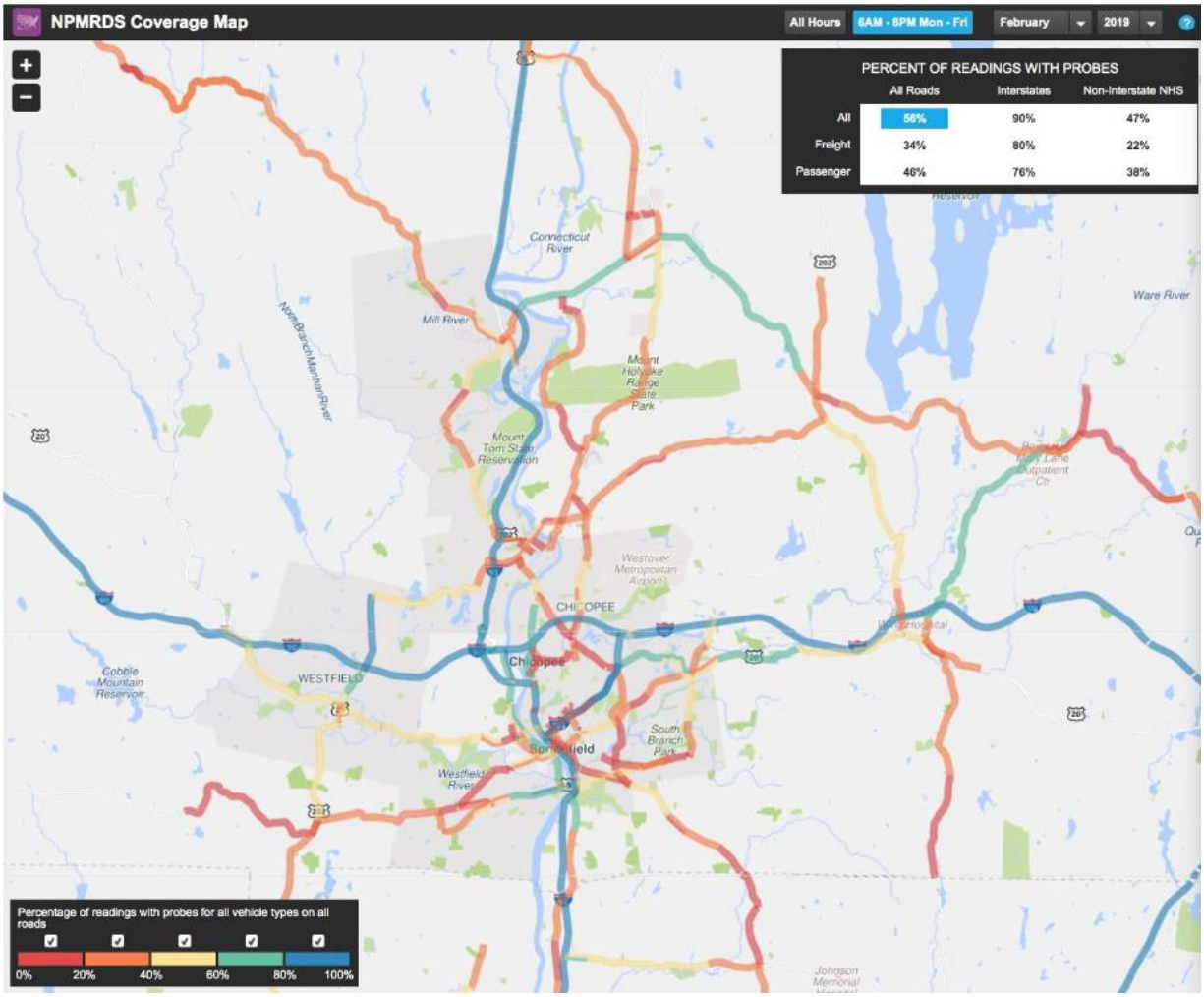


5. National Performance Measures Research Data Set (NPMRDS)

NPMRDS is defined as the baseline dataset to meet the newly established federal congestion and freight performance reporting regulation. Data is available for all state departments of transportation and metropolitan planning organizations; and is available from 2017 to the present. NPMRDS provides consistent data for passenger and commercial freight roadway performance across the National Highway System.

The federal performance measure planning rule (PM3) for congestion only requires states to report on the Interstate and National Highway System (NHS). Figure 1 shows the portion of the roadway network in the Pioneer Valley region covered by the NPMRDS data.

Figure 8-2 – NPMRDS Coverage



PVPC is in the process of integrating NPMRDS data as the primary data used in the CMP. By utilizing NPMRDS data, PVPC can process data for the entire region in a much more efficient and accurate way. Not only does the NPMRDS data allow PVPC to monitor reliability of roadways to meet the PM3, staff can also calculate the Travel Time Index (TTI) by roadway segment. TTI is used to measure congestion intensity. It is the ratio of time spent in traffic during peak traffic times as compared to light or free flow traffic times. By processing TTI by roadway segment, PVPC will be able to identify regional bottlenecks. See Figure 8-3 and 8-4.

For the RTP, PVPC staff has used the same methodology used to determine PM3 reliability by roadway segment to determine TTI. Staff will reevaluate the methodology and modify it to better meet the needs of the CMP.

Figure 8-3 – Travel Time Index – Urban (2017)

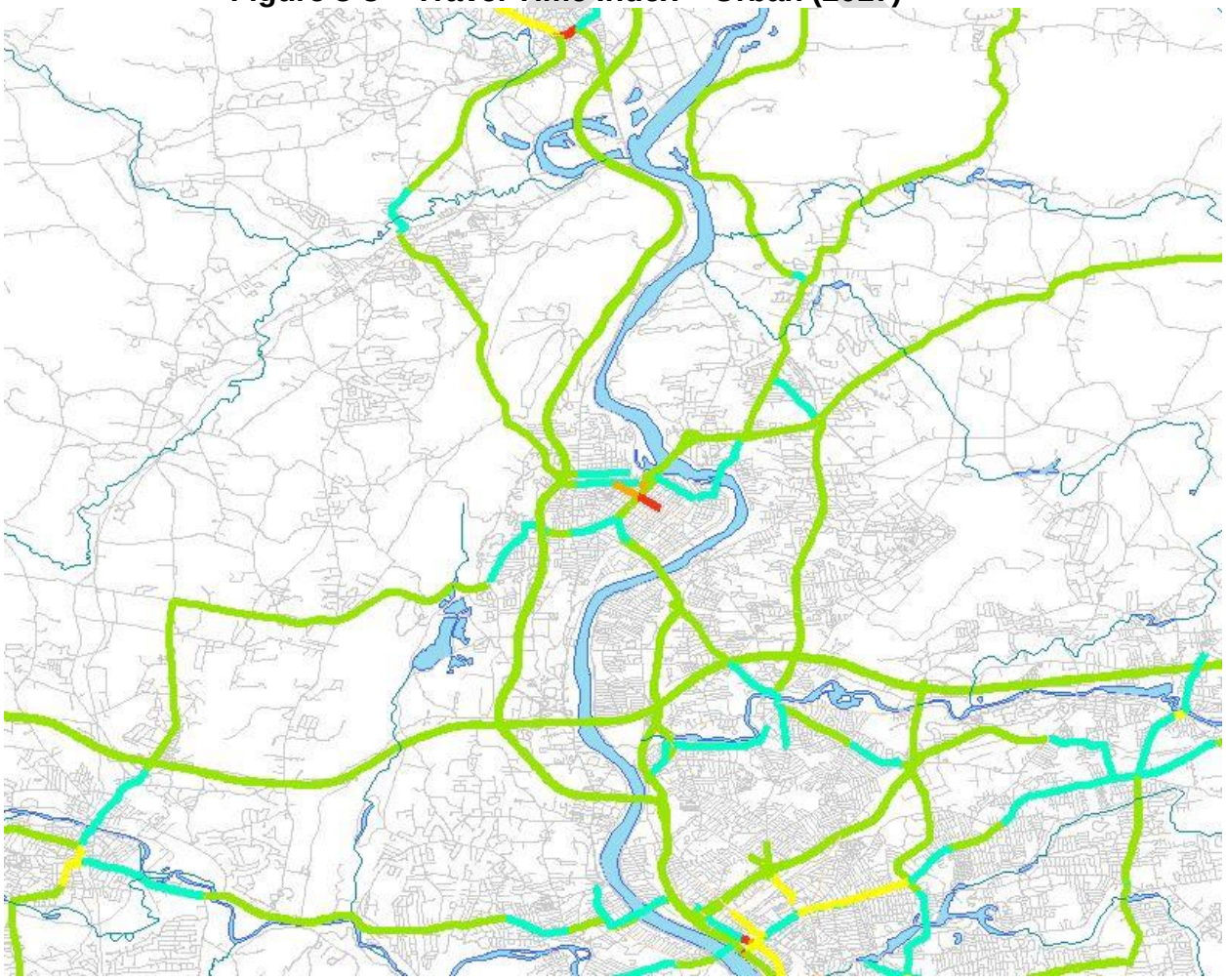
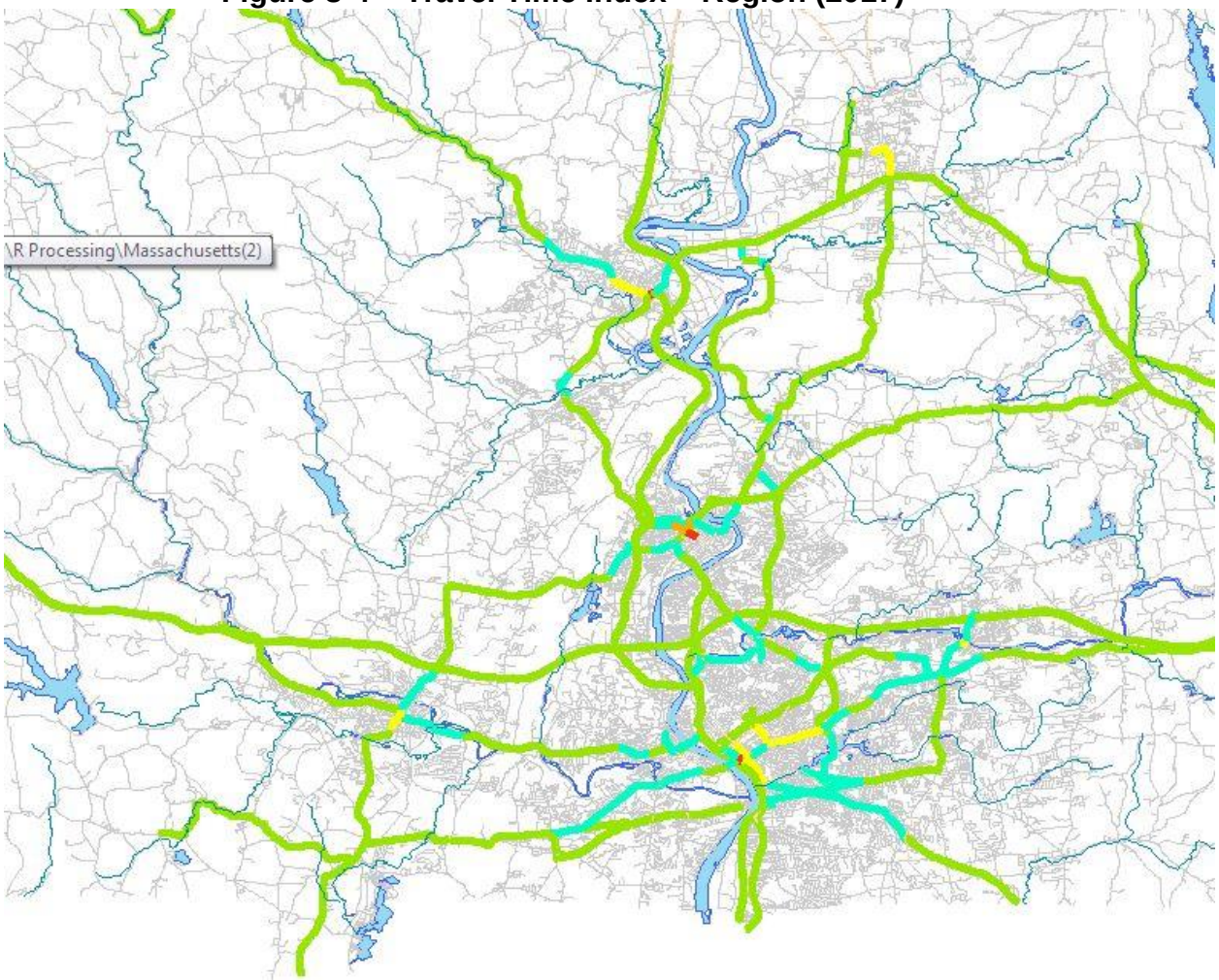


Figure 8-4 – Travel Time Index – Region (2017)



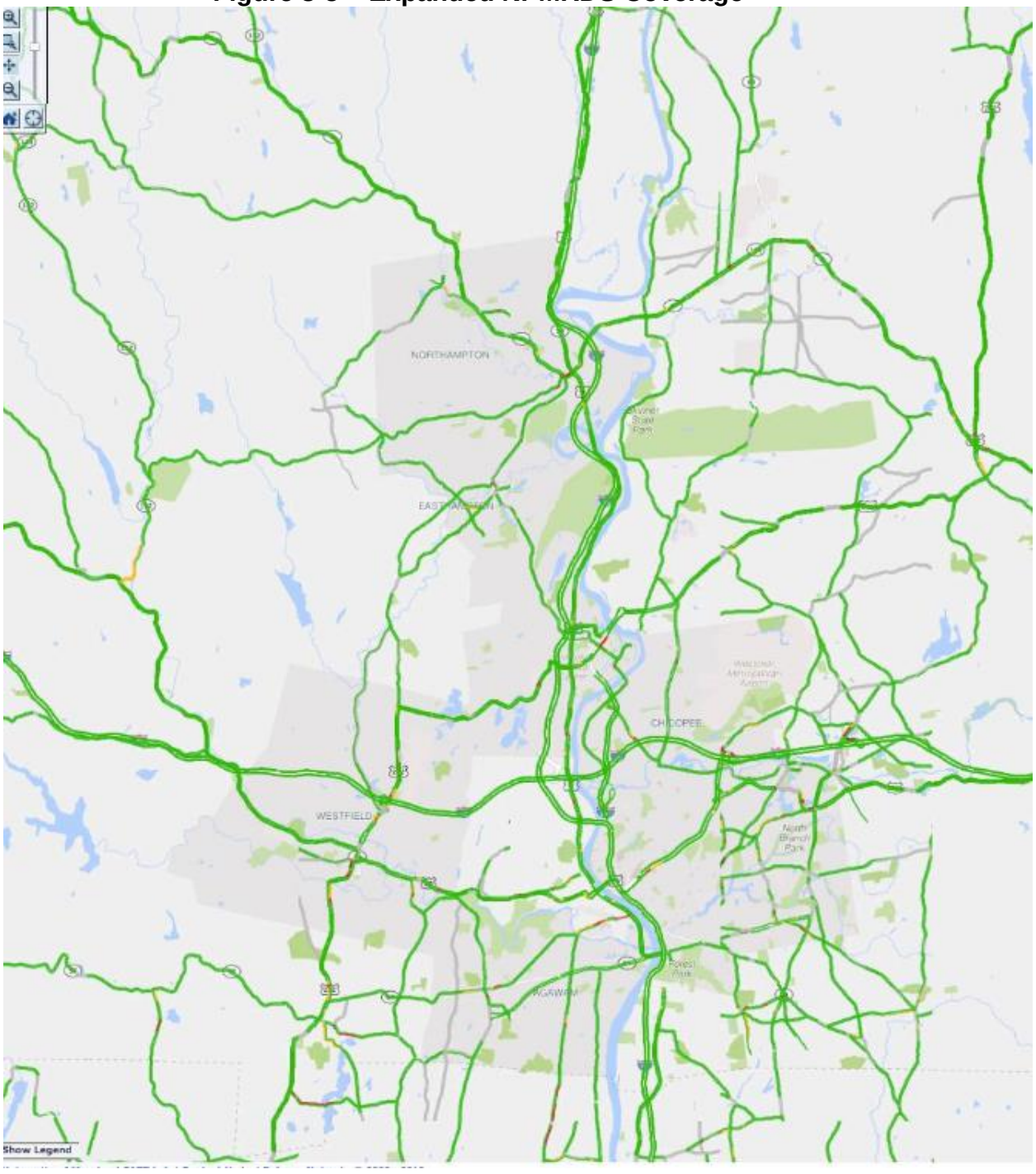
As can be seen in Figure 8-3 and 8-4 the majority of the congestion (red, orange, and yellow) are located in the urban centers in close proximity to the interstate system. Red locations are indicated by any roadway segment with a TTI greater than 2, Orange or those segments between 1.75 and 1.99, and Yellow are between 1.5 and 1.74. For reference a TTI of 2 indicates a travel time twice that of the free flow travel time. PVPC will integrate 2018 data into the process before updating the CMP report and the Top bottleneck report.

6. Expanded NPMRDS Data

Although NPMRDS data meets the requirements of PM3, is does not sufficiently cover the roadway network in the Pioneer Valley Region. PVPC is in the process of identifying resources to acquire expanded NPMRDS data. Figure 8-5 illustrates the coverage of the expanded data in our region. Although the expanded NPMRDS data would not provide full roadway coverage, we believe the data would work sufficiently for our CMP and Regional Bottleneck reports. Manual data may still be

needed on a small scale to verify congestion or to fill in gaps on known congestion routes.

Figure 8-5 – Expanded NPMRDS Coverage



B. 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 in Table 8-2 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 8-2 – 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 – NPMRDS Data
PVTA Service Area	Advance the "Transit Congestion Severity" calculation based on the data discussed in the transit congestion severity section of this chapter
Interstate and NHS Off Ramp Study	Study existing congestion that causes traffic to queue back onto the highway
Regional Corridor Updates	Evaluate the existing CMP corridors and evaluate for future CMP update based on availability of data.
Regional Corridor Congestion Ranking	Update corridor ranking based on NPMRDS and expanded NPMRDS data
Region Wide	Analysis of Top Bottleneck locations based on NPMRDS data

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Table 8-3 – TIP Projects that May Improve Congestion

Current TIP	Municipality	SID	Project Name and Description	Estimated Cost
2020	Northampton	608236	NORTHAMPTON- RECONSTRUCTION OF DAMON ROAD, FROM ROUTE 9 TO ROUTE 5	$ 10,043,653
2020	Chicopee	604434	RECONSTRUCTION & RELATED WORK ON FULLER ROAD, FROM MEMORIAL DR (RTE 33) TO SHAWINIGAN DR (2.0 MILES)	$ 8,034,211
	Springfield	608717	SPRINGFIELD- RECONSTRUCTION OF SUMNER AVE AT DICKINSON ST AND BELMONT AVE (THE "X")	$ 13,369,637
2022/2023	West Springfield	608374	RECONSTRUCTION OF MEMORIAL AVENUE (ROUTE 147), FROM COLONY ROAD TO THE MEMORIAL AVENUE ROTARY (1.4 MILES)	$ 22,545,121
2021	Northampton	607502	INTERSECTION IMPROVEMENTS AT KING ST, NORTH ST & SUMMER ST AND AT KING ST & FINN ST	$ 3,384,309
2021 SW	Holyoke	606450	TRAFFIC SIGNAL UPGRADES AT 15 INTERSECTIONS ALONG HIGH & MAPLE ST	$ 9,100,000
2021/2022	Hadley	605032	HADLEY- RECONSTRUCTION ON ROUTE 9, FROM MIDDLE STREET TO MAPLE/SOUTH MAPLE STREET	$ 23,893,982
2021	Amherst	608084	AMHERST- IMPROVEMENTS & RELATED WORK ON ROUTES 9 & 116, FROM UNIVERSITY DRIVE TO SOUTH PLEASANT STREET (0.8 MILES)	$ 3,892,738
2020	Westfield	607773	WESTFIELD- IMPROVEMENTS & RELATED WORK ON ROUTE 20, COURT ST & WESTERN AVE, LLOYDS HILL RD TO HIGH ST/MILL ST INTERSECTION (PHASE II) Eastern Section	$ 8,153,565
2021	Springfield	608782	SPRINGFIELD- INTERSECTION IMPROVEMENTS AT COTTAGE ST, ROBBINS RD AND INDUSTRY AVE	$ 2,748,386
2021	Springfield	608718	SPRINGFIELD- INTERSECTION IMPROVEMENTS AT BERKSHIRE AVE, COTTAGE AND HARVEY ST	$ 2,280,751
2020 SW	Springfield	608560	IMPROVEMENTS ON ST. JAMES AVENUE AT TAPLEY STREET	$ 1,589,420
	Northampton	609286	NORTHAMPTON- DOWNTOWN COMPLETE STREETS CORRIDOR AND INTERSECTION IMPROVEMENTS ON MAIN STREET (ROUTE 9)	$ 7,654,605
2021	Easthampton	608577	EASTHAMPTON- IMPROVEMENTS AND RELATED WORK ON UNION STREET (ROUTE 141) FROM PAYSON AVENUE TO HIGH STREET (0.36 MILES)	$ 3,284,450
2023	Longmeadow / Springfield	608881	RESURFACING AND INTERSECTION IMPROVEMENTS ON LONGMEADOW STREET (ROUTE 5) AND CONVERSE STREET (0.84 MILES)	$ 5,228,168
	Chicopee	609061	CHICOPEE - INTERSECTION RECONSTRUCTION, MONTGOMERY RD AT GRANBY RD AND MCKINSTRY AVE, AND MONTGOMERY RD AT TURNPIKE ACCESS RD	$ 6,000,000
	South Hadley	608785	MAIN STREET ROAD IMPROVEMENT PROJECT	$ 3,089,720
2021 SW	Springfield	608565	IMPROVEMENTS ON ST. JAMES AVENUE AT ST. JAMES BOULEVARD AND CAREW STREET	$ 2,400,000

1. 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. These contours were developed for the region based on the location of centers of employment. A total of six employment centers were selected because of their geographic diversity and significance. Each contour is broken down into 15, 30, 45, and 60 minute intervals.

Pioneer Valley Region Travel Time Contours were created using the Esri ArcGIS 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 8-6 – 8-11.

Table 8-4 – Travel Time Comparison Northbound Routes (2001, 2015, and 2019)

Northbound	2001 (Minutes)	2015 (Minutes)	2019 (Minutes)
North End Bridge Rotary	2.25	3.86	4.06
I-91 Exit 9 (Route. 20 - North End Bridge)	2.03	4.33	5.06
I-91 Exit 10 (Birnie Ave)	0.65	0.78	0.91
I-91 Exit 12 (I-391 - Chicopee)	1.05	1.09	1.08
I-91 Exit 13A (Route 5 - West Springfield	0.58	0.79	0.77
I-91 Exit 14 (Massachusetts Turnpike)	2.38	2.54	2.53
I-91 Exit 15 (Holyoke - Ingleside)	0.65	0.90	0.85
I-91 Exit 16 (Holyoke - Route 202)	1.48	1.60	1.56
I-91 Exit 17A (Holyoke - Route 141)	1.17	0.81	0.77
I-91 Exit 18 (Northampton - Route 5)	6.17	7.55	7.23
I-91 Exit 19 (Northampton - Route 9)	1.80	1.91	2.02
I-91 Exit 21 (Hatfield/Northampton)	2.10	2.32	2.36
I-91 Exit 22 (North Hatfield)	2.37	2.61	2.59
I-91 Exit 24 (Deerfield/Whately)	7.12	4.40	4.28
I-91 Exit 26 (Greenfield - Route 2A)	10.47	7.74	7.65
I-91 Exit 27 (Greenfield - Route 2)	2.37	2.58	2.57
I-91 Exit 28 (Bernardston)	4.12	4.67	4.60
Vermont State Line	4.17	4.13	4.19
I-91 VT Exit 1 (US Route 5)	6.93	6.88	7.36
Total	**59.85**	**61.49**	**62.44**

As can be seen in Tables 8-4 – 8-7, 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 8-5 – Travel Time Comparison Southbound Routes (2001, 2015, and 2019)

Southbound	**2001 (Minutes)**	**2015 (**Minutes**)**	**2019 (Minutes)**
Memorial Bridge Rotary	5.10	1.86	2.15
I-91 Exit 3 (Route 5/57 - South End Bridge)	2.53	3.01	4.10
I -91 Exit 2 (Longhill Street)	0.37	0.89	0.73
I-91 Exit 1 (Route 5 - Longmeadow)	0.63	0.12	0.12
I-91 CT Exit 49 (US Route 5)		3.77	3.77
I-91 CT Exit 48 (CT Route 220)	1.27	1.53	1.54
I-91 CT Exit 47 (CT Route 190)	2.08	0.41	0.41
I-91 CT Exit 46 (US Route 5)	2.30	2.57	2.59
I-91 CT Exit 45 (Bradley Airport)	8.22	2.16	2.12
Total	**22.50**	**14.46**	**17.53**

Table 8-6 – Travel Time Comparison Eastbound Routes (2001, 2015, and 2019)

Eastbound	**2001 (Minutes)**	**2015 (Minutes)**	**2019 (Minutes)**
I-291 Exit 2 (Dwight/Chestnut Streets	4.67	5.51	6.65
I-291 Exit 3 (Armory Street)	0.73	0.68	0.73
I-291 Exit 4 (St. James Avenue)	1.07	1.37	1.34
I-291 Exit 5 (Page Boulevard)	1.72	1.76	1.77
I-291 Exit 6 (Shawinigan Drive)	1.38	1.26	1.28
I-90 Exit 6 (Chicopee/Springfield)	2.03	2.01	1.94
I-90 Exit 7 (Ludlow)	4.27	3.20	3.45
I-90 Exit 8 (Palmer)	5.88	7.02	7.00
I-90 Exit 9 (Sturbridge)	14.12	14.71	14.43
I-90 Exit 10 (Auburn/Worcester)	10.67	10.87	10.73
Total	**46.53**	**48.39**	**49.32**

Table 8-7 – Travel Time Comparison Westbound Routes (2001, 2015, and 2019)

Westbound	2001 (Minutes)	2015 (Minutes)	2019 (Minutes)
I-90 Exit 4 (Holyoke/West Springfield	12.78	10.73	10.36
I-90 Exit 3 (Westfield)	5.45	4.43	4.99
I-90 Exit 2 (Lee)	27.23	28.12	27.69
I-90 Exit 1 (West Stockbridge)	7.63	8.14	7.91
Total	**53.10**	**51.42**	**50.95**

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Figure 8-6 – Travel Time Contours for the Springfield Central Business District

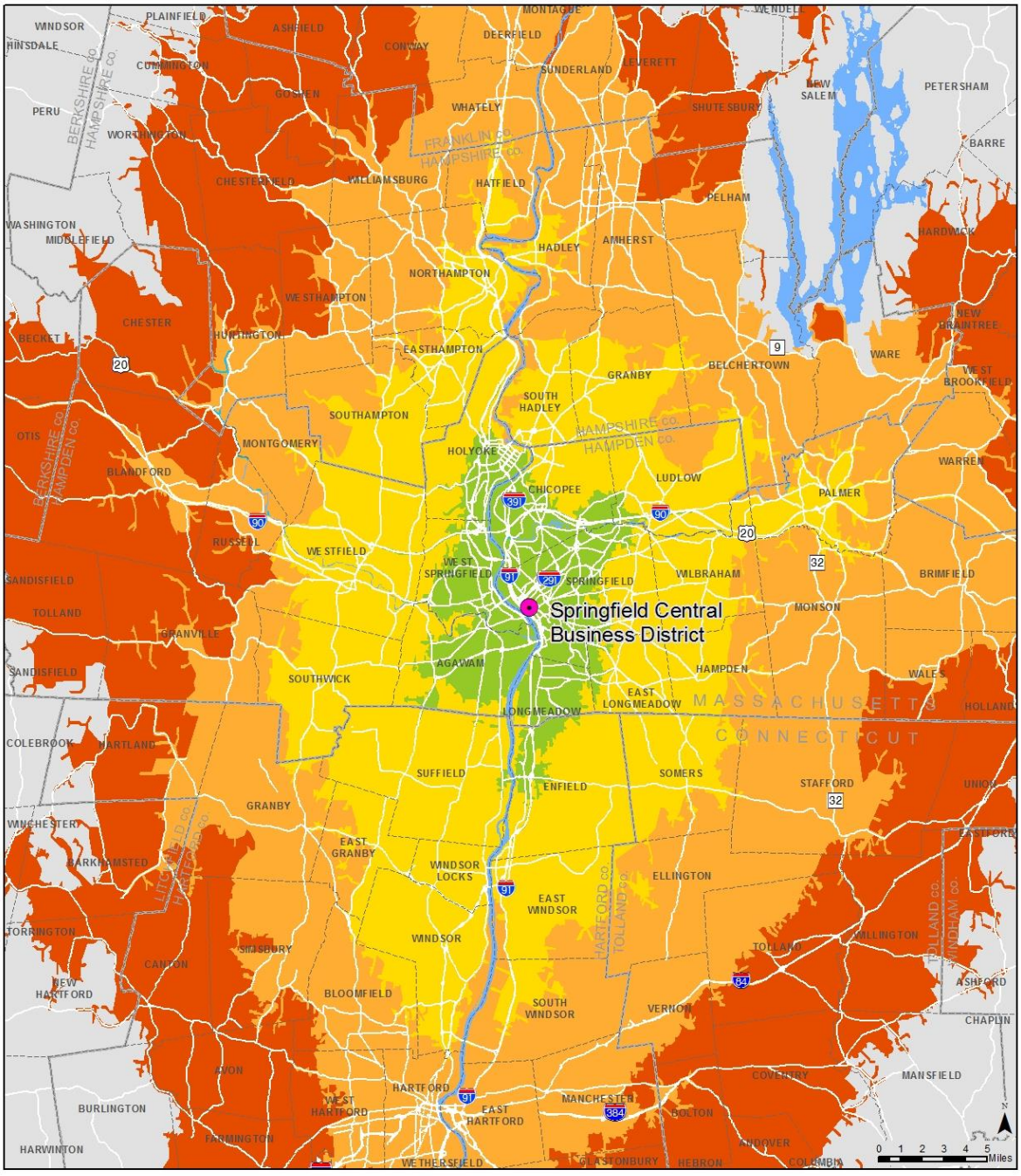


Figure 8-7 – Travel Time Contours for the University of Massachusetts - Amherst

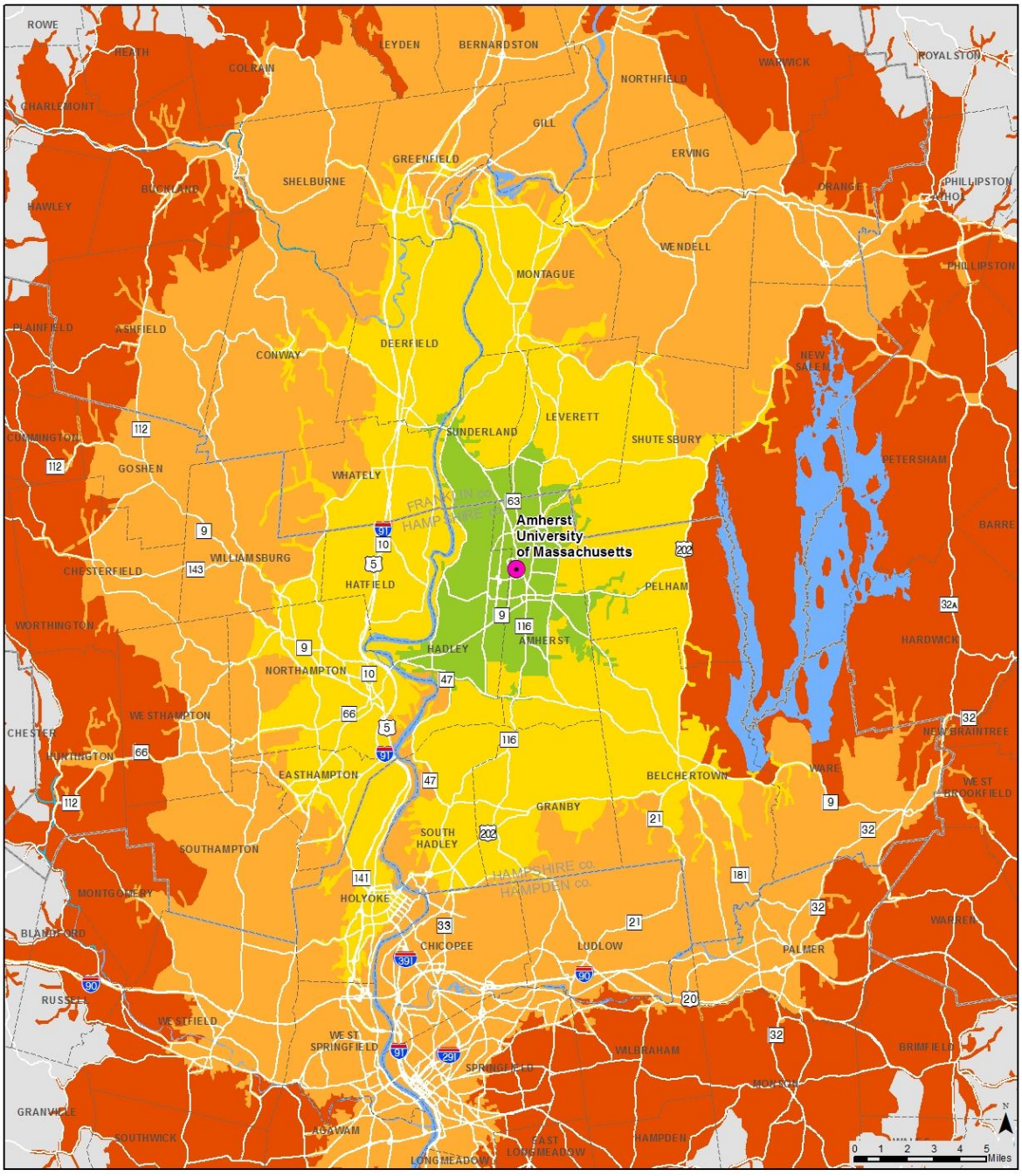
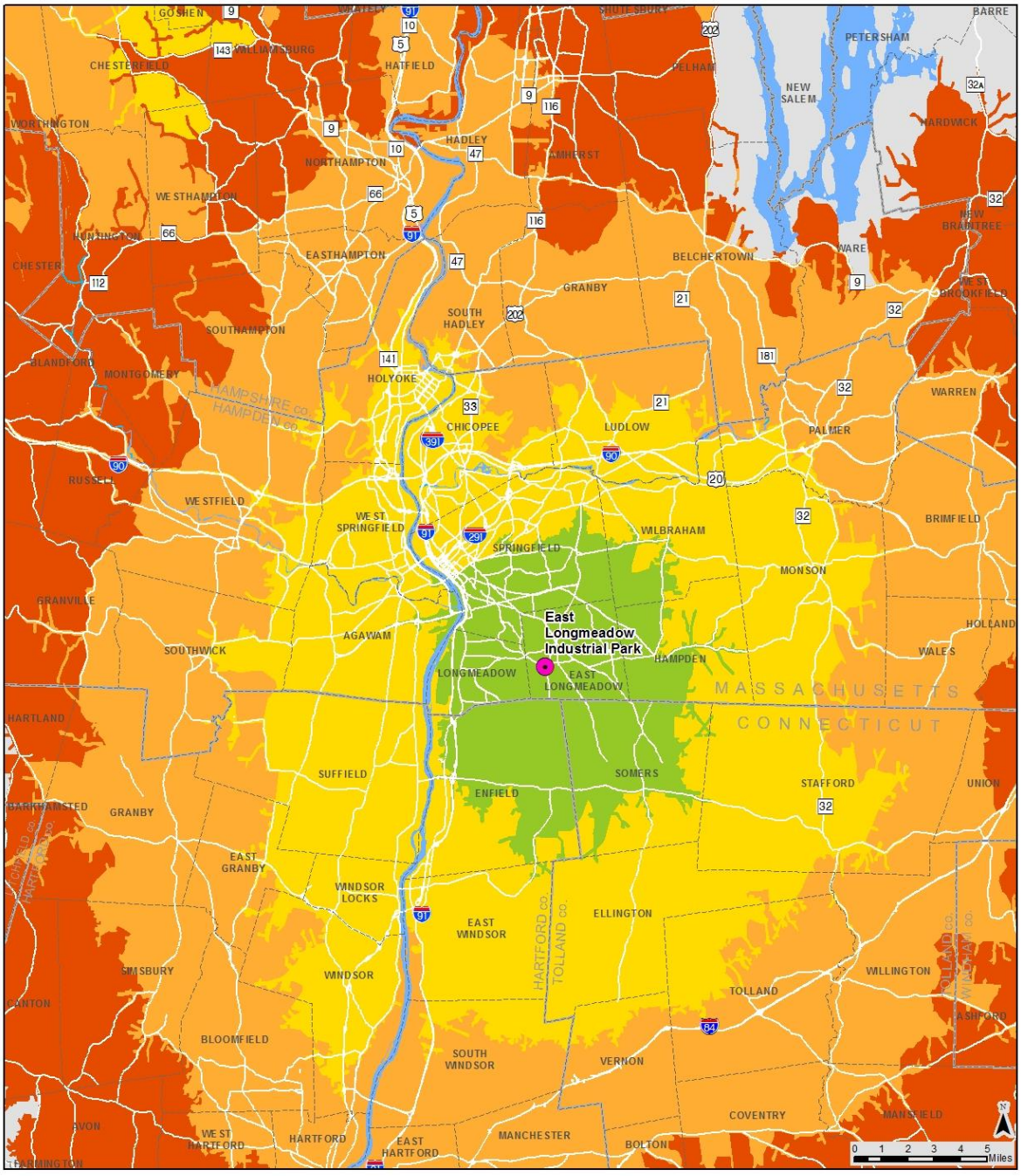


Figure 8-8 – Travel Time Contours for the East Longmeadow Industrial Park



Central Business District Drive Times

(Calculated December 2018, using average traffic conditions for Wednesdays 8am)

EAST LONGMEADOW MA

Drive Time Areas

- 0 - 15 minutes
- 15 - 30 minutes
- 30 - 45 minutes
- 45 - 60 minutes

Figure 8-9 – Travel Time Contours for the Northampton Central Business District

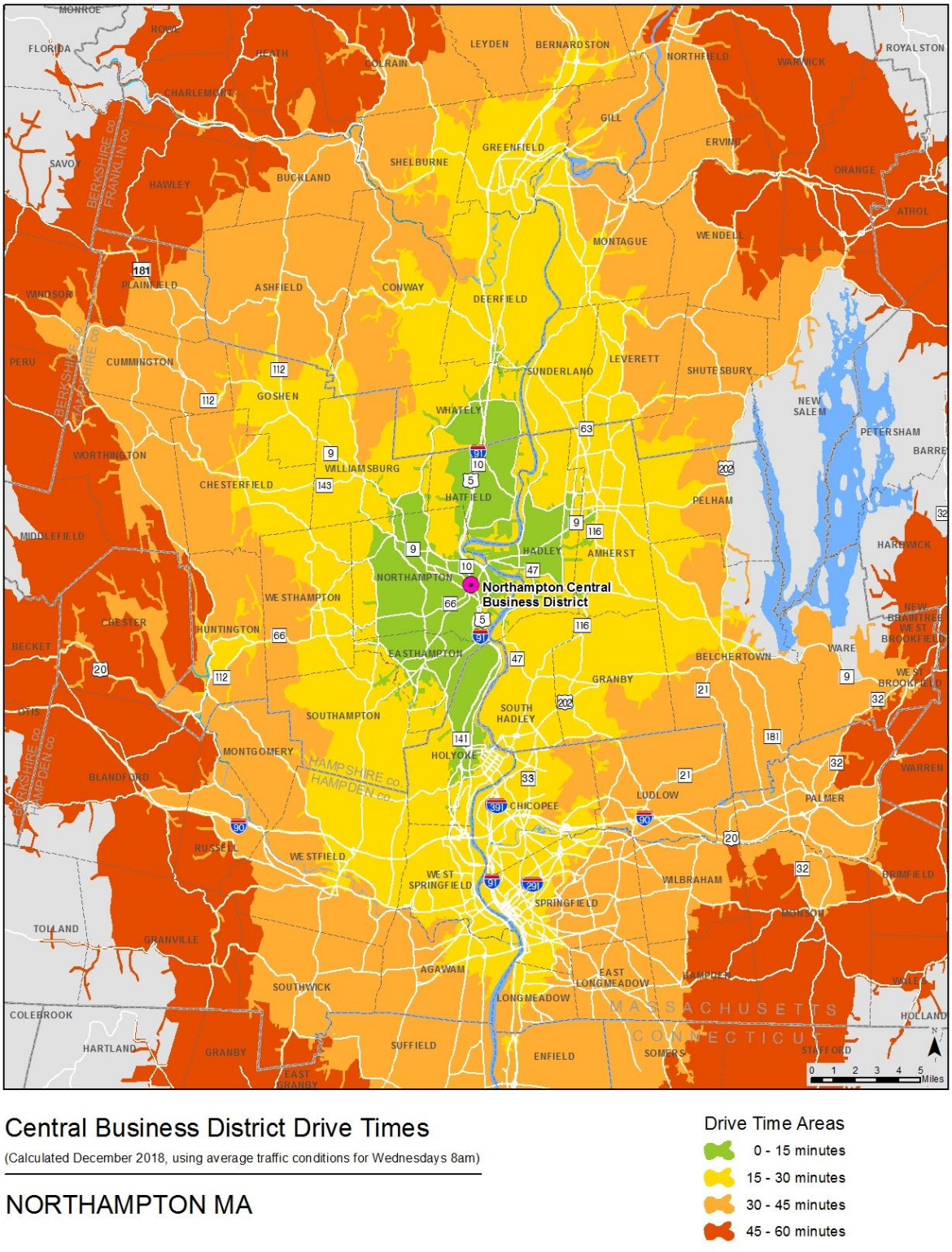
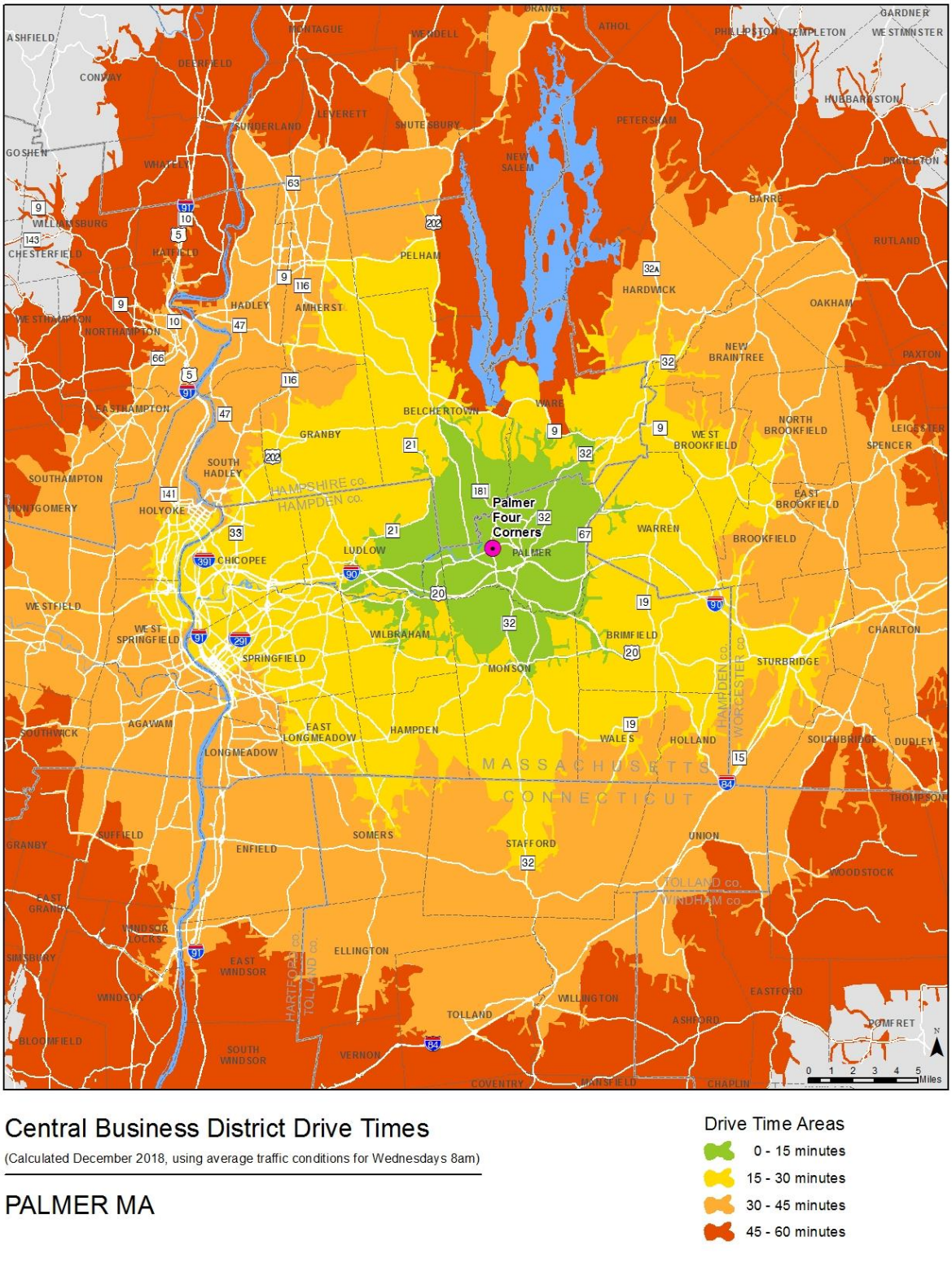


Figure 8-10 – Travel Time Contours for the Palmer Four Corners



Central Business District Drive Times

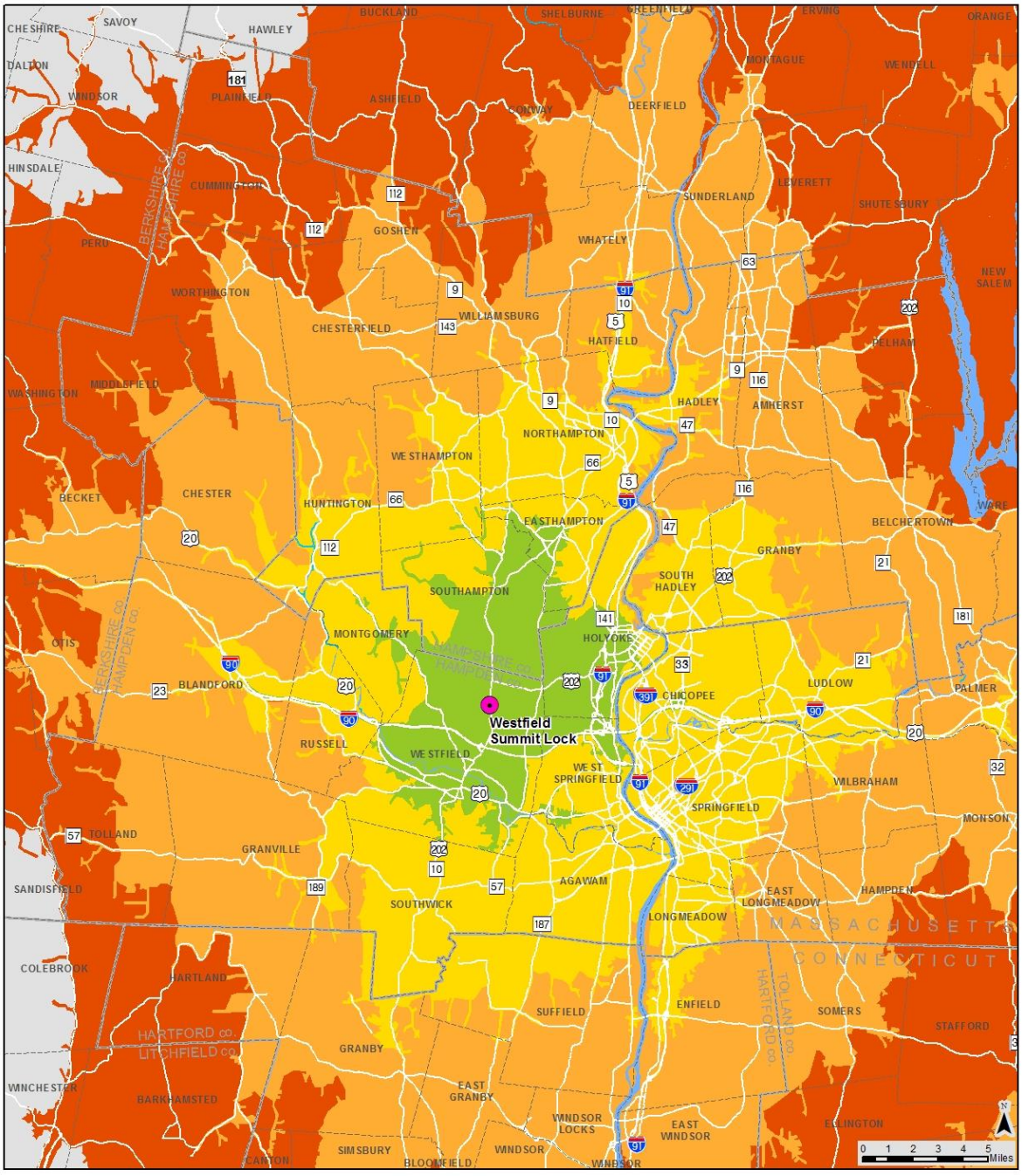
(Calculated December 2018, using average traffic conditions for Wednesdays 8am)

PALMER MA

Drive Time Areas

- 0 - 15 minutes
- 15 - 30 minutes
- 30 - 45 minutes
- 45 - 60 minutes

Figure 8-11 – Travel Time Contours for Westfield Summit Lock



CHAPTER 9

Photo :Route 9 in Williamsburg, MA

PAVEMENT

A. REGIONAL EFFORTS AND PROCESS

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.

The 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 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 "PAVEMENT*View*" software developed by Cartegraph Systems was used to generate an Overall Condition Index (OCI) for each inventoried roadway segment using the pavement distress data collected by PVPC. 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. PVPC incorporates 5 default repair categories:

- Reconstruction of Collectors and Arterials
- Rehabilitation
- Preventive maintenance
- Routine maintenance
- No action

Reconstruction involves the complete removal and replacement of a failed pavement section which includes reclamation. 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.

B. EXISTING CONDITIONS

The PVPC staff surveyed approximately 1,280 miles of federal-aid eligible roadways in the Pioneer Valley region which was divided into 2,479 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 76, which indicates that majority of the roadways are in a good condition. The average OCI information by community is depicted in Table 9-1.

The OCI generated by PAVEMENT*View* was used to establish pavement condition categories of “Excellent”, “Good”, “Fair”, “Poor”, and “Failed” using the OCI ranges provided in Table 9-2.

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Table 9-1 - Average OCI by Community

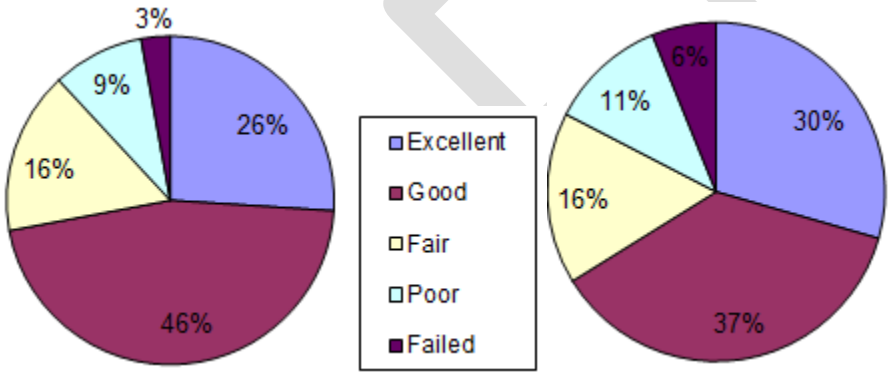
Community	Arterial Miles	Collector Miles	Federal Aid Miles	Average OCI 2020	Average OCI 2016
Agawam	24.47	26.18	50.65	85	67
Amherst	16.32	34.15	50.47	65	58
Belchertown	26.22	20.63	46.85	79	74
Blandford	8.47	7.87	16.34	68	68
Brimfield	11.58	13.56	25.14	87	83
Chester	8.058	0.00	8.058	76	84
Chesterfield	7.71	9.29	17.00	88	81
Chicopee	17.84	43.23	61.07	88	74
Cummington	12.95	7.77	20.72	72	71
East Longmeadow	8.31	23.304	31.61	84	73
Easthampton	4.25	25.79	30.04	58	68
Goshen	5.401	3.71	9.11	76	71
Granby	7.72	14.117	21.83	67	85
Granville	8.803	6.94	15.74	60	76
Hadley	17.41	21.439	38.85	65	85
Hampden	0.00	12.64	12.64	84	84
Hatfield	0.00	14.687	14.69	76	83
Holland	0.00	11.45	11.45	69	77
Holyoke	16.25	46.97	63.22	87	54
Huntington	11.227	7.06	18.29	75	72
Longmeadow	3.26	15.79	19.05	88	74
Ludlow	24.47	11.68	36.15	75	68
Monson	8.64	22.95	31.59	54	83
Montgomery	0.00	5.197	5.20	74	83
Northampton	50.81	15.7	66.51	78	68
Palmer	15.59	30.73	46.32	58	87
Pelham	5.795	6.02	11.82	94	71
Plainfield	0.00	11.893	11.89	60	39
Russell	9.45	4.75	14.2	60	78
South Hadley	15.39	13.84	29.23	68	74
Southampton	0.00	17.17	17.17	65	88
Southwick	14.14	12.66	26.8	60	77
Springfield	42.08	116.52	158.60	84	62
Tolland	5.66	0.00	5.66	99	77
Wales	0.00	8.03	8.03	60	44
Ware	13.36	19.77	33.13	66	85
West Springfield	7.51	28.64	36.15	86	60
Westfield	19.21	48.57	67.78	82	62
Westhampton	0.00	21.08	21.08	73	71
Wilbraham	5.79	28.25	34.04	78	85
Williamsburg	8.11	11.20	19.31	73	74
Worthington	10.32	6.48	16.80	64	84
			Average OCI	**75.8**	**71.1**

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	>24.5 and <=47.5	<=24.5

The results indicate that most of the region's surveyed federal-aid eligible roadways are in good condition. Figure 9-1 shows 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 473 miles of arterial and 818 miles of collector roadways.

Figure 9-1 - Pavement Condition of the Region's Arterial and Collector Roadways



Arterial Roads Collector Roads

Figures 9-2 and 9-3 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 9-2 is indicative of pavement repair action taken on the arterial roadway segments which require major rehabilitation and whose condition cannot deteriorate much further resulting in more roadway segments in excellent or good condition. Figure 9-3 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 resulting in more miles of excellent condition and keeping up with miles of good or fair condition.

Figure 9-2- Arterial Road Condition Comparisons by Miles

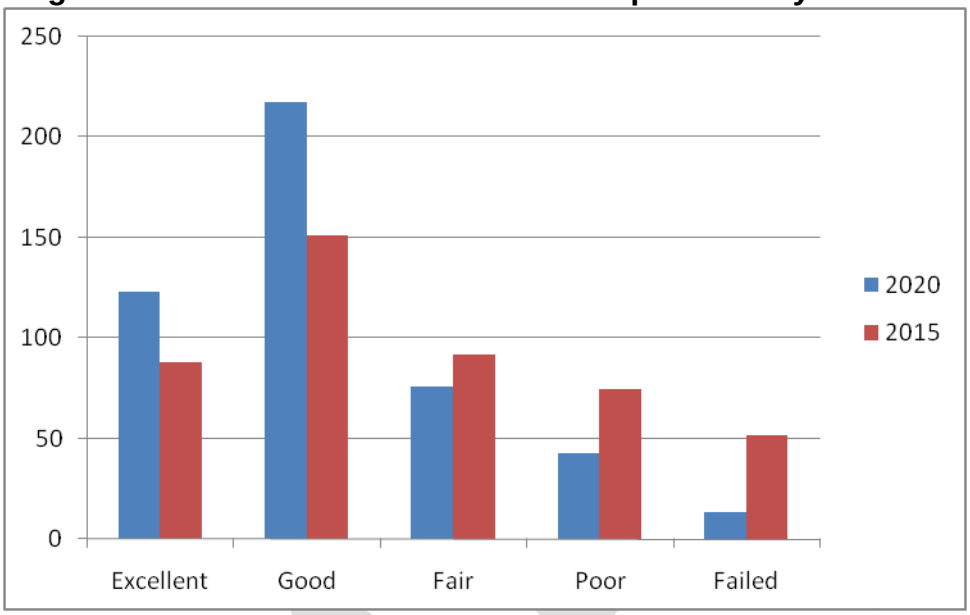
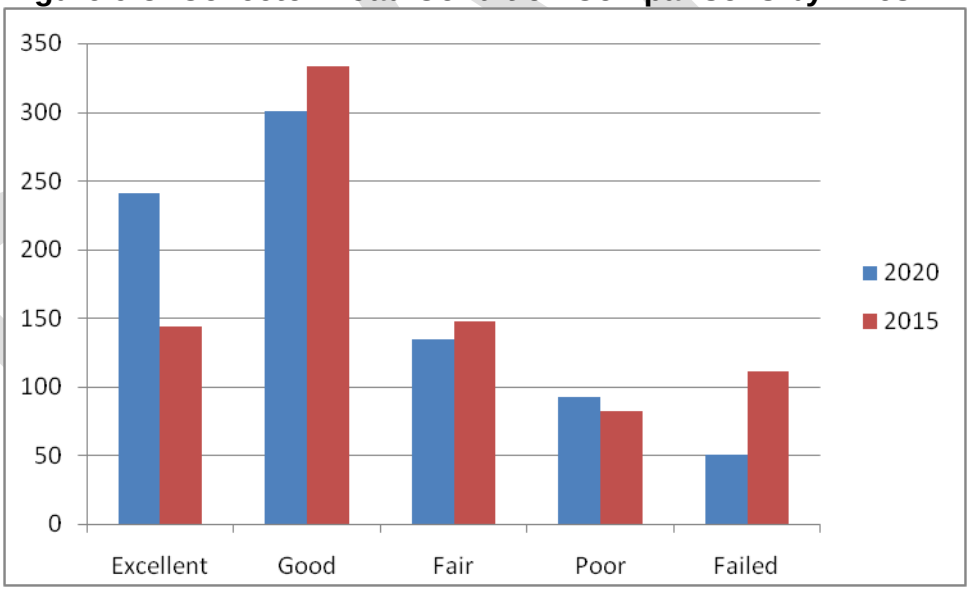


Figure 9-3- Collector Road Condition Comparisons by Miles



CHAPTER 10

Photo: Solar Farm off Holyoke Street in Ludlow, MA

SUSTAINABILITY

In the Pioneer Valley we define sustainability as "meeting the needs of the present generation without jeopardizing the ability of future generations to meet their own needs." [4] We also find the analogy of the three legged sustainability stool to be useful, with its balanced understanding of the importance and inter-dependence of equity, the environment and the economy.

Our transportation system can advance our sustainability goals: affirmatively furthering improved access to opportunity for people in the region who have been left out/kept out; sustainably growing our regional economy and respecting/nurturing the environment while maintaining/developing resilient thriving communities; or it can be an impediment. The majority of motorized vehicles consume fossil fuels to operate and as a result produce exhaust and other GHG emissions. This accelerates the climate crisis that threatens the resilience of our region, pollutes our air and exacerbates health problems such as asthma and emphysema. Complete

[4] using the United Nations Bruntland Commission definition from 1984—

Streets, however, those that are safe and comfortable for all road users focus equally on pedestrians, bicyclists, transit users, cars and trucks. They also facilitate residents' healthy behavior, making it easier for people to walk and bike to work, school, and play, and reduce GHG emissions from transportation. Motorized vehicles require impervious surfaces, which pollute both ground and surface water sources as rain water runs across these surfaces, picking up gasoline, oil and other pollutants before being absorbed into surface water bodies or into groundwater.

Access to a vehicle, especially one that is safe, reliable and energy efficient, can help a family move out of poverty and into the middle class by making it easier and more efficient to consistently get to work, school, and appointments on time. Individual and neighborhood access to electric vehicles (EV) with a robust public and private EV charging station network can advance climate action goals. Lack of transit services, missing sidewalks and bicycle lanes all hamper the quality of life of people without vehicle access. A balanced transportation system is more sustainable, it meets more people's needs while using resources efficiently, and it facilitates regional economic development.

A 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, as well as by improving the flow of existing traffic through signal timing, roundabouts, electronic toll collection and real ride-sharing (not on-demand ride hailing apps.) Expanding access to resource efficient transportation options can maximize social equity, increase social connectivity, and improve safety and resource efficiency. Transportation efficiency benefits society and reduces the negative impacts of motorized vehicles, which account for one-third of greenhouse gas emissions and 20-25% of average U.S. household expenditures.

Since our last RTP, the Commonwealth of Massachusetts has made dramatic strides in articulating and implementing a range of initiatives to advance sustainability across the State. In 2016, Governor Baker signed Executive Order 569, which lays out a comprehensive approach to further reduce greenhouse gas emissions, safeguard residents, municipalities and businesses from the impacts of climate change, and build a more resilient Commonwealth.

"Massachusetts is a national leader in addressing the threat of climate change and proactively preparing for its impacts, and I am proud to sign this bipartisan bill to build on those efforts," said Governor Charlie Baker. *"The Commonwealth is now positioned to increase our resiliency to climate change, protect the environment, and improve recreational opportunities. We look forward to working with our legislative and local partners to build a cleaner and more sustainable Commonwealth."* https://www.mass.gov/news/governor-baker-signs-legislation-directing-24-billion-to-climate-change-adaptation

On March 21, 2018, at a conference focused on recycling, a statement from Governor Baker was presented: "*The Commonwealth is committed to sustainability and protection of our environment, and working collectively, we can continue to increase the economic value and environmental benefit of recycling in all of our communities.*" In addition, Governor Baker's administration recently committed $10 million to Municipal Vulnerability Preparedness (MVP) to invest in climate-smart infrastructure and nature-based solutions to protect public health, safety, and property.

In Massachusetts sustainability means acting to reduce GHG emissions and protect the environment while maintaining economic value. The Commonwealth has long been a leader with respect to aggressive goals of GHG emissions reduction. However, Green House Gas (GHG) emissions from transportation are still 38% of MA GHG emissions and 32% in the Pioneer Valley. Single vehicle trips are still most common. Housing costs in MA are some of the highest in the country. Severe weather events cost the Commonwealth and its residents $556,876,789,345. And just 6% of Pioneer Valley commuters do so on foot and only 4% on bike.

The Pioneer Valley region is committed to a sustainable future, working to reduce GHG emissions in accord with state goals, protect open space, catalyze sustainable economic and community development, build a balanced transportation system and advance municipal, regional and Commonwealth resilience. We are proud to partner so effectively with many state agencies and departments.

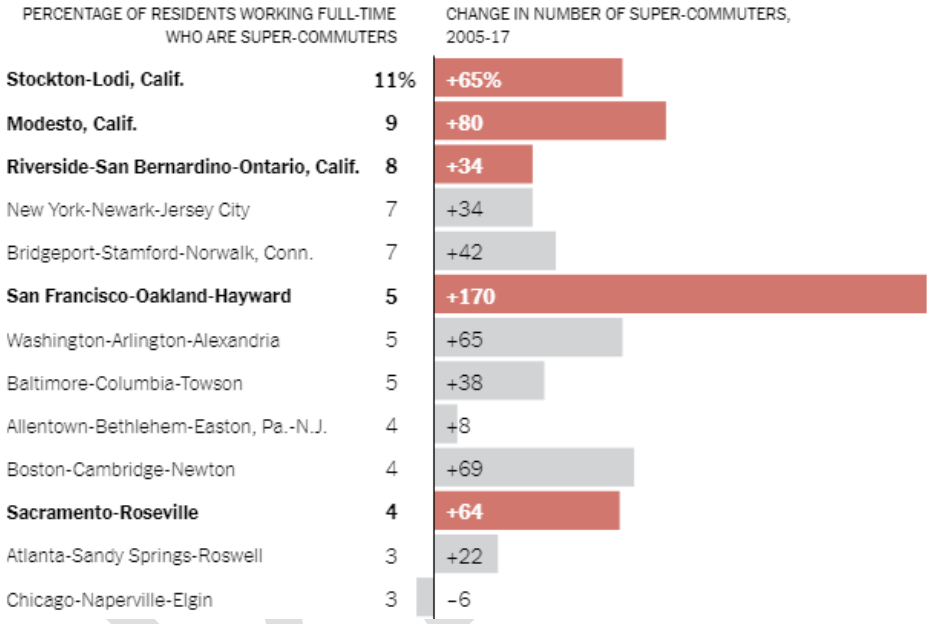
The Housing crisis in Massachusetts is related to how we use land and the transportation needs that result from our spread out development patterns. Massachusetts and California are two places in the country experiencing a surge in "super commuters", people who have to travel for 90 minutes or more to get to their jobs because the cost of housing near jobs is too high for all but the wealthy to afford.[5]

Our goal for sustainable transportation is 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 expanded rail service, sidewalks, on and off road bike ways, airports, and miles of paved and unpaved roadways, while minimizing negative impacts on the region's current and future air, land, water and people.

[5] https://www.ctps.org/data/html/studies/other/Long-Distance_Commuting/Long-Distance_Commuting_in_the_Boston_Region.html#_Toc496628576

Figure 10-1 – Cities with the Most "Super – Commuters"

Of the 100 largest U.S. metropolitan areas, these are the 20 with the greatest proportion of residents working full-time who spend 90 minutes or more getting to their jobs. (Nationally, 72 percent of these super-commuters drive.) Eight of these areas are in California; the San Francisco area has seen the most growth in ultra-commuters since 2005.



A. MASSDOT- COMMMISSION ON THE FUTURE OF TRANSPORTATION

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, the Commission on the Future of Transportation in the Commonwealth developed the report *Choices for Stewardship: Recommendations to Meet the Transportation Future*. Executive Order #579 established the Commission and charged it with imagining Massachusetts in 2040. The Commission report identifies 10 key challenges facing transportation in Massachusetts over the next 20 years:

- We can't know the future.
- Disruptive technological change is inevitable.
- Massachusetts is growing and aging.
- The existing transportation system is made up of transportation haves and have-nots.
- Transportation needs vary across the Commonwealth and its communities.

- The transportation system needs to move more people in fewer vehicles.
- Land use and development decisions drive transportation patterns.
- The transportation system needs to be de-carbonized.
- Transportation infrastructure needs to be made resilient to a changing climate.
- Needed investments need to be prioritized and paid for.

They went on to emphasize the importance of affirmatively focusing on people with low-incomes, disabilities, limited access to public transit and other transportation options. This also includes communities of color who are disproportionately affected by many of the challenges currently facing our transportation system and related systemic issues, such as pollution, congestion, long commute times, rising housing costs, and unreliable public transportation. PVPC is committed to ensuring active representation and participation of these groups of people in our regional transportation planning processes.

Chapter 11 of the RTP details the Pioneer Valley's plan, within the context of the Commonwealth of MA rules and regulations, to reduce GHG emissions from transportation: 10% -25% below 1990 levels by 2020 and an 80% reduction below 1990 levels by 2050. Based on information from the Commission on the Future of Transportation, almost 40% of GHG emissions in 2015 came from transportation infrastructure and vehicles.

B. REGIONAL SUSTAINABILITY INITIATIVES

Over the last decade, the Pioneer Valley has taken great steps to integrate sustainability into all our regional planning work. Our regional efforts support the recommendations from the Commission on the Future of Transportation in the Commonwealth's report as referenced above. In the Pioneer Valley, we are working on nine focus areas:

- Promote Smart Growth and assure integration of Land Use planning with Transportation, Housing, and Economic Development planning—continuing to collaborate with the Governor and others on zoning reform.
- Legislative changes to expand funding options—Regional Ballot Initiative (RBI) and the Transportation Climate Initiative (TCI).
- Electrify Buses and Cars—decarbonization of the fleet.
- Make all our streets "complete," safe and comfortable for all road users, by building out a connected network of both on and off road protected bike lanes, paths, and trails, prioritizing carbon free modes of transportation where possible.
- Expand ValleyBike, our regions' all electric bikeshare program a collaboration of PVPC and 5 member municipalities and UMASS.
- Maintain and strengthen our inter-disciplinary efforts to improve public health by facilitating Mass in Motion, Aging in Place, County Health Improvement Plans, Transforming Communities Initiative, Community Transformation Grant, Climate Action & Resilience plans and other public health work in our region.

- Advance Municipal Vulnerability Preparedness (MVP) and Hazard Mitigation work at the municipal level to assure strong and resilient communities.
- Advance and expand opportunities for North-South and East-West passenger rail.
- Collaborate to expand transit and other efficient multi-passenger forms of transportation.

1. Smart Growth—integrating transportation, land use and housing

The region has researched, planned and worked collaboratively to implement a regional Smart Growth plan, Valley Vision, since 1998. The goals of Valley Vision, promoting compact, mixed use development in and around existing urban and town centers while protecting open space and natural resources, are in sync with the RTP. For more information on Valley Vision, please visit: http://www.pvpc.org/plans/valley-vision-4-land-use.

The Commonwealth has continually funded District Local Technical Assistance (DLTA) for the last 12 years, helping our region advance smart growth planning. In addition the Executive Office of Energy and Environmental Affairs (EEA) has launched Land Use Planning Grants over the last three years, helping our municipalities and our region to advance smart growth. Some of our member municipalities are making great progress promoting infill, housing rehabilitation and new affordable and market rate housing development where there is existing infrastructure to support it.

2. Legislative Changes to Expand Funding Options

a) Zoning Reform

The effort to update Massachusetts zoning laws, widely recognized as the most out of date in the United States of America, is ongoing. Governor Baker is leading significant support to a new initiative to expand housing choice, which, could help reduce the need to drive if there was more of a range of housing choices - especially affordable housing. A recent study by a Boston University professor reveals how local Boards seem to prioritize the voices of established property owners who abut proposed new affordable housing over the needs of the rest of the community, highlighting the need for training and new perspectives of residents to serve on these boards.

b) Regional Ballot Initiatives

Massachusetts municipalities and regions would benefit from enabling legislation for Regional Ballot Initiatives (RBI), which would allow a city or town or a group of cities or towns to raise revenue through higher property taxes or sales taxes or another source. The revenue would have to be used for a specific transportation project. Approving a new tax would require a vote of the town's governing body

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and approval by town voters on the ballot. The ballot question would specify the size and duration of the tax and the specific projects it would be used for. RBIs were supported by the Senate in the last legislative session, but did not make it into the final approved legislation.

c) Transportation and Climate Initiative

The Transportation and Climate Initiative (TCI) is a regional collaboration of 12 Northeast and Mid-Atlantic States and the District of Columbia that seek to improve transportation, develop the clean energy economy and reduce carbon emissions from the transportation sector. The participating states are: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and Virginia. The initiative builds on the region's strong leadership and commitment to energy efficiency and clean energy issues, and its programs to reduce carbon emissions in the power sector, which have resulted in the region becoming one of the most energy efficient areas in the nation. At the same time, the effort underscores the sense of urgency shared by all 13 jurisdictions, and their collective aspirations to become the leading region for sustainability and clean energy deployment in the country.

The TCI is directed by state and district agencies located within the 13 TCI jurisdictions. Each agency is free to determine whether and how they will participate in individual projects and working groups. The initiative is facilitated by the Georgetown Climate Center.

3. Electric Charging—Decarbonization of the Fleet

In 2017, PVPC advanced a regional EV charging station plan and working group (http://www.pvpc.org/projects/ev-charging-station-planguide). The work affirmed that all municipalities, businesses and institutions that receive customers for an hour or more, should add EV charging stations. Both Eversource and National Grid, the two investor owned utilities that serve our region, currently offer incentive programs to advance EV charging stations. While our municipal utilities are not yet offering EV charging station subsidies, the Commonwealth continues to fund the Massachusetts Offers Rebates for Electric Vehicles (MOR-EV) program, offering funds to offset up to half the cost of an EV charging station as well as a rebate on the purchase of electric vehicles.

Thanks to the efforts of our certified Green Communities, and to some foresight from major employers in the region, we have a good start on a connected network of EV charging in our region and we continue to assist our municipalities and collaborators to advance this work.

The PVTA currently has 3 electric buses in their fleet of fixed route transit vehicles with plans to acquire more. When the PVPC worked with the city of Springfield on

their Climate Action & Resilience plan, we highlighted that a complete electrification of PVTA buses could result in reductions of 18,260 metric tons of CO2.

4. Complete Streets

Many communities in the Pioneer Valley still lack adequate bicycle and pedestrian infrastructure. However, in the last few years communities in the region have had some success improving bicycle infrastructure, repairing and adding new sidewalks and developing new shared use paths, thanks in part to MassDOT's Complete Streets program. Through this program our communities have initiated projects to make local streets safer and more inviting for people to walk, run, and bike. These efforts will also improve the health of Pioneer Valley residents through improved opportunities stay active, reducing chronic disease. More information on the Complete Streets program is included as part of the Appendix to the Regional Profile Chapter of the RTP.

5. ValleyBike

Bikeshare in the Pioneer Valley, known as ValleyBike, is the culmination and realization of state, regional and municipal goals articulated in the region's 2014 sustainability plan, Our Next Future, as well as in municipal and state plans and goals. Bikeshare is an integral component of the region's path to a regenerative and sustainable future and strives to promote healthy habits and reduce greenhouse gas producing vehicle trips. If managed effectively and expanded appropriately, ValleyBike could also mitigate the need for expensive road repairs and expansion, and has the potential to improve the effectiveness of our region's transit system.

ValleyBike had great success in its first five months of operation in the region. Riders rode 83,735 miles (equivalent to 3.3 trips around the earth!), on 26,353 bicycle trips. ValleyBike officially launched on June 28th, 2018 and remained open until November 30th hosting a total of 26,353 rides, an average of 170 per day. An average of 167 bikes were available at any given time throughout the season at 43 stations spread amongst five cities and towns (Amherst, Holyoke, Northampton, South Hadley, and Springfield). The ValleyBike program is designed to have 500 bikes available at 50 stations throughout the region. Twenty-six stations were opened at the launch in June and 17 more opened in July and August. The remaining seven stations should be opened in Year Two. The average rides per bike for the entire season was approximately 157.8, and the average rides per bike per day was just over 1.

6. Social Determinants of Health—Transportation and the Built Environment

Health-related impacts of transportation projects, particularly those on environmental justice populations, have been factored into our local TIP scoring process. The impacts of the aging population is receiving greater consideration, as well as access to medical care and sources of healthy foods for all segments of the population.

PVPC is assisting the communities of South Hadley, Chicopee and Holyoke with an Age-Friendly assessment and many of our member communities are moving forward with this designation on their own, including Springfield, Palmer, Agawam, West Springfield, Northampton, and Monson. Both Springfield and Holyoke are "urban food deserts" with portions of the community lacking easy access to full-line grocery stores. PVPC has worked with Springfield and Healthy Hampshire to complete food access mapping projects, helping the local government assess and respond to food insecurity. More information is available here: http://www.pvpc.org/HampshireFoodAsssessment.

7. Adapting to the Changing Climate/Risk Management

Transportation planning in our region is addressing the issue of adaptation to climate change. As our member municipalities complete their Municipal Vulnerability Preparedness (MVP) Community Resilience Building (CRB) processes and update their Hazard Mitigation plans, they are prioritizing 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, especially under-sized or poorly maintained culverts. They are all prioritizing the need to improve the capacity of culverts while minimizing roadway stream crossing impacts all while advancing ecologically and sensible alternatives to reduce roadway washouts. These are referred to by Governor Baker as "Nature Based Solutions." PVPC worked with the city of Springfield Department of Public Works to develop a Green Infrastructure Design Guide to facilitate nature based solutions in the city with Land Use Planning funding from EOEEA that could serve as a model for other municipalities.

In addition to the above, we also continue to work to promote technology and other measures to reduce the need to drive.

a) Avoided Trips

PVPC continues to support expansion of comprehensive internet access for our entire region, and to encourage home-based businesses, because just like in buildings, the most sustainable energy is the energy you do not use. We are working to make it possible for people to telecommute, shop, and take classes on-line, reducing the need for many vehicle trips.

b) Technology-Enhance Capacity of Existing Infrastructure

PVPC continues to advocate for and integrate Intelligent Transportation System (ITS) technologies into our existing transportation systems. This includes real-time traffic congestion monitoring and transit schedule information as well as ride and car sharing programs linked to smart phones. The use of highway medians and other transportation property for solar energy production is being studied and implemented, and the use of recycled roadway materials is encouraged on roadway projects carried out by MassDOT and municipal DPWs.

CHAPTER 11

Photo: Winter of 2018 at the Brunelle Marina in South Hadley, MA

LIVABILITY AND CLIMATE CHANGE

The Commonwealth of Massachusetts has re-affirmed its place as a leader in the country with respect to working actively to address our changing climate (https://www.mass.gov/topics/climate-action) both aggressively reducing GHG emissions to mitigate the damage caused by these pollutants and managing risk and facilitating adaptation to a 'new normal' of increasingly severe and unpredictable weather events while also promoting and facilitating livability--with MassDOT often leading the way. Regulations like the requirement to assess Green House Gas (GHG) emissions on all major transportation projects, and programs like the Complete Streets Initiative (https://www.mass.gov/complete-streets-funding-program) are helping Massachusetts become more livable and do our part to address the climate crisis.

The Pioneer Valley Planning Commission is a proud partner with the Commonwealth in leading the way to Livability and Climate Action, since 2008 when we completed the Commonwealth's first regional clean energy plan, committing the region to 80%

reductions in GHG emission by 2050. Just as the Commonwealth is realizing that we need to be even more aggressive in our commitment to climate action, so are we here in the Pioneer Valley. The same data and resulting conclusions that are summarized and explained in Volume II of the "Choices for Stewardship: Background Books – Facts, Trends, & Issues" report of the Commission on the Future of Transportation in the Commonwealth pp. 89-115, is guiding and informing the work of the PVPC.

We are a motivated partner with the MA EOEEA, promoting the Commonwealth's Municipal Vulnerability Preparedness (MVP) program to assist municipalities and regions to understand and manage risks to people, the environment and critical infrastructure. These risks are associated with the increasingly severe and unpredictable weather Massachusetts is experiencing and will continue to experience in the future. We also refer to and utilize the same data from the Northeast Climate Adaptation Science Center as cited by MassDOT in the recent products of the Commission on the Future of Transportation in the Commonwealth. Significant variations in the consequences of severe weather depend on how successful we can be in collectively reducing GHG emissions. Our region has been and continues to be a leader with respect to understanding the danger to municipalities caused by the climate crisis as demonstrated by our integration of climate change into our region's hazard mitigation plans in 2013.

PVPC promotes and provides technical assistance to advance Green Communities and Complete Streets certification in our region, two State initiatives that serve to help municipalities reduce energy use thereby reducing GHG emissions in the transportation sector. Green Communities requires municipalities to commit to purchase fuel efficient vehicles (in addition to many other building energy use reduction requirements) and Complete Streets promotes livability by requiring communities to adopt Complete Streets policies, requiring the addition of bike lanes (or other bike infrastructure) and sidewalks (or other pedestrian infrastructure) on all new and rehabilitated roadways. Each municipality must develop a Complete Streets Prioritization Plan to qualify for funding.

As the MassDOT "Choices for Stewardship" report Vol II highlights on p. 109, Massachusetts is unusual in the country with the high percentage of our GHG emissions that come from transportation—39%, compared to 28% for the USA. Our estimates of the magnitude of the problem here make our task slightly less onerous, with an estimated 32% of our GHG emissions coming from transportation. We are excited about the possibilities offered by the regional Transportation Climate Initiative (TCI) (https://www.transportationandclimate.org/) the regional collaboration of nine states, including Massachusetts that seeks to develop the clean energy economy and reduce oil dependence and GHG emissions from the transportation sector. As noted, the Pioneer Valley region is a leader with respect to Green

Communities and our communities have combined to reduce GHG emissions from municipal buildings using RGGI funds through the DOER by an estimated 20%.

We are very enthusiastic and optimistic about the possibilities to reduce GHG emissions from transportation if we had a comparable investment pool to fund collaborative work focused on the transportation sector. A public-private TCI funding stream could provide the spark needed to light the creative fires required to solve this emergency.

Just as PVPC has been catalyzing regional progress with respect to regional economic development, clean energy and transportation planning, PVPC has also been a leader in the Commonwealth with a regional smart growth plan. This plan is designed to help our member municipalities grow sustainably, channeling new development where there is existing supporting infrastructure. Livable communities are safe and convenient for people to walk, scoot, bus, stroll, drive, jog, ride, and/or bicycle to their destinations. Valley Vision, our regional Livability plan is now 21 years old and in its fourth iteration. (hyperlink)

A. REGIONAL WEATHER TRENDS AND ANTICIPATED CHANGES

The transportation sector is a significant source of greenhouse gases (GHG), accounting for almost 1/3 of the Pioneer Valleys GHG emissions and almost 40% of the Commonwealth's emissions. Our regional transportation plan includes the goal of reducing driving in single occupant vehicles and accelerating the transition to electric vehicles as we work to green the grid. At the same time we are also very aware of how vulnerable the existing transportation network is to the effects of our changing climate and we are simultaneously working to reduce municipal vulnerability.

1. Temperature

Depending on how successful we collectively are at reducing GHG emissions; our region stands to experience a wide range of temperature changes. The International Panel on Climate Change (IPCC) has documented a trend of warming temperatures caused by human use of fossil fuels. Both the Commonwealth and the Pioneer Valley region have committed to reduce GHG emissions by 80% of 1990 levels by 2050. As summarized in the following figures, temperature increases could be as bad as 34 days over 90 degrees by the end of this century with a 7.2 degree increase in average temperature.

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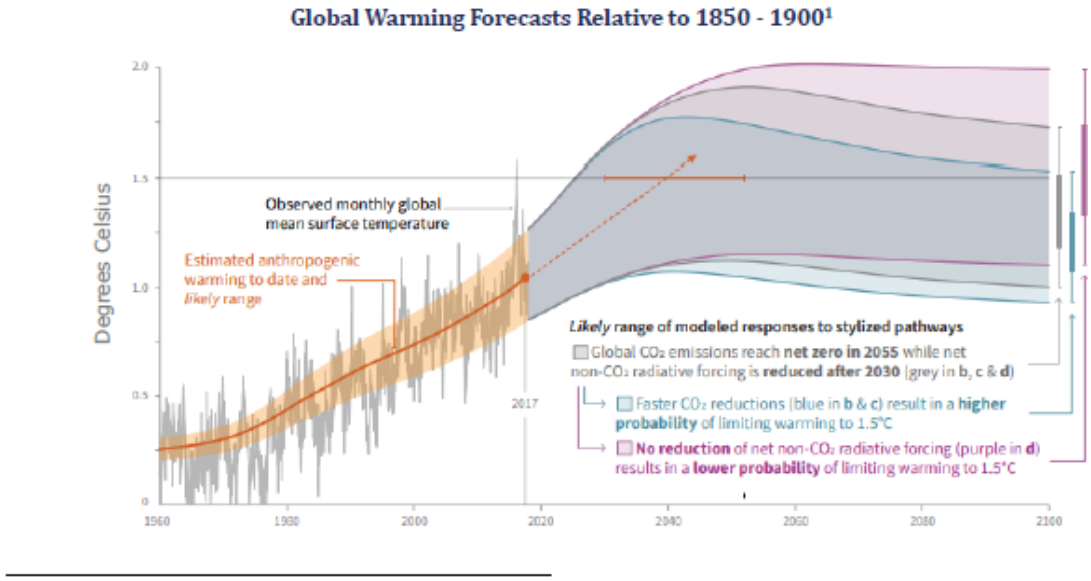
Figure 11-1 – Global Warming Temperature Forecasts



1. Intergovernmental Panel on Climate Change (2018). *Special Report on Global Warming of 1.5 ºC (SR15).* http://www.ipcc.ch/report/sr15/
2. Dupigny-Giroux, L.A., E.L. Mecray, M.D. Lemcke-Stampone, G.A. Hodgkins, E.E. Lentz, K.E. Mills, E.D. Lane, R. Miller, D.Y. Hollinger, W.D. Solecki, G.A. Wellenius, P.E. Sheffield, A.B. MacDonald, and C. Caldwell (2018). *Northeast. In Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, USA. doi: 10.7930/NCA4.2018.CH18. https://nca2018.globalchange.gov/chapter/18/

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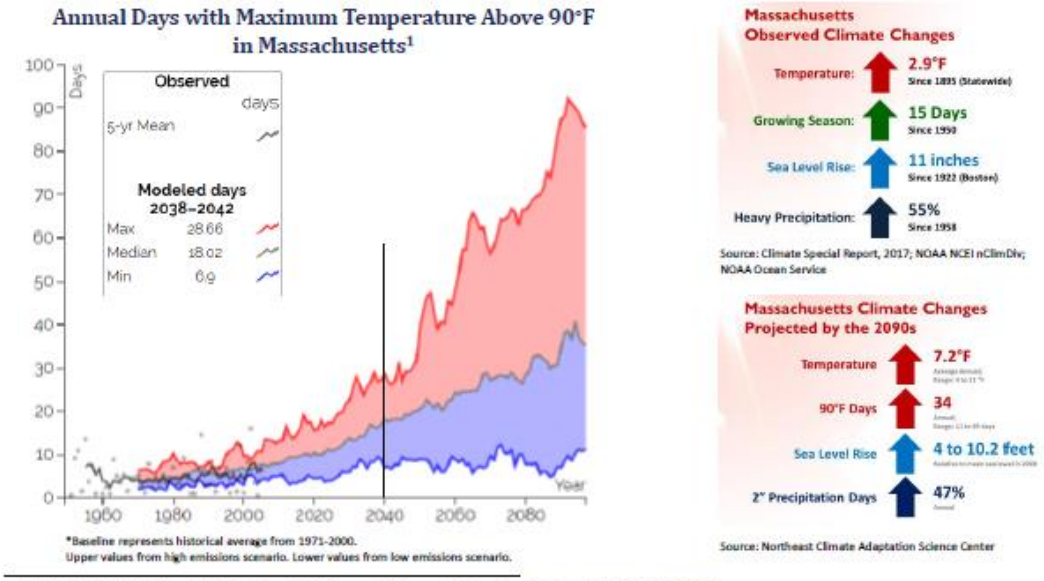
Figure 11-2 – Annual Days With Maximum Temperature Above 90° F



1. Resilient MA. (2018). *Climate Data Grapher.* http://www.resilientma.org/datagrapher/?c=Temp/state/maxt/ANN/MA/
2. National Academies Press. (2016). *Attribution of Particular Types of Extreme Events.* https://www.nap.edu/read/21852/chapter/6#113

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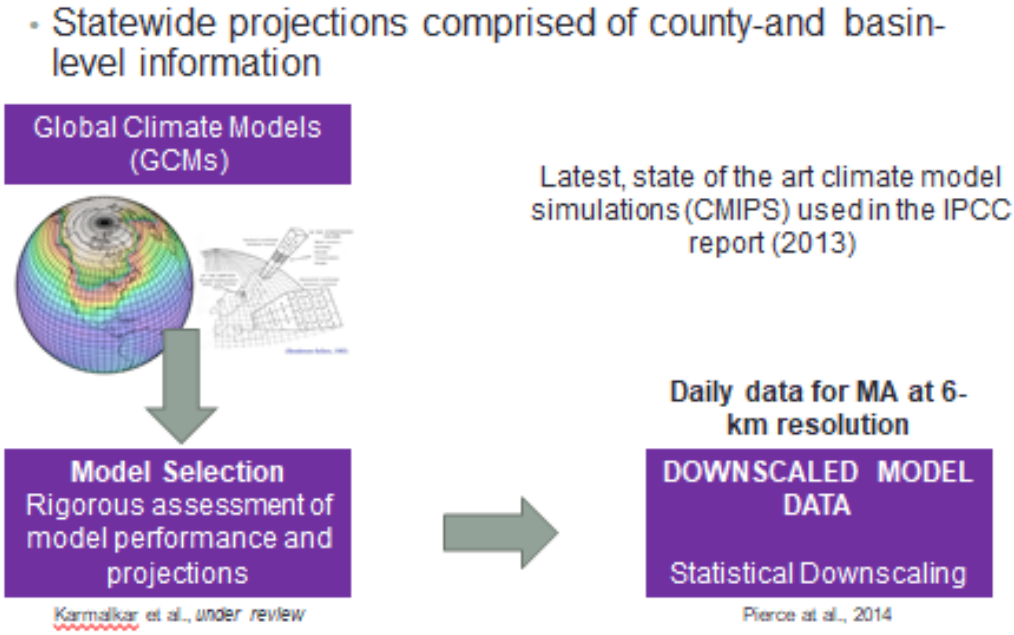
After Governor Baker signed Executive Order 569, committing the administration to work across the state to plan and prepare for the impacts of climate change, EOEEA funded the Northeast Climate Adaptation Science Center to develop down scaled

projections for changes in temperature, precipitation, and sea level rise for the Commonwealth of Massachusetts. The down-scaled, or localized, temperature and precipitation projections are based on simulations from the latest generation of climate models from the International Panel on Climate Change and scenarios of future greenhouse gas emissions. The models were carefully selected from a larger ensemble of climate models based on their ability to provide reliable climate information for the Northeast U.S., while maintaining diversity in future projections that capture some of the inherent uncertainty in modeling climate variables like precipitation. Both annual and seasonal projections are available at the statewide and major drainage basin geographic scales. The charts following highlight some of their findings. (insert website).

Figure 11-3 – Massachusetts Climate Projections



The Commonwealth could experience a dramatic variability depending on whether or not we are able to collectively reduce our GHG emissions.

Figure 11-4 – Massachusetts Emissions Scenarios

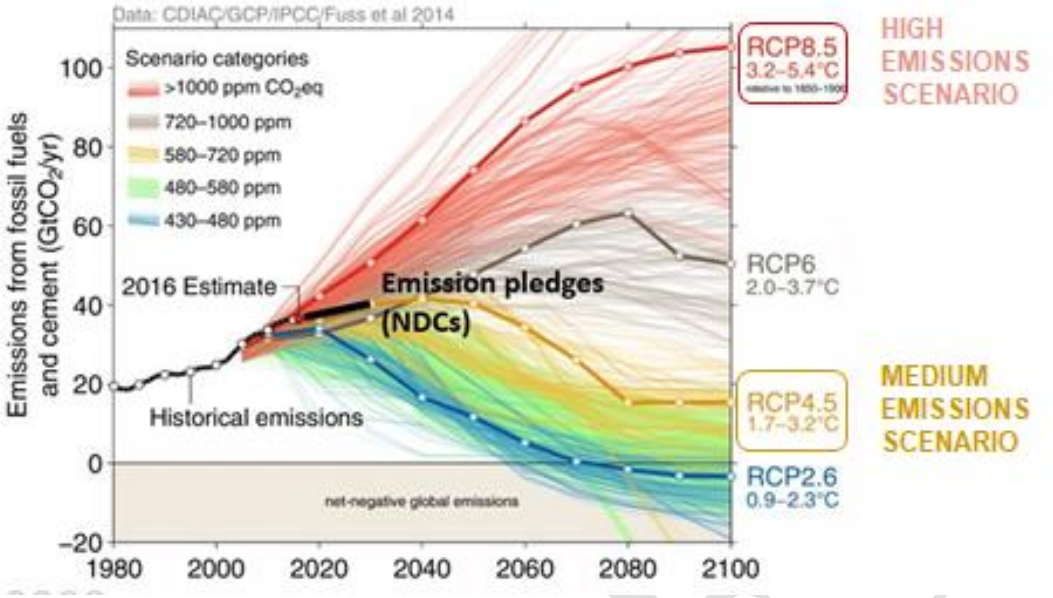


Figure 11-5 – Average Temperatures in Chicopee, MA

- ↑ in annual and seasonal average, max., and min. temps
- Summer highs may ↑ 9% by 2050, up to 17% 2100
- Fall highs may ↑ 12% by 2050, up to 20% 2100

Impacts

- Rain v. snow
- Ecosystem viability
- Consecutive dry days
- Drought and fire

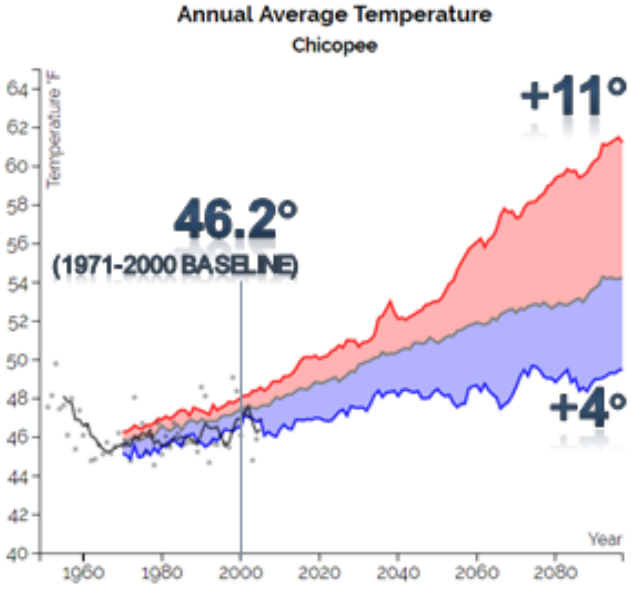
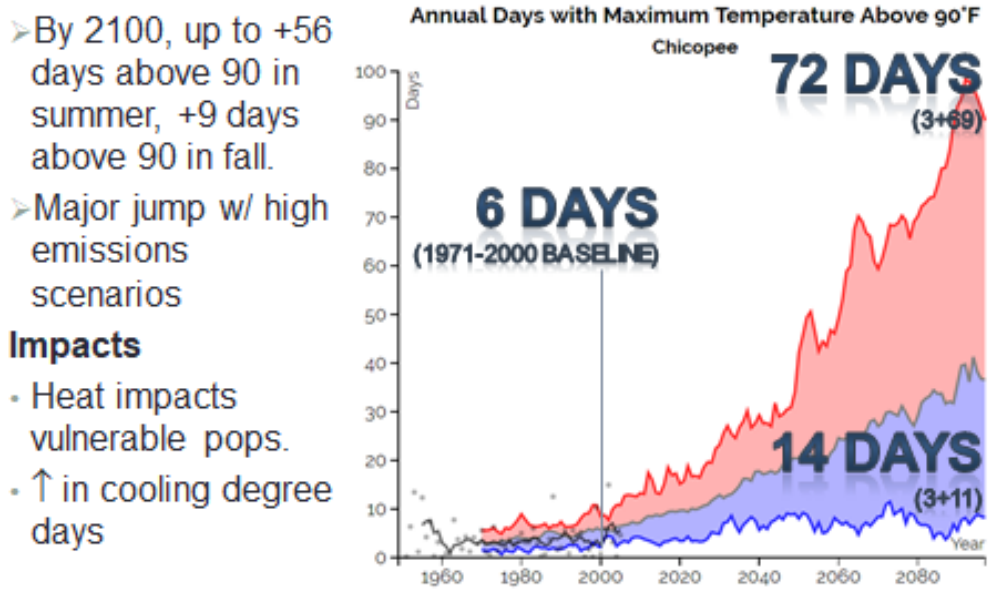


Figure 11-6 – Extreme Temperatures in Chicopee, MA



2. Precipitation

One of the most pronounced changes in climate in the northeast, more than any region of the U.S. during the past several decades, has been a 71% increase in the frequency of extreme precipitation events since the mid-1990s. Figure 11-7 shows the annual maximum 24 hour precipitation from the Amherst weather station, the closest station with solid historical data, showing a major change in the trend line since the 1960s.The highest 24-hour rainfall event recorded within the last few years was approximately 7.5 inches.https://www.climatehubs.oce.usda.gov/sites/default/files/ClimateRisksNortheast_02222017_final2.pdf.

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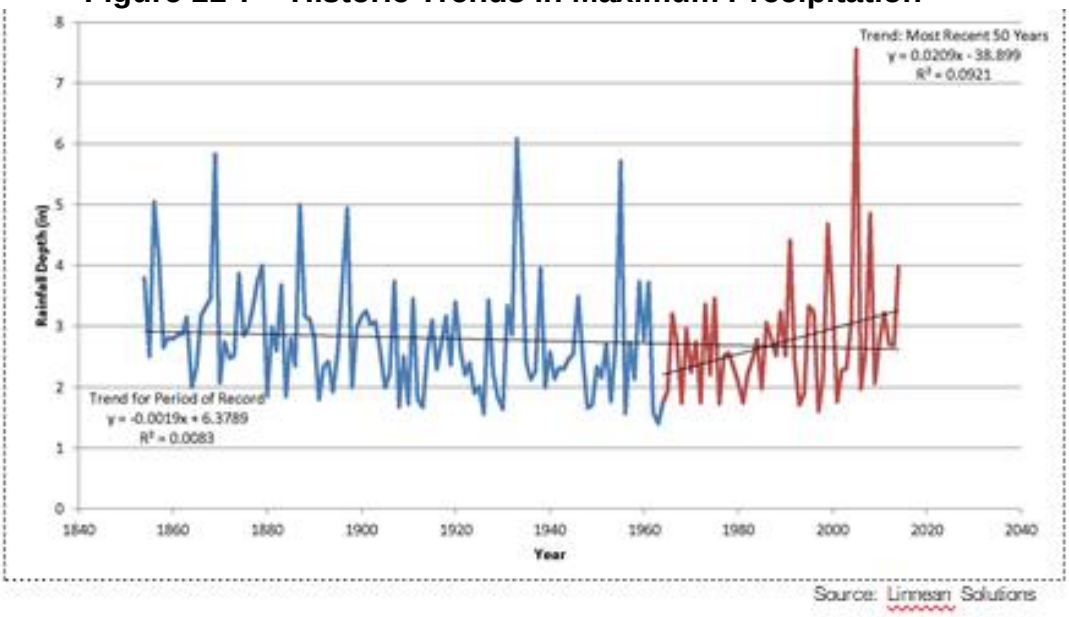
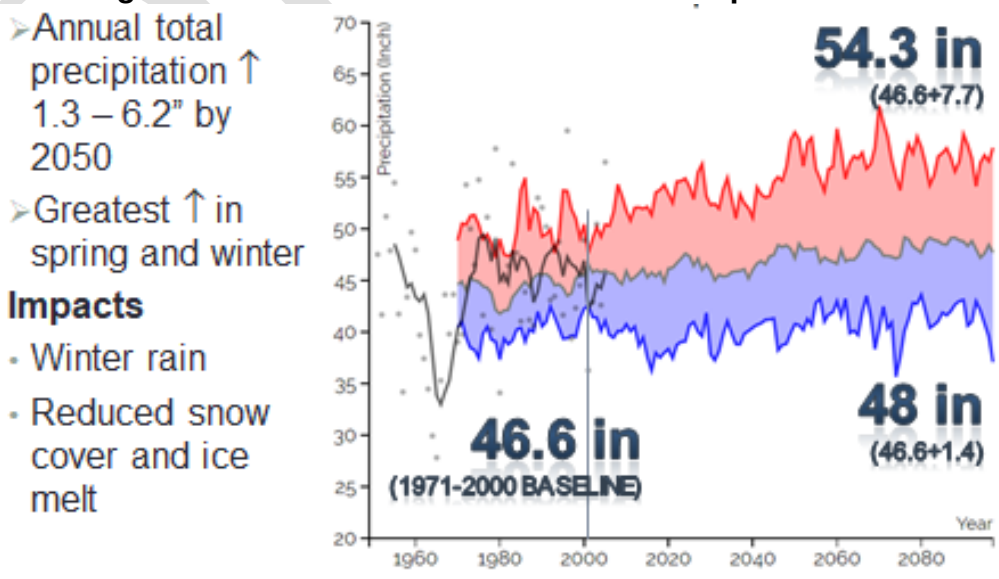
Figure 11-7 – Historic Trends in Maximum Precipitation



Annual precipitation in the basin is expected to increase by +1.1 to +6.0” by 2050 and by up to 7.7” by the end of the century. Rainfall is expected to increase in spring and winter months in particular. Understanding that both winter precipitation and winter temperatures could increase in future decades, we can expect more of this precipitation to fall as rain instead of snow. This could result in reduced snow cover for winter recreation and tourism, less spring snow melt to replenish aquifers, higher levels of winter runoff, and lower spring river flows for aquatic ecosystems. Less snowfall could also increase flood damage to roadways and other transportation infrastructure.

Figure 11-8 – Predicted Annual Total Precipitation



The climate projections suggest that the frequency of high-intensity rainfall and storm events will continue to trend upward. Again, we see the greatest changes in the spring and winter. These are the types of storms that cause flooding, erosion, and pollutant runoff from agricultural activities. Flooding that results from a single intense downpour can cause widespread damage to property and critical infrastructure. High-intensity rainfall events mobilize pollutants such as sediments and nutrients and pose a threat to surface water quality.

Figure 11-9 – Predicted Rainfall Events > 1"

Extreme Precipitation > 1" (Projected)

- Annual ↑ 1.51 days by 2050
- Greatest ↑ in spring and winter

Impacts

- Water quality
- Flood risk
- Erosion
- Stormwater infrastructure

Chicopee Basin

Season	Baseline (days)	Projected change in # Days with precipitation > 1" 2030s	2050s	2070s	2090s
Annual	6.46	+0.83	+1.51	+1.84	+1.73
Fall	2.04	+0.3	+0.42	+0.4	+0.26
Spring	1.39	+0.14	+0.33	+0.53	+0.57
Summer	1.9	+0.24	+0.34	+0.28	+0.28
Winter	1.11	+0.24	+0.41	+0.69	+0.82

The Commonwealth is funding municipalities to undertake Community Resilience Building (CRB) workshops to prioritize risks to existing infrastructure, people, and the environment. In our region, transportation infrastructure, especially culverts and bridges, are emerging as the most pressing need for improvement, repair, and maintenance as all our municipalities understand the increased risk of flooding due to our changing climate.

The Federal Emergency Management Agency (FEMA) has been slowly updating their federal floodplains based on the new normal of our changing climate, but their updated maps are not yet available to the public. Information on FEMA's flood mapping updates is available at this website: https://www.fema.gov/flood-mapping-products. The map below shows 100 and 500 year flood areas based on the latest flood map data available to the public.

Figure 11-10 - 100 and500 Year Flood Areas

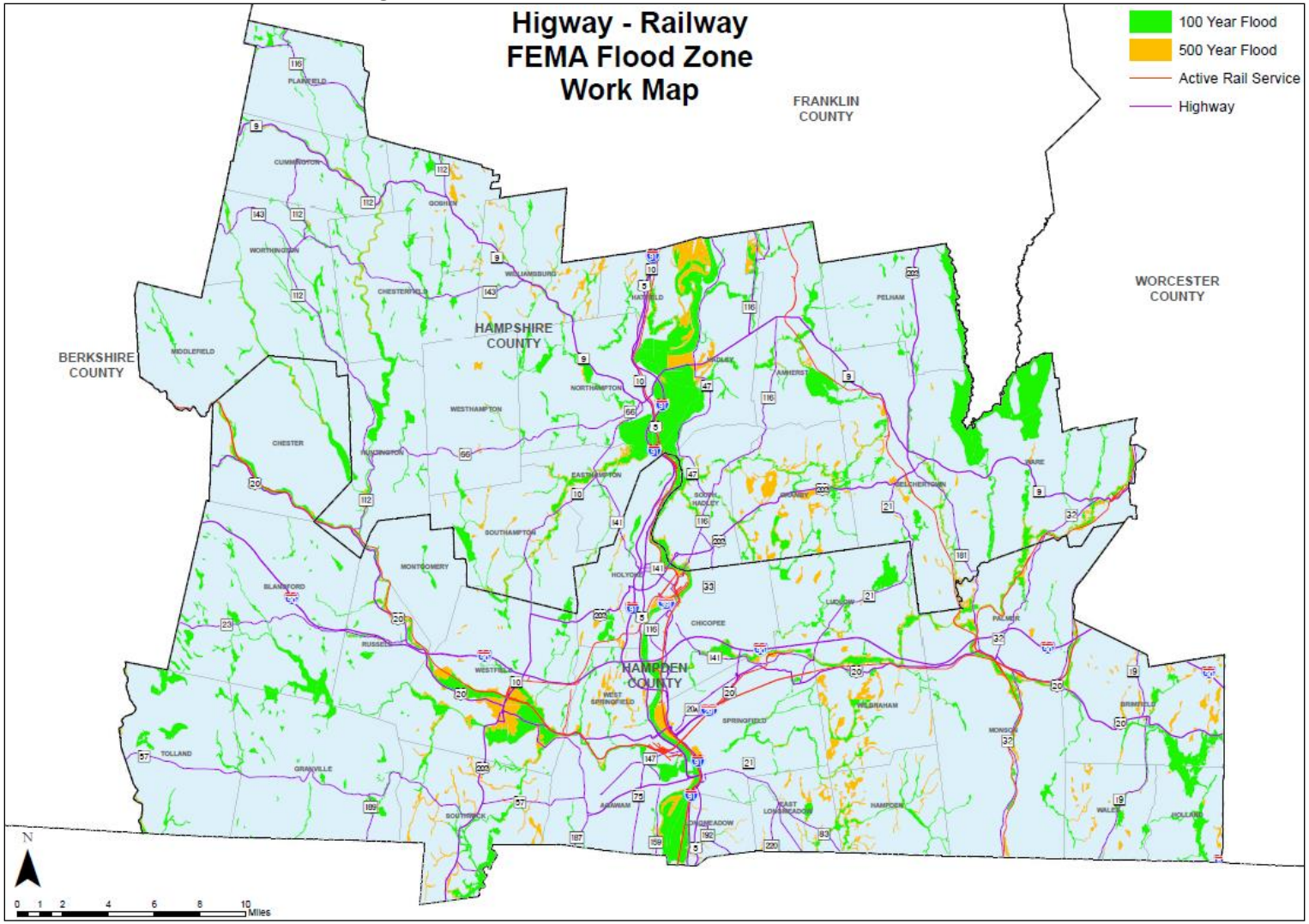
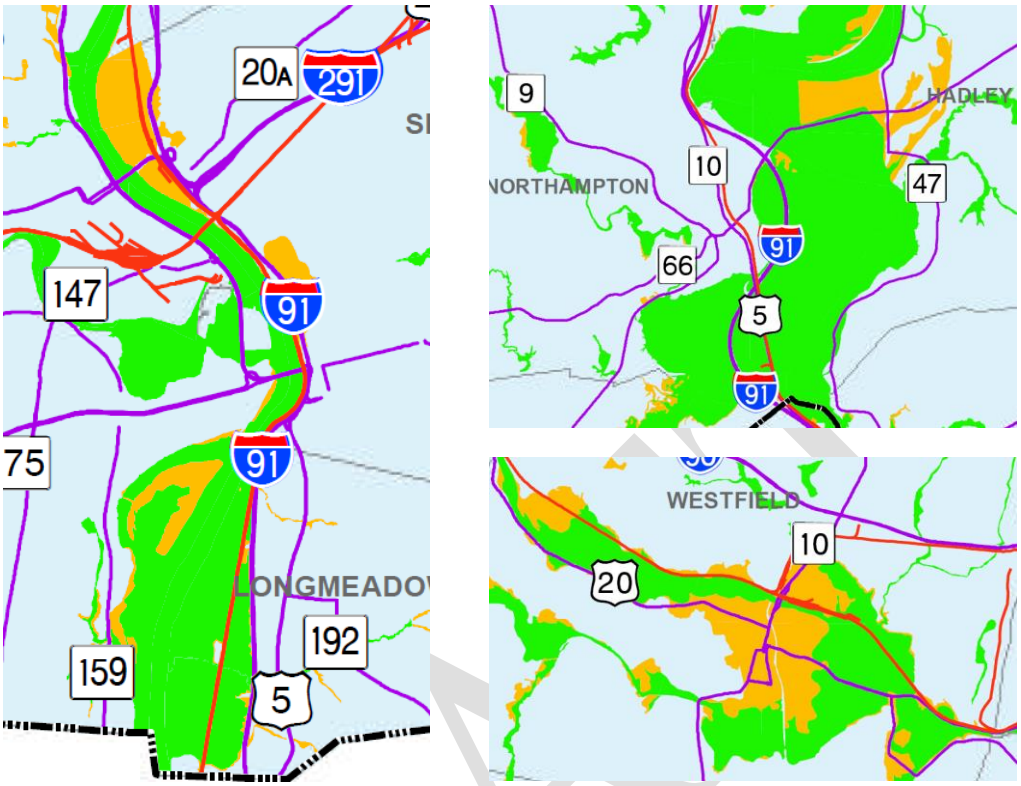


Figure 11-11 - Flood Zones for I-91, Route 9 and Route 20



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. In the City of 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 in Westfield. Downtown Westfield is within the 500 year flood zone. If a flood of that magnitude occurs Routes 10, 20, and 202 as well local roads and the CSX line could potentially be flooded by the Westfield River.

Interstate I-91 is expected to be accessible during a flood event due to its higher elevation. However, many ramps in near downtown Springfield are at a lower elevation and at risk of flooding. The Connecticut River rail line runs adjacent to I-91 in close proximity to the Connecticut River. 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. 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 11-12 and summarized by municipality in Table 11-1. 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 of the RTP.

Figure 11-12 – Culverts for Roadway Crossings in the Pioneer Valley

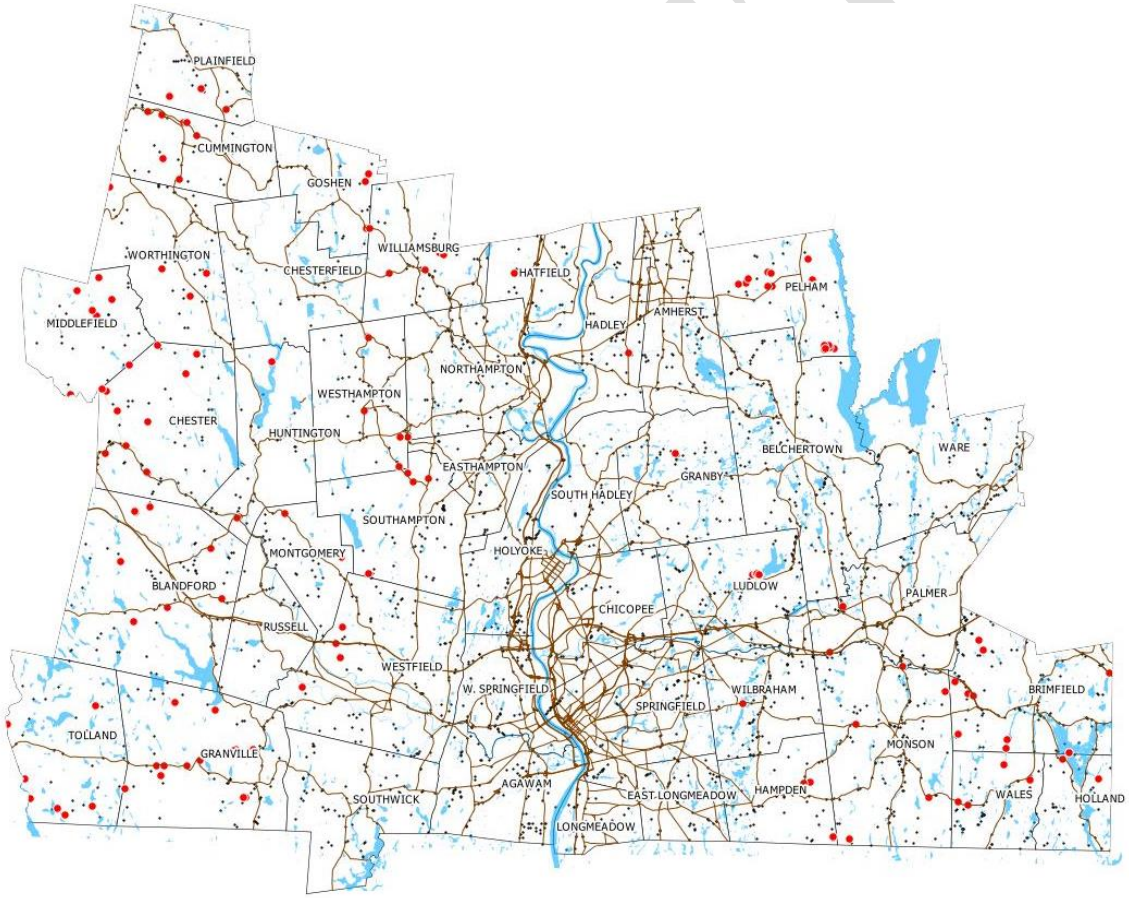


Table 11-1 – Regional Culverts

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**

3. Extreme Weather Events

The climate crisis is manifest by overall warming temperatures across the globe and an increase in precipitation, and it is also bringing a dramatic and noticeable increase in extreme weather events. Across the country weather disasters cost $16 billion in 2017, tying the record set in 2011, our region's year of disasters.

Figure 11-13 – Disaster Events in the United States

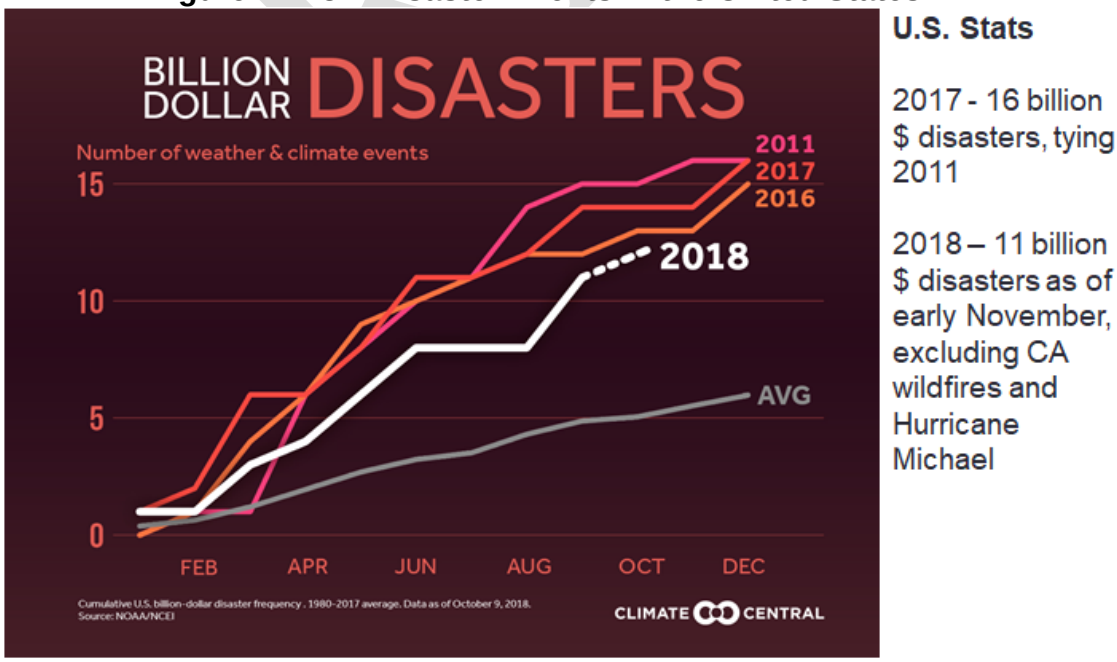


Image: Climate Central 2018

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B. EXISTING POLICIES PROGRAMS

As noted, the Commonwealth is a leader in forward-thinking climate action policies, which are developed into programs by staff at MassDOT, EOEEA and other state agencies and departments. Since 2008, Massachusetts has been using a strong combination of regulation, legislation, incentives, requirements, technical assistance and support to achieve necessary GHG emissions reductions to maintain Massachusetts livability, as exemplified by both the Complete Streets and the Municipal Vulnerability Preparedness (MVP) programs.

The GWSA provides a strong foundation on which current efforts have been built while risk management and adaptation to the changing climate have been built into how the Commonwealth does business. At the regional level, PVPC works with member municipalities to advance their participation in the State programs. We also regularly collaborate with public/private governments, organizations and institutions to plan for and implement local policies and programs that advance livable communities.

1. Complete Streets

In 2016 MassDOT launched the Complete Street Funding Program to incentivize municipal best practice in Complete Streets policy and implementation. To date, 38 communities have participated in MassDOT sponsored Complete Streets training and 18 communities have actively participated in the Complete Streets Program. More information on the Complete Streets program is included as part of the Appendix to the Regional Profile Chapter of the RTP.

2. GHG emissions assessments as MEPA

In 2007 Massachusetts started the process of integrating GHG emissions impact assessments into the Massachusetts Environmental Policy Act (MEPA). This policy was extremely innovative and continues to play an important role in raising awareness of GHG emissions and educating people about how to mitigate impacts. As explained by the Commonwealth:

> "The Executive Office of Energy and Environmental Affairs (EEA) has determined that the phrase "damage to the environment" as used in the Massachusetts Environmental Policy Act (MEPA) includes the emission of greenhouse gases caused by Projects subject to MEPA review. EEA now issues the following Greenhouse Gas Emissions Policy to fulfill the statutory obligation to take all feasible measures to avoid, minimize, or mitigate damage to the environment.
>
> The Policy requires that certain Projects undergoing review by the MEPA Office quantify the Project's greenhouse gas (GHG) emissions and identify measures to avoid, minimize, or mitigate such emissions. In addition to quantifying Project-related GHG emissions, the Policy also requires proponents to quantify the impact of proposed mitigation in terms of emissions and energy savings. EEA recognizes that this Policy will not itself avert climate change. However, this

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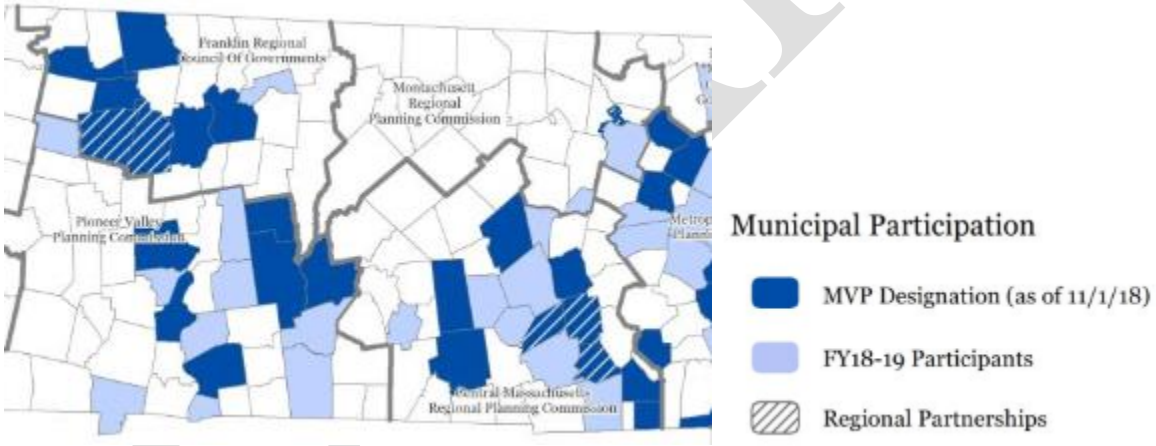
Policy is part of a larger effort to focus attention on the causes of climate change and harness creative thought and technology to implement long-term solutions.

EEA also recognizes that the GHG quantification required by this Policy will not result in absolutely accurate projections. The intent is not one hundred percent certainty as to the amount of GHG emissions; rather, it is a reasonably accurate quantitative analysis of emissions and potential mitigation that will allow the Project proponent and reviewers to assess the overall impact of the Project as proposed and the reduction in emissions if various techniques are used. https://eeaonline.eea.state.ma.us/EEA/emepa/pdffiles/misc/GHG%20Policy%20FINAL.pdf

3. Municipal Vulnerability Preparedness (MVP) Program

Every city and town is encouraged, but not required, to accept funding from the State to undertake a Community Resilience Building (CRB) process to identify municipal vulnerabilities and strengths, and to develop a prioritized action plan to build on strengths and minimize and mitigate vulnerabilities. The Commonwealth is funding MVP action grants up to $2,000,000/community in the second year of funding, 2019.

Figure 11-14 – Municipal Vulnerability Preparedness Program Participation



Fourteen member municipalities have participated in the MVP program in its first two years and an estimated 15 more are preparing to apply in the third year of planning work. Statements of findings from all 14 participating municipalities highlight the vulnerability of transportation infrastructure to extreme weather caused by our changing climate. In particular, concerns about under-sized and poorly maintained culverts and bridges are being raised across all participating municipalities.

4. Green Communities

The Green Communities Division provides funding opportunities to reduce municipal energy use and costs by way of clean energy projects in municipal buildings, facilities, and schools; guidance, technical assistance, and local support from Regional Coordinators working out of the Massachusetts Department of Energy

Resources (DOER). With respect to transportation, the program requires all participating municipalities to adopt a fuel efficient vehicle policy that requires the purchase of energy efficient vehicles by the municipality. This program is a “Lead by example’ initiative that shows residents and businesses in participating municipalities that it is possible to buy an energy efficient vehicle for most day to day uses and not suffer any negative consequences. There are 33 certified Green Communities in our region and three additional communities are working on certification. These communities have invested $10,617,410 to make their communities more energy efficient and reduce GHG emissions.

5. Local Bylaw/Ordinance & Other Regulatory Reform

PVPC’s Land Use & Environment Section leads the development and implementation of the region’s smart growth plan, Valley Vision. How land is used and developed determines how much people need to drive to fulfill their daily functions. The Pioneer Valley has been a leader for over 20 years with respect to promoting and encouraging smart growth, that is development that is targeted where there is existing infrastructure to support it, versus initiating development far away from roads, power lines, water and sewer lines etc. We work closely with our member municipalities to adopt and revise as needed, their existing bylaws and ordinances to make it possible for communities to minimize the need to drive and promote energy efficient modes of transportation such as walking, biking and using the bus.

For over 20 years the PVPC, along with many other organizations including the MAPC, MPHA, the MA Smart Growth Alliance and Transportation for MA have been advocating for and educating the Commonwealth about the need for zoning reform. A key area for improvement is the 2/3 majority needed to modify local land use regulations.

C. NEW/RECOMMENDED POLICIES

1. TCI

The Transportation Climate Initiative is an exciting future policy. If we can achieve the same success reducing GHG emissions from transportation that we have collectively achieved with RGGI reducing GHG emissions from buildings, we will be much better situated to have a safe and sustainable future for our children and our grandchildren. Excerpt from WBUR on 12/18/18:

> “Massachusetts and eight other states, along with Washington, D.C., announced Tuesday they will join together to try to reduce greenhouse gas emissions from the transportation sector.

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In a statement, the Transportation and Climate Initiative (TCI) said it will design a proposal that "would cap and reduce carbon emissions from the combustion of transportation fuels, and invest proceeds from the program into low-carbon and more resilient transportation infrastructure."

Along with Massachusetts, the Northeast and Mid-Atlantic states participating in the TCI, as of its inception, are: Connecticut, Delaware, Maryland, New Jersey, Pennsylvania, Rhode Island, Vermont and Virginia. The initiative is based on the decade-old Regional Greenhouse Gas Initiative that has reduced carbon emissions produced by Northeast electric power plants through carbon-trading. A "RGGI for Transport" would be a similar market mechanism for fossil fuels used to power vehicles, charging wholesalers a fee at the border for fuels they import into the region.

In a250-page report, the state's Transportation of the Future commission estimates that the new carbon price would cost the average driver $2 a month. The funds could be invested in building the transportation system of the future, offering rebates on electric cars, and constructing charging stations and bike paths.

Emissions from transportation account for the largest portion of the region's carbon pollution. In Massachusetts, the transportation sector accounts for nearly 40 percent of emissions.

"The trick in carbon pricing is to make sure you don't penalize people who can't adjust immediately," said Michael Barrett, chair of the Massachusetts Senate Telecommunications, Utilities and Energy Committee. Barrett suggested easing the pain of a carbon tax by paying people in advance to cut their future use of fossil fuels. For instance, the government could estimate the annual per capita cost of a carbon price, cut people a check for that amount, and let them decide what to do with the money. Perhaps they might use the advance to insulate their homes, or buy more fuel-efficient cars.

“Reducing emissions in the transportation sector requires a collaborative approach," state Energy and Environmental Affairs Secretary Matthew Beaton said in a statement, "and the Commonwealth is proud to partner with Northeast and Mid-Atlantic states to pursue a potential program to further mitigate the impacts of climate change, protect the health of our residents, and build a more resilient and sustainable transportation system for the next generation."

2. Housing Choice/Zoning Reform

As stated in a recent Boston Globe article, “in Massachusetts, even incremental legislation that aims to make it easier for towns to change their own zoning has proved to be a challenge. The (latest Zoning Reform) measure’s uncertain fate on Beacon Hill highlights the contentious politics around housing in a state that takes pride both in progressive social policy and in preserving local control of the look and

feel of its cities and towns." (Boston Globe, March 16, 2019.) Massachusetts is seeing a drastic decline in new housing development (half of the new housing development experienced in the 1970s and 80s) and the search for housing is causing more and more people to drive longer and longer distances to get to work and school and other important destinations. We very much need zoning reform in Massachusetts to address the connection between land use and zoning, housing and transportation, especially in the face of the severe consequences of our current global climate crisis.

3. Our Next Future

In 2014, PVPC wrapped up a three-year bi-state regional sustainability planning process: *Our Next Future: An Action Plan for Building A Smart, Sustainable, and Resilient Pioneer Valley***.** The plan is now being updated and implemented across all sections of the PVPC and in close partnership and collaboration with our member municipalities, the business and economic development sector, educational, health care, insurance, clean energy and other key anchor institutions, residents, the not for profit sector, community based organizations and the general public. These plans are available on our website: http://www.pvpc.org.

PVPC has a number of working committees/groups that meet regularly to advise staff and Commissioners on plan development and implementation. These include: the Joint Transportation Committee, Plan for Progress—focus on economic development, Valley Development Council—focus on land use and zoning, the Clean Energy/Climate Action committee, the CT River Clean Up committee, regional Housing Committee, and the Stormwater committee. All of these committees and working groups contribute to the region's livability.

4. Resources

Below is a list of websites and reports used in the development of this chapter.

https://necsc.umass.edu/projects/massachusetts-climate-change-projections

Massachusetts Climate Data Clearinghouse: http://www.resilientma.org

https://www.mass.gov/complete-streets-funding-program

https://www.mass.gov/municipal-vulnerability-preparedness-mvp-program

https://www.mass.gov/orgs/green-communities-division

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CHAPTER 12

Photo: I-391 Exit 3 in Chicopee, MA

PERFORMANCE MEASURES

A. INTRODUCTION

The FAST Act requires MPOs, in collaboration with the state DOT and transit agencies, to formally establish targets for performance measures aligned with the national goals. Performance Based Planning and Programming (PBPP) refers to the application of performance management within the parameters of the FAST Act to achieve desired outcomes for the multimodal transportation system. It is intended advance transportation investments based on their ability to meet established goals. This includes setting targets for the measures identified in the FAST Act.

Performance measures are intended to monitor and track performance over time and assess the effectiveness of projects and strategies in meeting the national goal areas. In the Pioneer Valley region, performance based planning methods have been used in the development of the Transportation Evaluation Criteria to program projects as part of the Regional Transportation Improvement Program for many years.

USDOT implemented the federal PBPP requirements through a series of phased rulemakings. At the conclusion of this rulemaking process, the Commonwealth of Massachusetts had twelve months to establish statewide performance targets for each required federal performance measure. The Pioneer Valley MPO then had 180 days from the date of Commonwealth's adoption of the statewide performance targets to either adopt the statewide targets or establish their own regional performance targets.

The Federal Transit Administration has finalized a rule to define requirements for transit asset management. This rule requires public transportation providers to develop and implement transit asset management (TAM) plans. TAM plans must include an asset inventory, condition assessments of inventoried assets, and a prioritized list of investments to improve the state of good repair of capital assets. This rule also establishes state of good repair standards and four state of good repair performance measures.

Table 12-1 - Regional Performance Measure Status

Final Rule	Effective Date	Status	Updated
Safety Performance Measures (PM1)	April 14, 2016	MPO adopted state targets on February 26, 2019	Annually
Pavement/Bridge Performance Measures (PM2)	May 20, 2017	MPO adopted state targets on October 23, 2018	Every Two Years
System Performance Measures (PM3)	May 20, 2017	MPO adopted state targets on September 25, 2018	Every Two Years
Transit Asset Management Plan (TAM)	July 26, 2016	MPO adopted TAM Plan on March 26, 2019	Every Four Years

As can be seen from the above table, the Pioneer Valley MPO has elected to adopt the State performance targets for PM1, PM2 and PM3. The MPO will continue to work in close collaboration with the PVTA to incorporate their TAM performance targets in to the regional transportation planning process. The UPWP includes specific tasks to support the performance based planning and programming for the Pioneer Valley MPO.

B. SAFETY PERFORMANCE MEASURES (PM1)

Pioneer Valley has chosen to adopt the statewide safety performance measure targets set by MassDOT for Calendar Year (CY) 2019. In setting these targets, MassDOT has followed FHWA guidelines by using statewide crash data and Highway Performance Monitoring System (HPMS) data for vehicle miles traveled (VMT) in order to calculate 5 year, rolling average trend lines for all FHWA-defined safety measures. For CY 2019 targets, four of the five safety measures—total number of fatalities, rate of fatalities per 100 million vehicle miles traveled, total number of incapacitating injuries, and rate of incapacitating injuries per 100 million VMT—were established by extending their trend lines into the 2015-2019 period. All four of these measures reflect a modest decrease in statewide trends. The fifth safety measure, the total number of combined incapacitating injuries and fatalities for non-motorized modes, is the only safety measure for which the statewide trend line depicts an increase. MassDOT's effort to increase non-motorized mode share throughout the Commonwealth has posed a challenge to simultaneously reducing non-motorized injuries and fatalities. Rather than adopt a target that depicts an increase in the trend line, MassDOT has elected to establish a target of non-motorized fatalities and injuries and for CY 2019 that remains constant from the rolling average for 2012–2016. In recent years, MassDOT and the Pioneer Valley have invested in "complete streets," bicycle and pedestrian infrastructure, intersection and safety improvements in both the Capital Investment Plan (CIP) and Statewide Transportation Improvement Program (STIP) to address increasing mode share and to incorporate safety mitigation elements into projects. Moving forward, Pioneer Valley, alongside MassDOT, is actively seeking to improve data collection and methodology for bicycle and pedestrian VMT counts and to continue analyzing crash clusters and crash counts that include both motorized and non-motorized modes in order to address safety issues at these locations.

In all safety categories, MassDOT has established a long-term target of "Toward Zero Deaths" through MassDOT's Performance Measures Tracker[6] and will be establishing safety targets for the MPO to consider for adoption each calendar year. While the MPO is not required by FHWA to report on annual safety performance targets, FHWA guidelines require MPOs to adopt MassDOT's annual targets or to establish their own each year.

The safety measures MassDOT has established for CY 2019, and that Pioneer Valley has adopted, are as follows:

- **Fatalities:** The target number of fatalities for years CY 2019 is 353, down from an average of 364 fatalities for the years 2012–2016. [See Figure 12-1]
- **Rate of Fatalities per 100 million VMT:** The target fatality rate for years CY 2019 is 0.58, down from a 0.61 average for years 2012–2016. [See Figure 12-1]

[6] https://www.mass.gov/lists/tracker-annual-performance-management-reports

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- **Serious Injuries:** The target number of incapacitating injuries for CY2019 is 2801, down from the average of 3146 for years 2012–2016. [See Figure 12-2]
- **Rate of Incapacitating Injuries per 100 million VMT:** The incapacitating injury rate target for CY2019 is 4.37 per year, down from the 5.24 average rate for years 2012–2016. [See Figure 12-2]

Figure 12-1 - Total Fatalities and Fatality Rate

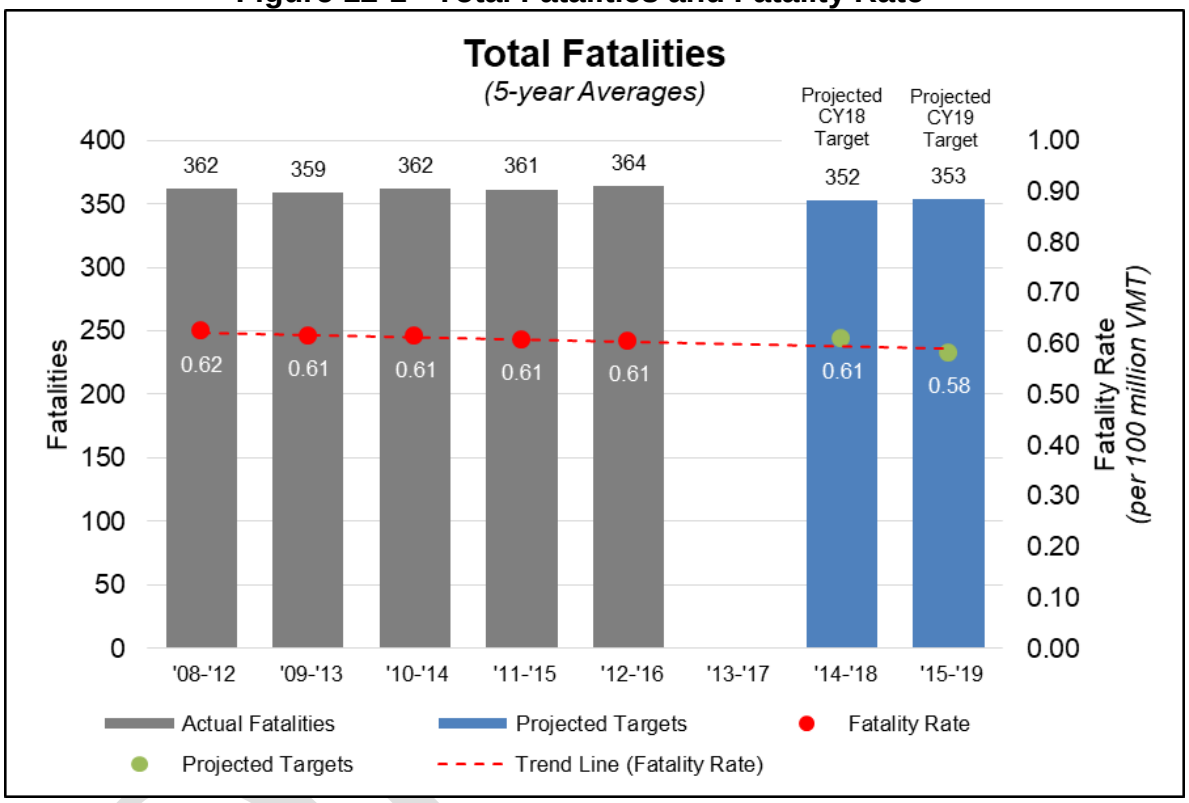
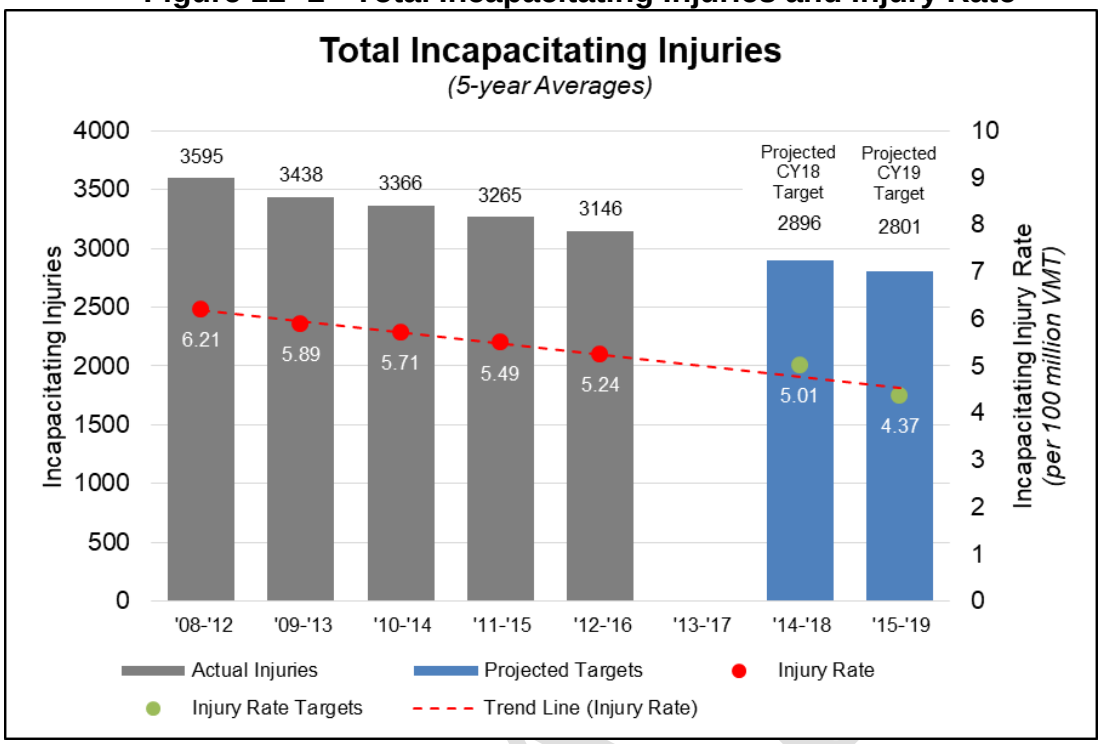


Figure 12--2 - Total Incapacitating Injuries and Injury Rate



C. BRIDGE & PAVEMENT PERFORMANCE MEASURES (PM2)

Pioneer Valley has chosen to adopt the 2-year (2020) and 4-year (2022) statewide bridge and pavement performance measure targets set by MassDOT. MassDOT was required to adopt a statewide target by May 20th, 2018, with MPOs either adopting the statewide target or establishing their own by November 2018. In setting these targets, MassDOT has followed FHWA guidelines by measuring bridges and pavement condition using the 9-point National Bridge Inventory Standards (NBIS); the International Roughness Index (IRI); the presence of pavement rutting; and the presence of pavement cracking. Two year and four year targets were set for six individual performance measures: percent of bridges in good condition; percent of bridges in poor condition; percent of Interstate pavement in good condition; percent of Interstate pavement in poor condition; percent of non-Interstate pavement in good condition; and percent of non-Interstate pavement in poor condition. All of the above performance measures are tracked in greater detail in MassDOT's Transportation Asset Management Plan (TAMP), which is due to be finalized in July 2019.

Targets for bridge-related performance measures were determined by identifying which bridge projects are programmed and projecting at what rate bridge conditions deteriorate. The bridge-related performance measures measure the percentage of deck area, rather than the total number of bridges.

Performance targets for pavement-related performance measures were based on a single year of data collection, and thus were set to remain steady under the

guidance of FHWA. These measures are to be revisited at the 2-year mark (2020), once three years of data are available, for more informed target setting.

MassDOT continues to measure pavement quality and to set statewide short-term and long-term targets in the MassDOT Performance Management Tracker using the Pavement Serviceability Index (PSI), which differs from IRI. These measures and targets are used in conjunction with federal measures to inform program sizing and project selection.

Table 12-2 – Bridge and Pavement Performance Measure Status

Performance Measure	Current (2017)	2-year target (2020)	4-year target (2022)
Bridges in good condition	15.22%	15%	16%
Bridges in poor condition	12.37%	13%	12%
Interstate Pavement in good condition	74.2%	70%	70%
Interstate Pavement in poor condition	0.1%	4%	4%
Non-Interstate Pavement in good condition	32.9%	30%	30%
Non-Interstate Pavement in poor condition	31.4%	30%	30%

D. RELIABILITY, CONGESTION, & EMISSIONS PERFORMANCE MEASURES (PM3)

Pioneer Valley has chosen to adopt the 2-year (2020) and 4-year (2022) statewide reliability, congestion, and emissions performance measure targets set by MassDOT. MassDOT was required to adopt a statewide target by May 20th, 2018, with MPOs either adopting the statewide target or establishing their own by November 2018.

MassDOT followed FHWA regulation in measuring Level of Travel Time Reliability (LOTTR) on both the Interstate and non-Interstate NHS as well as Truck Travel Time Reliability (TTTR) on the Interstate system using the National Performance Management Research Dataset (NPMRDS) provided by FHWA. These performance measures aim to identify the predictability of travel times on the roadway network by comparing the average travel time along a given segment against longer travel times. For LOTTR, the performance of all segments of the Interstate and of the non-Interstate NHS are defined as either reliable or unreliable based on a comparison between the 50th percentile travel time and the 80th percentile travel time, and the proportion of reliable segments is reported. For TTTR, the ratio between the 50th

percentile travel time and the 90th percentile travel time for trucks only along the Interstate system is reported as a statewide measure. As this data set has but one year of consistent data, FHWA guidance has been to set conservative targets and to adjust future targets once more data becomes available. To that end, MassDOT's reliability performance targets are set to remain the same.

Emissions reduction targets are measured as the sum total of all emissions reductions anticipated through CMAQ-funded projects in non-attainment or air quality maintenance areas (currently the cities of Lowell, Springfield, Waltham, and Worcester, and the town of Oak Bluffs) identified in the Statewide Transportation Improvement Program (STIP). This anticipated emissions reduction is calculated using the existing CMAQ processes.

Table 12-3 – Reliability, Congestion and Emissions Performance Measure Status

Measure	Current (2017)	2-year (2020)	4-year (2022)
Non-Interstate LOTTR	80%	80%	80%
Interstate LOTTR	68%	68%	68%
TTTR	1.85	1.85	1.85
PHED (Boston UZA)	18.31	18.31	18.31
% non-SOV (Boston UZA)	33.6% (2016)	34.82%	35.46%
Emissions Reductions	Baseline (FFY 14–17)	1,622 CO 497.9 Ozone	TBD CO (Springfield) 1.1 Ozone

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Table 12-4 - Performance Measure Linked Investments 2015-2019

TIP Year	SID	Municipality	Project Description	Total Programmed Funds	PM Rule
2017	608023	Multiple	AMHERST- HADLEY- SIDEWALK & WHEELCHAIR RAMP CONSTRUCTION ON ROUTE 9	$ 1,204,050	PM1
2015	604035	Hadley	HADLEY- SIGNAL & INTERSECTION IMPROVEMENTS AT ROUTE 9 (RUSSELL STREET) & ROUTE 47 (MIDDLE STREET)	$ 1,000,000	PM1
2015	604035	Hadley	HADLEY- SIGNAL & INTERSECTION IMPROVEMENTS AT ROUTE 9 (RUSSELL STREET) & ROUTE 47 (MIDDLE STREET)	$ 1,201,102	PM1
			PM 1 Total (3 Projects)	**$ 3,405,152**	**14%**
2019	600513	Agawam	AGAWAM- RECONSTRUCTION OF ROUTE 187 FROM 425 FT. SOUTH OF S. WESTFIELD STREET TO ROUTE 57 (0.3 MILES - PHASE I)	$ 2,622,622	PM2
2015	606417	Cummington	CUMMINGTON- RETAINING WALL REPLACEMENT ON ROUTE 9 ADJACENT TO C-21-023 OVER WESTFIELD BROOK	$ 1,500,000	PM2
			PM 2 Total (2 Projects)	**$ 4,122,622**	**17%**
2019	PV0001	multiple	P21 Express - Year 2 Operating	$ 500,000	PM3
2018	PV0005	Multiple	PVTA P21 Express Service Between Union Station in Springfield and the Holyoke Transportation Center	$ 500,000	PM3
2018	608786	Multiple	AMHERST- HADLEY- NORTHAMPTON- TRANSIT SIGNAL PRIORITY UPGRADES AT VARIOUS LOCATIONS	$ 1,200,000	PM3
2019	607987	Ware	WARE- INTERSECTION IMPROVEMENTS @ MAIN STREET, WEST STREET, NORTH STREET, SOUTH STREET & CHURCH STREET	$ 2,475,087	PM3
2018	604203	Agawam	AGAWAM- INTERSECTION IMPROVEMENTS AT ROUTE 187 & ROUTE 57	$ 3,288,000	PM3
2018	604597	Northampton	NORTHAMPTON- IMPROVEMENTS ON I-91 INTERCHANGE 19 AT ROUTE 9 AND DAMON ROAD	$ 7,438,490	PM3
2015	604035	Hadley	HADLEY- SIGNAL & INTERSECTION IMPROVEMENTS AT ROUTE 9 (RUSSELL STREET) & ROUTE 47 (MIDDLE STREET)	$ 1,836,958	PM3
			PM 3 Total (7 Projects)	**$ 17,238,535**	**70%**
			Total (12 Projects)	**$ 24,766,309**	**100%**

As can be seen in Table 12-4 the PVMPO has invested $25 million on projects which will help meet the MassDOT Performance Targets. This assessment was made based on the project TEC scoring for performance related categories such as safety, pavement condition, congestion relief, etc. Of these investments, 14% will help achieve PM1, 17% will help achieve PM2, and 70% will help achieve PM3. As more data becomes available it is anticipated that corresponding PM trends should demonstrate that our region is meeting or exceeding our PM Targets.

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1. National Performance Measure Research Data Set (NPMRDS)

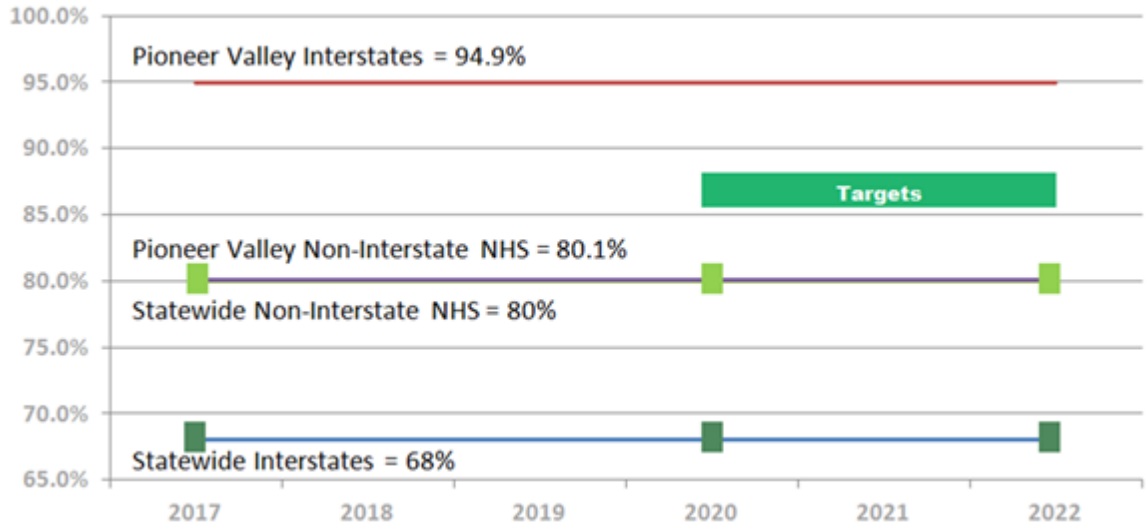
The NPMRDS is a monthly archive of average travel times, reported every 5 minutes when data is available, on the National Highway System. The travel times are based on vehicle probe-based data. Separate average travel times are included for "all traffic", freight and passenger travel. FHWA provides access to the NPMRDS to our State DOT and MPO partners for their performance management activities. Average travel times have been collected monthly since July 2013.

- Level of Travel Time Reliability (LOTTR) on both the Interstate System and non-Interstate NHS.
  - LOTTR is based on the amount of time it takes to drive the length of a road segment.
  - The metric is the percentage of person-miles traveled that are "reliable.
  - Reporting Requirements:
    - Must be on the **statewide** level.
  - MassDOT is required to adopt a target by May 20, 2018 with MPOs either adopting the statewide target or establishing their own by November 2018.

- To compute LOTTR:
  - Collect travel times (NPMRDS)
  - Find the 50th pct. and 80th pct. times
  - Compute LOTTR = 80th/50th percentile
  - Repeat for 4 periods (see figure on right)
  - If all are below 1.50, segment is reliable.
  - The statewide metric is the % of person miles traveled that are reliable.

Level of Travel Time Reliability (LOTTR) *(Single Segment, Interstate Highway System)*		
Monday – Friday	6am – 10am	LOTTR = $\frac{44 \text{ sec}}{35 \text{ sec}}$ = 1.26
	10am – 4pm	LOTTR = 1.39
	4pm – 8pm	LOTTR = 1.54
Weekends	6am – 8pm	LOTTR = 1.31
Must exhibit LOTTR below 1.50 during **all** of the time periods		**Segment is not reliable**

Figure 12-3 – Level of Travel Time Reliability



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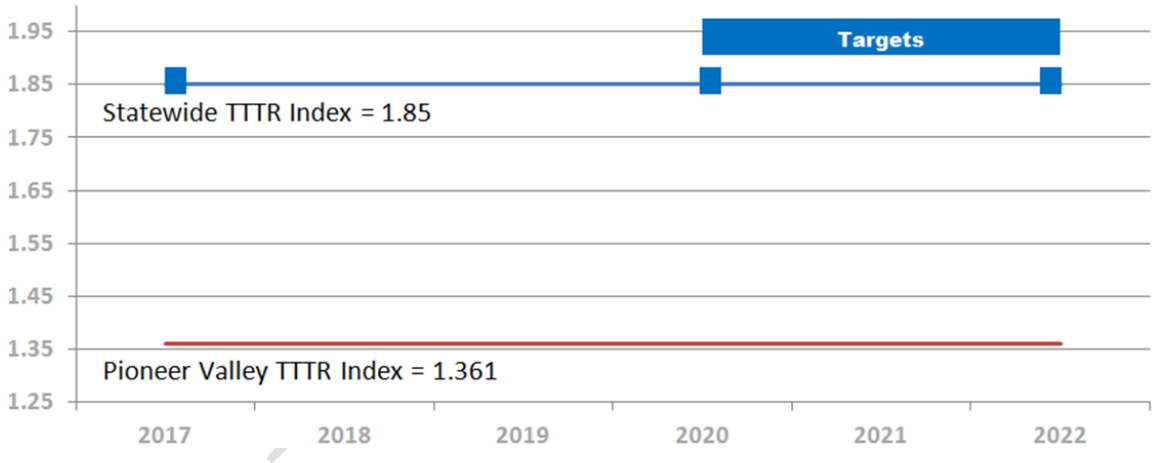
- Level of ***Truck*** Travel Time Reliability (TTTR)
- TTTR is based on the amount of time it takes trucks to drive the length of a road segment.
- Reporting Requirements:
  - Must be on the **statewide** level.
  - Only required to report on TTTR for the Interstate system.

MassDOT is required to adopt a target by May 20, 2018 with MPOs either adopting the statewide target or establishing their own by November 2018.

- To compute TTTR:
  - Collect travel times (NPMRDS)
  - Find the 50th pct. and 95th pct. times
  - Compute TTTR = 95th/50th percentile
  - Repeat for 5 periods (see figure on right)
  - The TTTR Index is generated as a weighted average of the largest period for each segment and its weight.

Level of Truck Travel Time Reliability (LOTTR) *(Single Segment, Interstate Highway System)*		
Monday – Friday	6am – 10am	$TTTR = \frac{55\ sec}{35\ sec} = 1.57$
	10am – 4pm	TTTR = 1.25
	4pm – 8pm	TTTR = 2.52
Weekends	6am – 8pm	TTTR = 1.2
All Days	8pm – 6am	TTTR = 1.05

Figure 12-4 – Truck Travel Time Reliability



E. TRANSIT ASSET MANAGEMENT PLAN (TAM)

The Federal Transit Administration (FTA) defines transit asset management as a strategic and systematic process through which an organization procures, operates, maintains, rehabilitates, and replaces transit assets to manage their performance, risks, and costs over their lifecycle to provide cost-effective, reliable, and safe service to current and future customers.

As part of the Moving Ahead for Progress in the 21st Century (MAP-21) Act and the subsequent Fixing America's Surface Transportation (FAST) ACT, the FTA enacted regulations for transit asset management that require transit service providers to establish asset management performance measures and targets and to develop a TAM Plan. The final TAM rule was published on July 26, 2016 and went into effect on October 1, 2016.

The Pioneer Valley Transit Authority (PVTA) manages a range of assets that include a fleet of heavy duty transit buses, paratransit vehicles, support vehicles, and nine facilities, plus other capital assets required to support operations across a service territory encompassing 24 communities. PVTA recognizes that an effective approach to asset management incorporates the people, processes, technology, data and information and continual improvement needed to support better management of assets over their entire lifecycle. PVTA has developed their TAM Plan as a roadmap to systematically identify and address assets and asset management practices in need of improvement; establish a benchmark for where their inventory and policies stand; identify gaps in their practice; establish new, measurable key performance indicators and use a data-driven approach to achieve its goals.

PVTA has developed the TAM plan, not as an end, but instead as the beginning of an on-going effort to develop and integrate asset management practices throughout the entire organization. Over the coming years PVTA plans to continue to build upon this foundation and will work to implement successful and effective policies, practices and processes that reinforce and complement the goals and objectives outlined in the TAM plan. PVTA expects the TAM plan to be a living document that is updated annually.

Table 12-5 – PVTA TAM Plan Performance Measures and Targets

Rule	Performance Measure	State Target
TAM	Percent of revenue vehicles by asset class that have met or exceeded their Useful Life Benchmark (ULB)	Articulated Bus = 0%, Bus = 20%, Minibus = 100%, Cutaway Bus = 25%, Minivan = 30%, Trolleybus = 100%
TAM	Percent of vehicles that have met or exceeded their Useful Life Benchmark (ULB)	Automobiles = 25% Trucks and other Rubber Tire Vehicles = 25%
TAM	Percent of facilities with a condition rating below 3.0 on the FTA Transit Economic Requirements Model (TERM) Scale	Administrative and Maintenance = 25% Passenger and Parking = 0%

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Table 12-6 - TAM Investments 2015-2019

TIP Year		RTA	Capital Project	Total Programmed	PM Rule
2019		PVTA	Buy Replacement 40' Diesel Bus (4)	$ 2,226,480.00	TAM
2019		PVTA	Buy Replacement 35" Bus (4)	$ 2,203,970.00	TAM
2019		PVTA	Purchase Replacement Vans (27)	$ 1,836,620.00	TAM
2018		PVTA	Replacement Vans (4)	$ 283,795.00	TAM
2018		PVTA	Replace Mini Buses for Shuttles (3)	$ 270,000.00	TAM
2018		PVTA	Replacement 40' Buses (4)	$ 2,161,631.00	TAM
2017		PVTA	Purchase - Replacement: Vans (12)	$ 781,298.00	TAM
2017		PVTA	BUY REPLACEMENT VAN (7)	$ 436,948.00	TAM
2016		PVTA	BUY 40-FT BUS FOR EXPANSION (4) - Match for FY 15	$ 395,640.00	TAM
2016		PVTA	BUY REPLACEMENT 40-FT BUS (6) Match for FY 15	$ 593,460.00	TAM
2016		PVTA	BUY REPLACEMENT 35-FT BUS (5) - Match for FY15	$ 489,549.00	TAM
2016		PVTA	BUY 40-FT BUS FOR EXPANSION (2) (Match for FY15)	$ 203,195.00	TAM
2016		PVTA	BUY 40-FT BUS FOR EXPANSION (2) (Match for FY15)	$ 196,805.00	TAM
2015		PVTA	PVTA Bus Replacement	$ 887,221.00	TAM
2015		PVTA	Buy replacements 35ft) bus (5)	$ 2,017,556.00	TAM
2015		PVTA	Buy <30ft bus for expansion (4)	$ 380,000.00	TAM
2015		PVTA	ADA operating projects	$ 1,479,468.00	TAM
2015		PVTA	Purchase - Buses for expanded service, 40'	$ 1,528,810.00	TAM
2015		PVTA	Buy , 30' mini bus, replacement (4)	$ 280,000.00	TAM
2015		PVTA	BUY REPLACEMENT 40-FT BUS (6) - Match in FY 16	$ 2,373,838.00	TAM
2015		PVTA	BUY REPLACEMENT 35-FT BUS (5) - Match in FY16	$ 1,958,199.00	TAM
2015		PVTA	BUY 40-FT BUS FOR EXPANSION (4) Match in FY16	$ 1,582,559.00	TAM
2015		PVTA	BUY 40-FT BUS FOR EXPANSION (2) - Match in FY 16	$ 635,220.00	TAM
2015		PVTA	BUY 40-FT BUS FOR EXPANSION (2) - Match in FY 16	$ 757,970.00	TAM
2015		PVTA	Purchase - Replacement: Vans (6)	$ 391,988.00	TAM
				$ 26,352,220.00	

Table 12-6 shows the PVTA capital investment which will help our region meet their TAM Targets. Over the past 5 years, PVTA has invested $26 million on buses, vans, and mini buses. PVTA spends approximately 30% of their annual capital budget on fleet replacement in order to meet TAM Targets.

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F. SYSTEM PERFORMANCE REPORT

The System Performance Report developed for the RTP 2016 was updated for the 2020 RTP to assess the progress made in achieving targets established during the previous report. Each performance target was assessed on an evaluation ranking of excellent, good, or needs improvement. 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 12-7 – Structurally Deficient Bridges in the Pioneer Valley Since 2009

	2009	2010	2011	2012	2014	2018
Structurally Deficient Bridges	75	69	63	65	53	50
Total Bridges	674	674	669	676	678	685

Source: MassDOT Bridge Data

The percentage of structurally deficient bridges in the region was reduced from 7.8% to 7.2%

- RTP Assessment: **Excellent**

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b) Overall Condition Index

Performance Target = Increase the average Overall Condition Index (OCI) for federal aid eligible roadways by 5% by 2025.

Table 12-8 – Regional OCI By RTP Year

	2012	2016	2019
Overall Condition Index	77.6	71.1	76

Source: PVPC

The average OCI has increased by 4.9% since 2016. This trend shows there is improvement in the pavement quality and the region is well placed to likely achieve the targeted improvement of 5% by the year 2025.

- RTP Assessment: Good

c) Motor Vehicle Fatalities

Performance Target = Reduce motor vehicle fatalities by 20% over five years.

Table 12-9 – Fatal Crashes in the Pioneer Valley

RTP 2016 Table

2008	2009	2010	2011	2012
35	41	37	34	44

RTP 2020 Update

2013	2014	2015	2016	2017
42	43	36	51	41

Source: MassDOT Crash Portal

The number of fatalities in the region has marginally reduced from the year 2012 to 2017; however this reduction is far less than 20%. Over the last five years the annual fatalities were below the 2012 threshold with an exception of the calendar year 2016.

- RTP Assessment: **Needs Improvement**

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d) Roadway Fatalities and Serious Injuries

Performance Target = Reduce the number of roadway fatalities and serious injuries by 50% by 2030.

Table 12-10 – Fatal and Serious Injury Crashes in the Pioneer Valley

RTP 2016 Table

2008	2009	2010	2011	2012
277	249	269	514	486

RTP 2020 Update

2013	2014	2015	2016	2017
408	362	333	356	264

Source: MassDOT Crash Portal

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 injury crashes decreased by nearly 45% from 2012 to 2017. The region is expected to achieve more than a 50% reduction by 2030 if similar trends continue.

- RTP Assessment: **Good**

e) Safety Studies

Performance Target = Complete at least one safety study per year as part of the UPWP.

Table 12-11 – Safety Studies Completed Over the Past 7 Years

2012	2013	2014	2015	2016	2017	2018
4	1	2	1	2	2	2

Source: PVPC

Currently, the region is exceeding the target to complete at least one safety study per year as part of the UPWP.

- RTP Assessment: **Excellent**

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f) Average Driver Delay

Performance Target = Reduce the average regional travel time index to less than 1.5 by 2025.

Table 12-12 – Average Regional Travel Time Index by CMP Analysis Year

2010	2015	2019
1.56	1.71	Data Collection Method is being updated

Source: PVPC

Currently the PVPC is in the process of updating the data collection method to determine travel times, congestion, and driver delays in the region.

- RTP Assessment: **Needs Improvement**

g) Congestion Improvement Projects

Performance Target = Fund at least one congestion improvement project through the TIP every 5 years.

Table 12-13 – Completed Congestion Improvement Projects

2011	2012	2013	2014	2015	2016	2017	2018
1	1	1	2	2	1	1	3

Source: PVPC

Historically, the Pioneer Valley region has completed at least one congestion improvement project through the TIP over the last 8 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 12-14 – Completed Congestion Planning Studies

2012	2013	2014	2015	2016	2017	2018
1	0	2	1	1	1	1

Source: PVPC

PVPC has consistently conducted at least one study per year that addresses congestion and/or safety improvement at different locations within the region.

- RTP Assessment: **Excellent**

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i) On-road Bicycle Facility Mileage

Performance Target = Increase the total mileage of on-road bicycle facilities by 10% by 2025.

Table 12-15 – On-road Bicycle Facility Mileage in the Pioneer Valley

2000	2005	2010	2015	2019
4.50	7.25	8.95	17.95	43.12

Source: PVPC

The region has exceeded expectations and has already increased the bicycle facilities mileage by more than 140%.

- 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 12-16 – PVTA Routes That Meet Passengers per Trip and Passengers per Revenue Hour Standards

	September 2014 – April 2015	July 2018 – April 2019
Number of Routes that Meet Minimum Performance Standards	34	15
Total PVTA Routes	47	41

Source: PVPC

The number of routes that meet the PVTA performance standards has decreased since 2015. Factors such as uncertain funding environment, service cuts, increasing use of Uber and Lyft, increased rates of car ownership, stagnant/declining urban population, and fare hikes in the past two years could have contributed towards this decline.

- RTP Assessment: **Needs Improvement**

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k) Transportation Sector Green House Gas Emissions

Performance Target = Reduce greenhouse gas emissions from the transportation sector by 25% by 2020 and 80% by 2050.

Table 12-17 – Statewide GHG Emissions from the Transportation Sector

2008	2009	2010	2011	2012	2015	2016
33.6	30.8	30.8	31.0	30.4	39%	43%

Source: Massachusetts Annual Greenhouse Gas Emissions Inventory, July 2014

The greenhouse gas emissions from the transportations sector have increased rather than decrease since 2012.

- RTP Assessment: **Needs Improvement**

l) Air Quality Improvement Projects

Performance Target = Fund at least one air quality improvement project through the TIP each year.

Table 12-18 – Air Quality Improvement Projects Completed Over the Past 5 Years

2011	2012	2013	2014	2015	2016	2017	2018
1	1	1	2	3	1	0	2

Source: PVPC

The region has been successful in achieving a project per year target for the majority of the TIP years assessed.

- RTP Assessment: **Good**

m) Weight Restricted, Height Restricted, and Closed Bridges

Performance Target = Minimize the impact of weight restricted, height restricted, and closed bridges.

Table 12-19 – Restricted and Closed Bridges

	2011	2014	2018
Weight Restricted Bridges	92	63	78
Bridges with Vertical Clearance Restrictions (Under 15ft)	73	65	110
Closed Bridges	14	13	6

Source: MassDOT

There is an increase in number of restricted bridges for both weight and height limitations; however the number of closed bridges has declined.

- RTP Assessment: **Needs Improvement**

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n) Average Park and Ride Lot Use

Performance Target = Increase average park and ride lot use by 5% by 2025.

Table 12-20 – Average Park and Ride Lot Occupancy 2011 -2015

2011	2012	2013	2014	2015	2016	2017	2018
136	138.6	118.3	99.9	76.5	42.5	42.7	38

Source: PVPC

The Park and Ride lots usage has been declining in the region. Rideshare is not a popular option for the inhabitants of the region and increased popularity of Lyft and Uber also decreases the necessity for people to consider this alternative.

- RTP Assessment: **Needs Improvement**

o) Regional Bike Path Usage

Performance Target = Demonstrate an overall annual increase in the use of regional bike paths.

Table 12-21 – Historic Use of the Springfield Riverwalk

2012	2013	2014	2018
56	100	189	Bikepath closed due to construction

Use of the Springfield Riverwalk was steadily increasing over the period when data was collected which is a trend with a majority of bike paths in the region. PVPC has collected data along this path over a period of time and has been working towards developing an ongoing data collection program to track bike path use for all facilities in the Pioneer Valley region.

- RTP Assessment: **Good**

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p) PVTA and FRTA Ridership

Performance Target = Demonstrate an overall annual increase in PVTA and FRTA ridership.

Table 12-22 – PVTA and FRTA Total Annual Ridership

	2013	2014	2015	2016	2017	2018
PVTA	11,128,713	11,415,923	12,074,280	12,154,880	11,466,707	10,902,207

Source: PVPC

Transit ridership increased between 2013-2016, however the last 2 years have seen a decline in number of PVTA users across majority of the routes. PVTA reduced services along some routes and increased fares system wide which strongly contributed to the decline in number of riders.

- RTP Assessment: **Needs Improvement**

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. PVPC has performed sidewalk inventory for communities such as Granby, Palmer, Holyoke, Springfield, and South Hadley over past few years. 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, 9 of the 17 defined regional performance targets are either currently met or are on track to be met by established deadlines. Eight targets require additional data or are currently not being met. This information is summarized in Table 12-23.

Table 12-23 – Summary of System Performance Assessment

Excellent	Good	Needs Improvement
5	4	8

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CHAPTER 13

Photo: PVTA Loop Shuttle

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) led the effort of developing forecasts for future population and employment for Massachusetts and each MPO region. This was a collaborative effort between MassDOT's Office of Transportation Planning (OTP), the Metropolitan Area Planning Commission (MAPC), and the UMass Donahue Institute (UMDI). These three entities, in consultation with the thirteen regional planning agencies, acted as the Projections Advisory Group tasked with estimating the potential for future growth and decline across the state over 30

years from 2010 to 2040. This chapter summarizes this process. A more detailed description of this process is provided in the Appendix to the RTP.

Initial municipal population and employment projection estimates were provided by MassDOT. Thereafter, PVPC staff adjusted the values by reallocating growth among each community based on current trends and local staff knowledge of the opportunity for additional growth and major development planned throughout all forecast years. The resulting forecasts for population, households and employment are shown in Tables 13-1 – 13-3. An alternate regional specific scenario for employment estimates in the 2020 forecast year was subsequently developed by the PVPC.

The regional projections presented in Tables 13-1 – 3 represent the demographic data that was included as part of the statewide model for air quality conformity. The alternate employment scenario presented in Table 13-4 was used in the PVPC regional transportation model.

A. REGIONAL EMPLOYMENT SCENARIO

PVPC developed an in-house scenario for regional employment for use in the regional transportation model and RTP. This scenario results in an additional 23,105 employees for the 2020 analysis year. It was developed based on the following assumptions:

- Employment growth out to 2020 largely mirrors that from 2010 – 2015.
- Twenty four growth communities were identified:
  - Agawam, Amherst, Belchertown, Brimfield, Chicopee, E. Longmeadow, Easthampton, Granby, Hadley, Hatfield, Holyoke, Ludlow, Monson, Northampton, Palmer, South Hadley, Southampton, Southwick, Springfield, Ware, West Springfield, Westfield, Wilbraham, Williamsburg.
- Growth communities received more growth as deemed necessary based on the actual growth in employment from 2010 – 2015.
- Non-growth communities (with the exception of Longmeadow) were allocated growth based on the actual growth rate calculated from 2010 - 2015 for that community.
- 2030 and 2040 employment estimates mirrored the projections developed by MassDOT in conjunction with UMDI.

This alternate regional employment scenario will be used in the regional transportation model but not in the statewide transportation model for air quality conformity purposes.

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Table 13-1 – Population Forecast for the Pioneer Valley Region

	Population 2010	Population 2020	Population 2030	Population 2040
Agawam	28,438	28,577	29,267	29,707
Amherst	37,819	40,002	40,546	40,995
Belchertown	14,649	15,388	15,760	15,996
Blandford	1,233	1,205	1,234	1,252
Brimfield	3,609	3,727	3,817	3,875
Chester	1,337	1,313	1,293	1,273
Chesterfield	1,222	1,176	1,138	1,101
Chicopee	55,298	56,395	57,806	58,674
Cummington	872	841	828	816
East Longmeadow	15,720	16,485	17,320	17,936
Easthampton	16,053	16,091	16,480	16,727
Goshen	1,054	1,085	1,111	1,128
Granby	6,240	6,235	6,280	6,267
Granville	1,566	1,555	1,574	1,559
Hadley	5,250	5,773	6,053	6,308
Hampden	5,139	5,025	5,146	5,224
Hatfield	3,279	3,233	3,311	3,360
Holland	2,481	2,504	2,534	2,547
Holyoke	39,880	40,626	41,815	42,770
Huntington	2,180	2,112	2,070	2,029
Longmeadow	15,784	15,384	15,461	15,307
Ludlow	21,103	21,005	21,512	21,835
Middlefield	521	490	469	410
Monson	8,560	8,613	8,821	8,953
Montgomery	838	930	952	967
Northampton	28,549	28,604	29,295	29,735
Palmer	12,140	12,111	11,979	11,764
Pelham	1,321	1,257	1,287	1,306
Plainfield	648	652	668	678
Russell	1,775	1,795	1,839	1,866
South hadley	17,514	17,802	18,091	18,424
Southampton	5,792	5,941	6,421	6,482
Southwick	9,502	9,715	9,950	10,099
Springfield	153,060	155,995	161,277	165,016
Tolland	485	504	516	523
Wales	1,838	1,879	1,924	1,953
Ware	9,872	9,867	9,935	9,628
West Springfield	28,391	28,952	29,302	29,596
Westfield	41,094	41,665	42,113	42,493
Westhampton	1,607	1,629	1,772	1,828
Wilbraham	14,219	14,379	14,726	14,947
Williamsburg	2,482	2,433	2,496	2,534
Worthington	1,156	1,062	1,088	1,104
Pioneer Valley	**621,570**	**632,012**	**647,277**	**656,992**

Table 13-2 – Household Forecast for the Pioneer Valley Region

	Households 2010	Households 2020	Households 2030	Households 2040
Agawam	11,664	12,373	13,183	13,518
Amherst	9,259	11,409	11,955	11,980
Belchertown	5,595	6,370	6,953	7,185
Blandford	492	528	577	616
Brimfield	1,429	1,643	1,826	1,942
Chester	543	585	624	653
Chesterfield	511	530	557	590
Chicopee	23,739	24,946	26,048	26,735
Cummington	404	413	429	457
East Longmeadow	5,851	6,442	7,025	7,360
Easthampton	7,224	7,632	8,175	8,508
Goshen	416	446	477	490
Granby	2,374	2,478	2,598	2,644
Granville	608	666	713	714
Hadley	2,107	2,340	2,479	2,607
Hampden	1,898	2,002	2,171	2,248
Hatfield	1,483	1,555	1,671	1,731
Holland	994	1,101	1,176	1,202
Holyoke	15,361	16,481	17,491	18,202
Huntington	868	925	977	1,019
Longmeadow	5,741	5,957	6,333	6,324
Ludlow	8,080	8,561	9,239	9,633
Middlefield	230	233	241	220
Monson	3,279	3,527	3,771	3,886
Montgomery	330	389	406	411
Northampton	12,000	12,448	13,234	13,576
Palmer	5,099	5,361	5,516	5,538
Pelham	549	546	570	578
Plainfield	269	294	328	349
Russell	656	695	738	747
South hadley	6,793	7,088	7,504	7,658
Southampton	2,249	2,473	2,801	2,867
Southwick	3,710	4,145	4,466	4,669
Springfield	56,753	59,867	62,896	64,996
Tolland	197	219	224	220
Wales	736	819	870	869
Ware	4,120	4,408	4,722	4,772
West Springfield	12,124	12,795	13,228	13,531
Westfield	15,335	16,512	17,314	17,770
Westhampton	623	669	763	792
Wilbraham	5,309	5,719	6,116	6,264
Williamsburg	1,118	1,169	1,258	1,328
Worthington	510	567	650	695
Pioneer Valley	**238,630**	**255,326**	**270,293**	**278,094**

Table 13-3– Employment Forecast for the Pioneer Valley Region

	Employment 2010	Employment 2020	Employment 2030	Employment 2040
Agawam	11,668	10,830	10,777	10,801
Amherst	14,733	15,433	15,358	15,392
Belchertown	2,619	2,629	2,616	2,622
Blandford	223	184	183	184
Brimfield	540	471	468	469
Chester	110	113	112	113
Chesterfield	123	135	134	134
Chicopee	19,003	17,921	17,834	17,874
Cummington	208	137	136	136
East Longmeadow	7,927	7,365	7,329	7,346
Easthampton	4,341	4,469	4,447	4,457
Goshen	158	155	154	154
Granby	753	894	889	891
Granville	157	163	162	163
Hadley	5,307	6,145	6,115	6,129
Hampden	821	879	875	877
Hatfield	1,965	1,806	1,797	1,801
Holland	147	118	117	117
Holyoke	21,164	20,849	20,747	20,794
Huntington	420	403	401	402
Longmeadow	3,376	3,483	3,466	3,473
Ludlow	6,431	6,510	6,478	6,493
Middlefield	39	41	41	41
Monson	1,295	1,246	1,240	1,242
Montgomery	26	37	37	37
Northampton	18,130	17,782	17,696	17,735
Palmer	4,986	4,498	4,476	4,486
Pelham	155	133	132	132
Plainfield	40	37	37	37
Russell	182	151	150	150
South hadley	4,441	4,274	4,253	4,262
Southampton	1,085	1,119	1,114	1,116
Southwick	2,533	2,520	2,507	2,513
Springfield	74,927	87,255	86,830	87,025
Tolland	37	35	35	35
Wales	150	151	150	150
Ware	2,728	2,457	2,445	2,451
West Springfield	16,922	15,612	15,536	15,571
Westfield	16,736	17,149	17,065	17,103
Westhampton	291	306	305	306
Wilbraham	4,510	4,913	4,889	4,900
Williamsburg	555	555	552	553
Worthington	194	168	167	167
Pioneer Valley	**252,156**	**261,527**	**260,253**	**260,838**

Table 13-4 – PVPC Scenario for Projected Employment Change

	Census Employment 2010	Actual Employment 2015	PV Scenario Employment 2020	PV Scenario Employment 2030	PV Scenario Employment 2040
Agawam	11,668	12,040	12,642	12,580	12,609
Amherst	14,733	16,725	18,986	18,894	18,936
Belchertown	2,619	2,771	2,979	2,964	2,971
Blandford	223	194	169	168	168
Brimfield	540	496	546	543	544
Chester	110	119	129	128	128
Chesterfield	123	142	164	163	164
Chicopee	19,003	19,257	20,220	20,121	20,167
Cummington	208	144	100	99	99
East Longmeadow	7,927	7,764	8,152	8,112	8,131
Easthampton	4,341	4,711	5,113	5,088	5,099
Goshen	158	163	168	167	168
Granby	753	942	1,178	1,173	1,175
Granville	157	172	188	188	188
Hadley	5,307	6,478	7,126	7,091	7,107
Hampden	821	927	1,047	1,042	1,044
Hatfield	1,965	1,904	1,999	1,989	1,994
Holland	147	124	105	104	104
Holyoke	21,164	22,237	23,364	23,251	23,303
Huntington	420	425	430	428	429
Longmeadow	3,376	3,671	3,708	3,690	3,698
Ludlow	6,431	6,862	7,322	7,286	7,303
Middlefield	39	43	47	47	47
Monson	1,295	1,313	1,411	1,405	1,408
Montgomery	26	39	59	58	58
Northampton	18,130	19,116	20,157	20,059	20,104
Palmer	4,986	4,741	5,097	5,072	5,083
Pelham	155	140	126	126	126
Plainfield	40	39	38	38	38
Russell	182	159	139	138	139
South hadley	4,441	4,505	4,730	4,707	4,718
Southampton	1,085	1,180	1,283	1,277	1,280
Southwick	2,533	2,656	2,785	2,771	2,778
Springfield	74,927	79,547	85,513	85,096	85,288
Tolland	37	37	37	37	37
Wales	150	159	169	168	168
Ware	2,728	2,590	2,720	2,706	2,712
West Springfield	16,922	16,907	17,752	17,666	17,706
Westfield	16,736	18,471	19,949	19,852	19,896
Westhampton	291	323	359	357	358
Wilbraham	4,510	5,179	5,593	5,566	5,579
Williamsburg	555	585	673	669	671
Worthington	194	177	161	161	161
Pioneer Valley	**252,156**	**266,174**	**284,632**	**283,245**	**283,882**

B. REGIONAL TRAVEL DEMAND MODEL

Travel demand forecasting is a major step in the transportation planning process. By simulating the current roadway conditions and travel demand, deficiencies in the transportation system are identified. This is an important tool in planning future network enhancements and analyzing proposed improvement projects as travel demand models are developed to simulate actual travel patterns and existing demand conditions. PVPC uses the TransCAD software for its regional travel demand model.

1. 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 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 project.
- 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.

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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.
- Passenger Rail Service from Hartford, CT to Greenfield, MA. (Currently in operation but not modeled.)
- Extension of the North South Passenger Rail Service from Springfield to serve stations in Holyoke, Northampton and Greenfield. (Anticipated to begin this year.)
- Reduction from 2 lanes of travel to one lane of travel in each direction along Route 116 (Chicopee Street) in the City of Chicopee from Meadow Street to Springfield Street (Davitt Bridge). This occurred in 2018.

The 2030 model network will include the following regionally significant projects:

- Hadley -Route 9 widening from Middle Street to Maple Street from one lane in each direction to two lanes in each direction. Expected in 2026.

The 2040 model network does not include any regionally significant projects:

Visionary Projects are discussed in Chapter 15 of the RTP and may be included as part of the 2040 model network for analysis purposes as follows:

- MassDOT I-91 Viaduct Recommendations:
  - Interstate I-91 and South End Bridge improvements
  - The installation of collector-distributor roads alongside I-91 mainline and roundabouts at the South End Bridge and U.S. Route 5; reduction in on/off ramps; realignment of I-91; and elimination of existing lane drops in the vicinity of the South End Bridge.
  - Replacement of the Agawam Rotary with modified diamond interchange; replacement of the South End Bridge and Westfield River bridge to provide two travel lanes in each direction and a new shared-use path; new acceleration and deceleration lanes and proper left and right shoulders on both bridges; access to/from Meadow Street.
  - Replacement of the Plainfield Street bridges over I-91 and the existing railroad tracks with a third westbound travel lane.
  - Relocation of the existing left side on ramp from I-291 to I-91 SB to a more traditional right side on ramp.
- A potential new Turnpike Exit in Blandford, pending the results of a current study by MassDOT.
- East/West Passenger Rail Service to Boston pending the outcome of the current MassDOT study.

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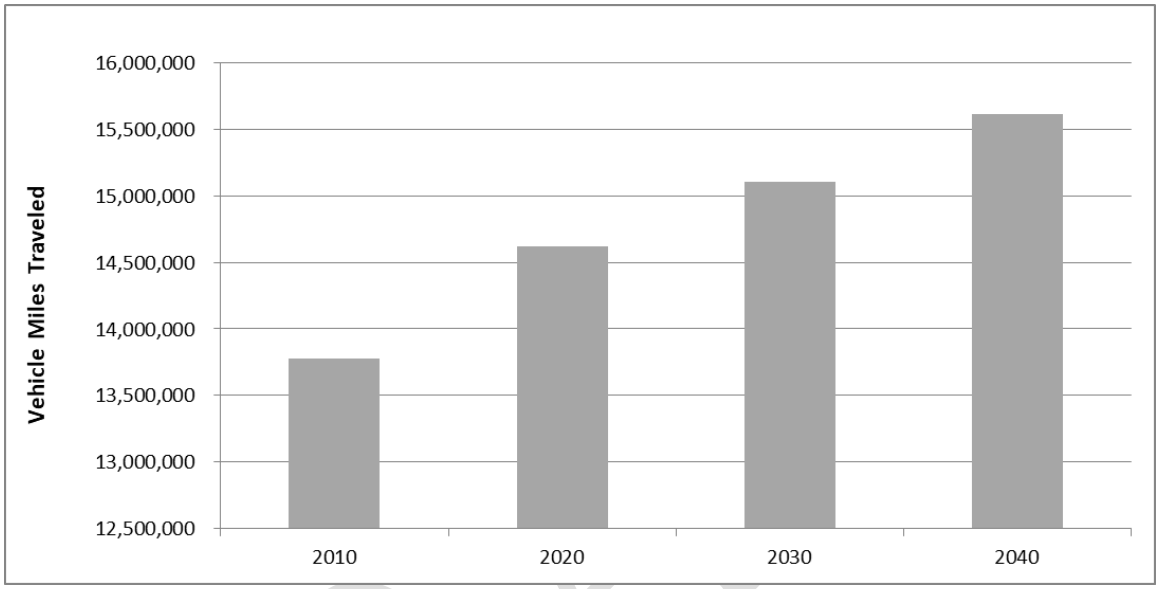
2. Estimated Regional Vehicle Miles Traveled

The total Vehicle Miles Traveled (VMT) was estimated for the model years of 2010, 2020, 2030, and 2040. The total VMT is shown in Figure 13-1. The total VMT is projected to increase by an average of 0.6% per year from 2010 to 2020 and 0.3% per year from 2020 to 2040.

Figure 13-1 – Estimated Future VMT



3. Future Traffic Volume Projections

The PVPC regional travel demand model was used to estimate the Average Daily Traffic (ADT) on key roadways throughout the region. These estimates are used to identify the potential traffic impacts of the future growth scenarios for the 2020, 2030, and 2040 analysis years. Projected changes in ADT on 5 area bridges are shown on Figure 13-2. The projected ADT along the I-91 corridor is shown on Figure 13-3. Additional projections for ADT along regional roadways are included as part of the appendix to this chapter.

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Figure 13-2 - Projected Average Daily Traffic on Area Bridges

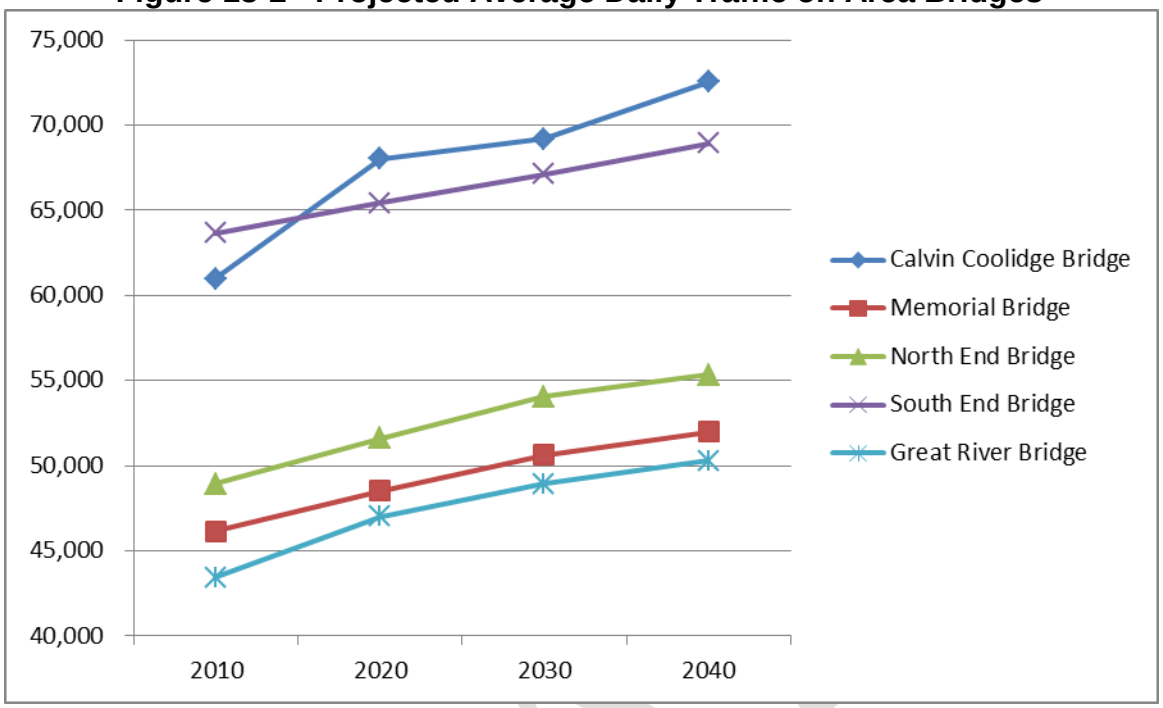
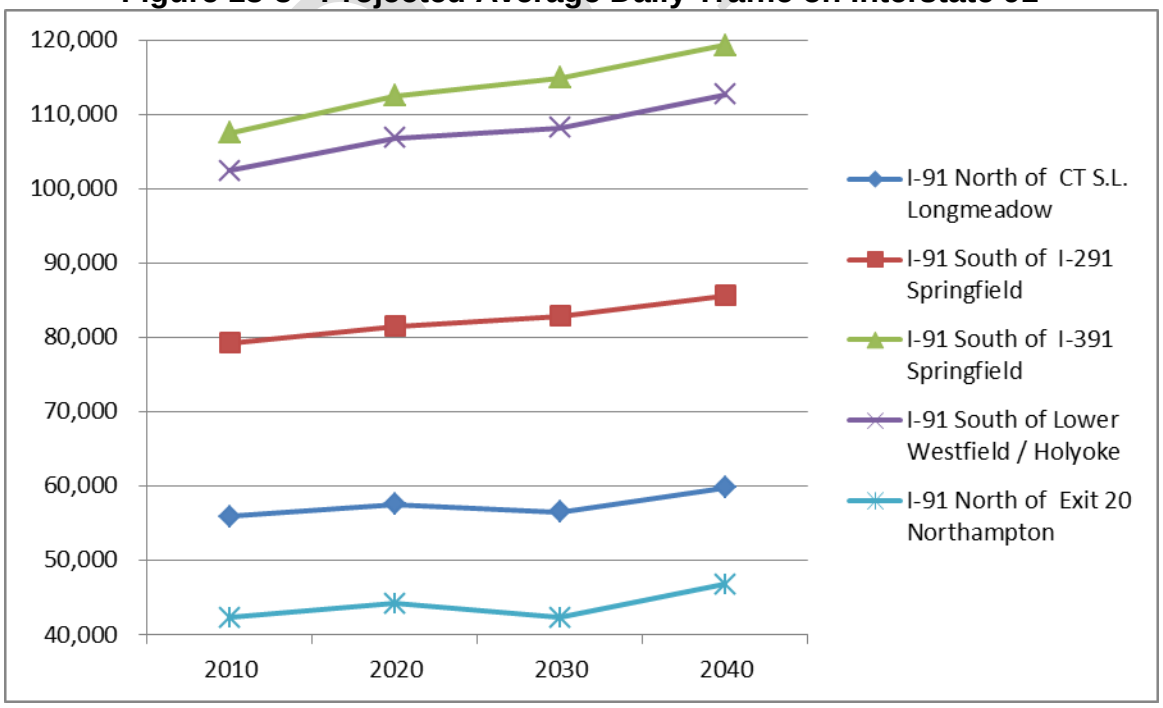


Figure 13-3 - Projected Average Daily Traffic on Interstate 91



CHAPTER 14

Photo: Columbia River Greenway, Westfield, MA

NEEDS, STRATEGIES AND PROJECTS

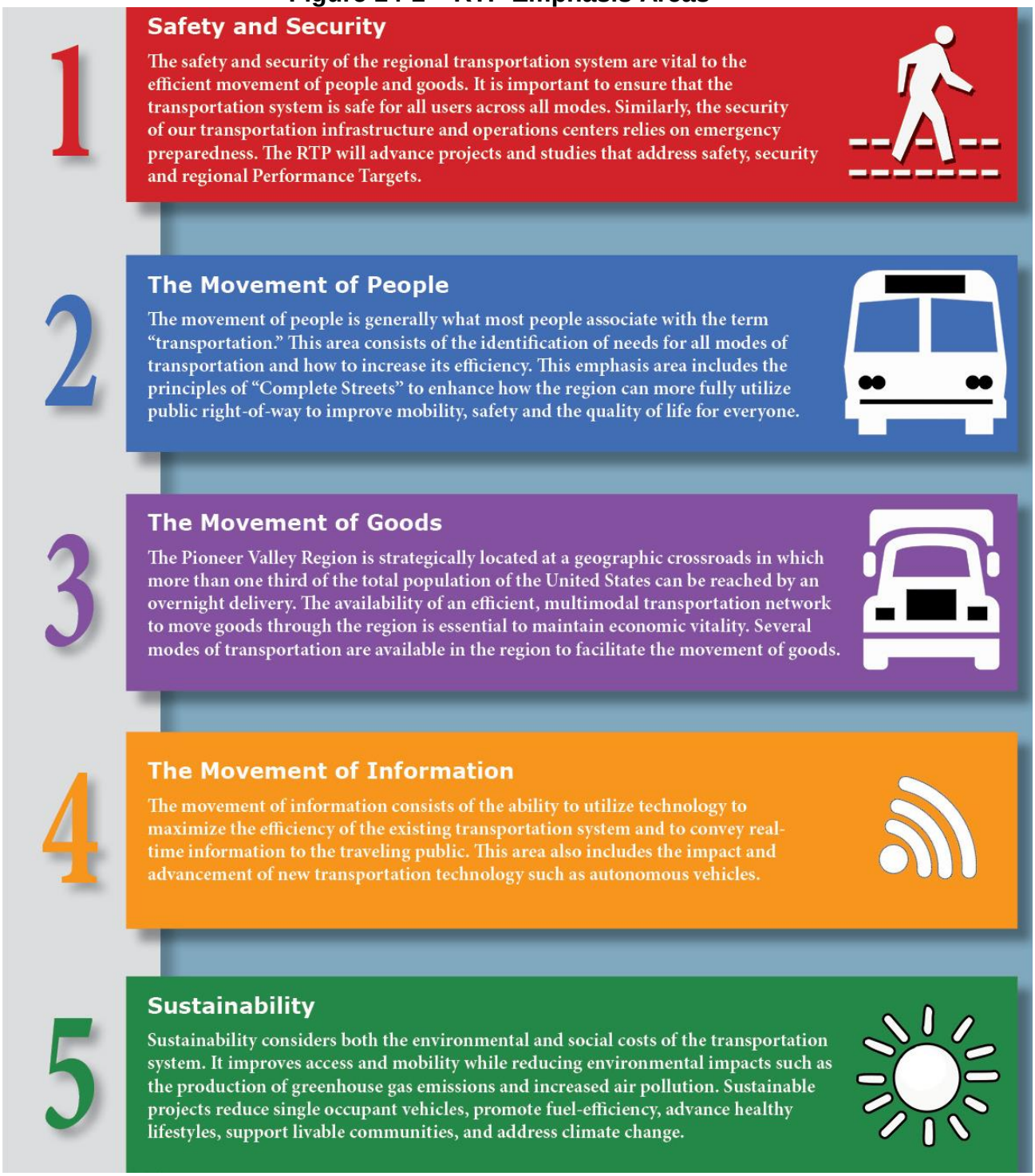
The vision of the RTP focuses on the attainment of a safe and dependable transportation system. To achieve this vision and its associated goals, regional transportation needs have been identified. The second step is to develop appropriate strategies to address these needs while adhering to the policies and objectives of the RTP. The third and final step is to advance planning studies and implement improvement projects that will enhance the transportation system in a manner consistent with our vision.

Emphasis areas were identified 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 (S&S)
- The Movement of People (MoP)
- The Movement of Goods (MoG)
- The Movement of Information (MoI)
- Sustainability (S)

The transportation emphasis areas are related to each of the thirteen Regional Transportation Goals. Needs and Strategies were developed for each emphasis area to advance each of the thirteen goals without the need for repetitiveness. More information on the five RTP Emphasis Areas is presented in Figure 14-1.

Figure 14-1 – RTP Emphasis Areas



A. NEEDS

Regional transportation needs have been identified and summarized by emphasis area in Tables 14-1 – 14-5. 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 – Safety and Security Needs (S&S)

1	Reduce the number of fatal and incapacitating injury crashes for bicyclists, pedestrians and vehicles in the region.	Ongoing
2	Ongoing construction activities, special events and major incidents can negatively impact emergency responders.	Ongoing
3	Improve safety at freight facilities and at-grade railroad crossings.	Ongoing
4	Improve knowledge and compliance with existing Emergency Evacuation plans.	Ongoing
5	Protection of critical/at-risk regional transportation infrastructure.	Ongoing
6	Ensure the safety and security of mass transit facilities and equipment.	Ongoing
7	Provide for the safety and security of hazardous materials while in transportation and in storage.	Immediate
8	Improve access to driver, bicycle, and pedestrian education.	Immediate
9	Many roadways are unsuitable for bicycles, pedestrians and transit users.	Immediate
10	Communities lack the proper resources to maintain bridges and culverts under their jurisdiction.	Immediate

Table 14-2 – Needs to Enhance the Movement of People (MoP)

1	Proper integration of complete streets, traffic calming, parking and connectivity into transportation improvements.	Ongoing
2	Monitor peak hour congestion in the region.	Ongoing
3	Expansion of the existing bicycle and pedestrian network.	Ongoing
4	Maintain equity in providing transportation services and access throughout the region.	Ongoing
5	Maintain and increase access to national passenger rail service in the Pioneer Valley.	Ongoing
6	The regional transportation system does not address the requirements of an aging population.	Ongoing
7	Improve coordination and notification of the review of roadway improvement projects.	Ongoing
8	Secure adequate, dependable and equitable funding for a balanced regional transportation system that serves both urban and rural areas in the region.	Immediate
9	Increase the number of riders using transit to commute to work and school.	Immediate
10	Expand transit options for inter-city, inter-regional passenger trips.	Immediate
11	Transportation options for underserved populations to designated heating and cooling centers	Immediate
12	Expand opportunities for tourism along designated Scenic Byways.	Future

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Table 14-3 – Needs to Enhance the Movement of Goods (MoG)

1	Support the development and maintenance of short line and regional railroads.	Ongoing
2	Improve the communication between private carriers and state and local officials.	Ongoing
3	Increase opportunities for air cargo in the region.	Ongoing
4	Improve coordination with class one carriers serving the region.	Immediate
5	Consider impacts on freight when making future transportation investments.	Future

Table 14-4 – Needs to Enhance the Movement of Information (MoI)

1	Improve distribution and access of real-time highway and transit information.	Ongoing
2	Coordinate efficient use of existing rights of way to house communication infrastructure.	Ongoing
3	Educate communities on the advantages of ITS and expand the use of ITS in the region.	Ongoing
4	Outdated navigation applications provide incorrect travel directions.	Ongoing
5	Increase public and community involvement in the transportation planning process.	Ongoing
6	Improve the availability of high speed internet and wireless communication access in the region.	Immediate
7	Develop and implement policies on autonomous vehicles.	Immediate
8	On demand services require a smart phone and cellular service which are not easily available to low income households and rural areas.	Immediate

Table 14-5 – Summary of Needs to Enhance Sustainability (S)

1	Protect existing natural, historical, and cultural resources.	Ongoing
2	Reduce vehicle miles traveled in the region to minimize impacts on air quality, greenhouse gas emissions and energy consumption.	Ongoing
3	Raise the average vehicle occupancy rate for the region.	Ongoing
4	Consider the impacts of large scale development on surrounding communities.	Ongoing
5	Reduce impervious surfaces and stormwater runoff from roads and highways.	Ongoing
6	Promote transit oriented development and pedestrian friendly development.	Immediate
7	Reduce visual and light pollution while ensuring pedestrian and bicycle visibility.	Immediate
8	Incorporate renewable energy into transportation improvement projects and transportation facilities.	Future
9	Reduce sprawl and foster investment in existing urban areas.	Future
10	Provide for fish and wildlife migration and passage in transportation projects.	Future

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B. STRATEGIES

Strategies were developed to address the regional needs identified for each emphasis area. These strategies are summarized in Table 14-6 – 14-10. 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.

Recognizing that regional strategies can address more than one need, a third column has been added to each strategy table to identify the corresponding regional need(s). This column is abbreviated for space considerations and includes the Emphasis Area abbreviation followed by the corresponding need number(s) from Tables 14-1 – 14-5. Each table has also been color coded by Emphasis Area to match Figure 14-1.

Table 14-6 – Safety and Security Strategies

		Priority	Need(s) Addressed
1	Develop a regional list of high crash locations. Incorporate "Vision Zero" strategies in safety planning.	Ongoing	S&S 1,9 S 7
2	Work with appropriate agencies to improve the consistency of crash records and reporting to assist in identifying the contributing factors to crashes, fatalities, and incapacitating injuries.	Ongoing	S&S 1
3	Provide accommodations for pedestrians, transit users, and bicyclists in roadway and bridge design and the maintenance of existing facilities. Promote connectivity as part of all transportation improvement projects.	Ongoing	S&S 1,9
4	Implement communications and ITS technologies to improve public transit safety, and security.	Ongoing	S&S 2,6
5	Develop an inventory of critical transportation choke points, haz-mat routes, and users.	Ongoing	S&S 5,7
6	Promote the Safe Routes to School program.	Ongoing	S&S 1,8
7	Promote and advance the use of roadway safety audits in the Pioneer Valley.	Ongoing	S&S 1
8	Work with emergency responders to update regional evacuation plans.	Ongoing	S&S 4
9	Identify and advocate for additional revenue sources to bring the regional transportation system into a state of good repair.	Immediate	S&S 10, MoP 8
10	Improve intersection geometry and upgrade traffic signal control equipment to improve safety. Consider roundabouts as alternatives to new traffic signals.	Immediate	S&S 1
11	Develop appropriate educational resources to promote safety for drivers, bicyclists, transit users, and pedestrians.	Immediate	S&S 8
12	Limit opportunities to access freight rail facilities and infrastructure.	Immediate	S&S 3

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Table 14-7 – Strategies to Assist in the Movement of People

		Priority	Need(s) Addressed
1	Seek innovative methods to increase transit ridership, including express routes and flex vans.	Ongoing	MoP 6,8,9 S 2,3,6
2	Monitor congested areas using the regional Congestion Management Process (CMP).	Ongoing	MoP 2
3	Develop a regional list of top congested locations.	Ongoing	MoP 2
4	Promote the implementation of cycle tracks.	Ongoing	MoP 3
5	Advance and promote the principles of pavement management. Invest in the repair and maintenance of existing transportation infrastructure.	Ongoing	MoP 8
6	Conduct parking studies for downtown areas and village centers for all modes of transportation. Identify locations for park and ride lots and supporting express transit service.	Ongoing	MoP 9,10 S&S 9
7	Work with local communities to incorporate the concepts of Complete Streets and Traffic Calming into transportation improvement projects.	Ongoing	MoP 1,3 S&S 9
8	Maintain equity in providing transportation services and access throughout the region.	Ongoing	MoP 4 MoI 8
9	Incorporate TAP eligible components into transportation improvement projects.	Ongoing	MoP 12
10	Develop a comprehensive Commuter Rail network.	Immediate	MoP 5 S 2,3,6
11	Work with the State and local communities to enhance education and use of GeoDOT and the MaPIT tool.	Immediate	MoP 7
12	Advocate for better collaboration and coordination between all transportation service providers to allow for more opportunities to provide connections between existing services.	Immediate	MoP 5,10,11
13	Identify sources of revenue for local transportation projects.	Immediate	MoP 8
14	Promote compact “Village Center” development to include senior and low-income housing, access to healthy food and medical services via a variety of modes of transportation.	Future	MoP 3,6
15	Encourage private connections to the regional bikeway network.	Future	MoP 3

Table 14-8 – Strategies to Enhance the Movement of Goods

		Priority	Need(s) Addressed
1	Enhance directional and guide signs to/from the regional highway system and major destinations.	Ongoing	MoG 1,3
2	Meet with class one carriers on a regular basis to enhance the regional freight rail network.	Ongoing	MoG 4
3	Incorporate appropriate design measures in roadway improvement projects to accommodate freight movements.	Ongoing	MoG 2,5
4	Improve the connections between the national highway network and air and rail intermodal terminals, freight yards, and distribution centers.	Immediate	MoG 1,3
5	Develop incentives to encourage businesses to utilize a mix of freight transportation alternatives.	Immediate	MoG 1,3
6	Identify and mitigate vertical clearance issues at underpasses.	Immediate	MoG 5
7	Use the regional CMP to identify areas of freight congestion.	Immediate	MoG 1,2,3 MoP 2

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Table 14-9 – Strategies to Enhance the Movement of Information

		Priority	Need(s) Addressed
1	Encourage the integration of cameras, security devices and other ITS equipment as part of transit and roadway improvement projects.	Ongoing	MoI 1
2	Provide training for local communities and stakeholders to increase their understanding of various ITS technologies and equipment.	Ongoing	MoI 3
3	Ensure consistency with the ITS Regional Architecture for Western Massachusetts.	Ongoing	MoI 1,2,3,6,7
4	Monitor emerging information and communications technologies to stay current with state-of-the-art information systems and identify opportunities for expansion of existing service.	Ongoing	MoI 1,7,8
5	Expand efforts to incorporate more feedback into the regional transportation planning process.	Ongoing	MoI 5 MoP 7
6	Continue to refine and improve the regional TEC project prioritization system as necessary.	Ongoing	MoI 5 MoP 7
7	Educate local communities on the project development process.	Ongoing	MoI 5 MoP 7
8	Encourage and promote telecommuting and video conferencing.	Ongoing	MoI 5 S 2
9	Expand real-time passenger and travel information systems.	Immediate	MoI 1,3
10	Pursue public/private partnerships to reduce costs and enhance information access.	Immediate	MoI 2,6
11	Pursue relationships with application developers to ensure they have access to the latest transportation network.	Future	MoI 4
12	Incorporate best practices to accommodate autonomous vehicles in infrastructure projects.	Future	MoI 7

Table 14-10 – Strategies that Enhance Sustainability

		Priority	Need(s) Addressed
1	Mitigate the adverse impact of sprawl by creating incentives for downtown revitalization, promoting smart growth and mixed use development.	Ongoing	S 2,3,4,9
2	Divert highway runoff through stormwater Best Management Practices, such as rain gardens.	Ongoing	S 5
3	Restore or maintain connected habitats that allow for movement of fish, water, and wildlife.	Ongoing	S 1,10
4	Encourage the use of permeable materials and reduce the use of concrete.	Ongoing	S 5
5	Assist local communities with their sub division needs.	Ongoing	S 4,6
6	Designate wild and scenic corridors along highways and streams of historic and natural significance to promote tourism.	Ongoing	S 1
7	Implement the Regional Clean Energy Plan to promote energy efficient travel modes and encourage local fleets to use clean fuels.	Ongoing	S 2,3
8	Implement transportation based strategies identified in local Hazard Mitigation Plans.	Ongoing	S 1
9	Encourage the planting of shade trees in urban areas and along shared use paths to improve air quality and modulate extreme weather conditions.	Ongoing	S 6,8
10	Work with major employers to develop incentives to decrease single occupant vehicle use.	Immediate	S 2,3,4 MoI 6
11	Mitigate the impacts of roadway salt and chemical usage during snow season.	Immediate	S 1
12	Refer new TIP projects to the Pioneer Valley Sustainability Toolkit.	Immediate	S 5,7,8,10
13	Incorporate energy efficient lighting, solar power, and electric vehicle charging stations as part of transportation improvement projects.	Immediate	S 7,8
14	Improve education and enforcement of idling reduction programs to reduce greenhouse gas emissions.	Immediate	S 2
15	Identify hazardous locations susceptible to drought and flooding along major roadways.	Immediate	S 1
16	Prohibit billboards and screen lighting on highways.	Future	S 7

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C. PROJECTS

The projects section of the 2020 Regional Transportation Plan was reorganized to provide greater clarity. In previous versions of this document, every approved project as well as any future project believed to be ready for construction within the life of the plan was identified in this section. Instead, PVPC has identified three types of projects to be included in this section:

- Projects included in the 2020-2024Transportation Improvement Program (TIP) (Table 14-12)
- Major Regional projects (Table 14-13)
- Visionary projects (Table 14-14)

Major regional projects are defined as projects with an inflated cost greater than $20 million. Visionary projects include any project that either does not fit into financial constraint due to cost and/or a priority project that may not be ready to construct during the lifetime of this plan. A listing of all approved projects, major projects and visionary projects can be found in the appendix to the RTP. Chapter 15 of the RTP provides additional information on the anticipated transportation revenue over the life of the plan and the regional scenario for how transportation funding can be allocated by the type of project.

The impacts 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. This information is summarized in Chapter 13.

1. PROJECT PRIORITY CRITERIA AND SELECTION

In 2014 PVPC with the assistance of the JTC completed a comprehensive update to the Transportation Evaluation Criteria (TEC) for the PVMPO. The purpose of the update was to bring the TEC up to the latest federal requirements. In 2018, PVPC staff with the assistance of the JTC reviewed the effectiveness of the TEC to ensure the criteria was working as anticipated and met the requirements of the FAST Act. All projects included in the TIP have been evaluated and assigned a priority rating using the TEC scoring as adopted by the MPO. This process is used as a management tool to identify projects of regional priority and program them in the TIP. Table 14-11 provides a summary of the TEC scoring.

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Table 14-11 – 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 and Title VI
Improves Substandard Pavement	Design is consistent with Complete Streets policies	Improves efficiency, reliability and attractiveness of public transit	Encourages development around existing infrastructure	Reduces number and severity of collisions	Preserves floodplains and wetlands	Enhances or preserves greenways and blueways	Reduces and limits disproportionate impacts on an EJ community
8	3	4	2	7	1	1	0.5
Improves Intersection Operations	Provides multi-modal access to a downtown, village center, or employment center	Improves existing peak hour LOS	Prioritizes transportation investments that support land use and economic development goals	Promotes safe and accessible pedestrian and bike environment	Promotes green infrastructure and low impact development to reduce stormwater impacts	Improves access to parks, open lands and open space	Reduces and limits disproportionate impacts on Title VI community
6	2	6	1	5	2	1	0.5
In a Congestion Management Process Area	Reduces auto-dependency	Reduces traffic congestion	Provides services to a TOD, TND or cluster development district	Improves emergency response	Reduced impervious surfaces	Improves access to jobs	Improves transit for EJ populations
5	2	7	0.5	4	0.5	2	1
	Project serves a targeted development site		Supports mixed-use downtowns and village centers		Protects or enhances environmental assets	Preserves historical and cultural resources	Improves transit for Title VI populations
	2		0.5		0.5	0.5	1
	Completes off-road bike and ped network		Improves Intermodal Connections		Supports Brownfield redevelopment	Preserves prime agricultural land	Creates an EJ Burden
	3		4		0.5	0.5	-5
			Reduces congestion on freight routes		Improves air quality	Provides safe and reliable access to education	Creates an Title VI Burden
			2		1	0.5	-5
					Reduces CO2 emissions	Supports designated scenic byways	
					1	0.5	
					Promotes mode shift	Implements ITS Strategies	
					1	2	
					Improves fish and wildlife passage	Improves Network Wayfinding	
					1	1	
					Supports Green Communities	Health Impact Assessment	
					0.5	1	
					Improves storm resilience	Length of Time Project has been in queue for TIP funding	
					3	1	
Maximum Score							
19	**12**	**17**	**10**	**16**	**12**	**11**	**3**

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2. Development of the FY2020 – FY2024 TIP

As the lead planning agency for the MPO, PVPC accepts the responsibility for developing the TIP in a cooperative process with members of the MPO and the general public. The final TIP is voted on for endorsement at a formal meeting of the MPO. The endorsed TIP project listing is included in the State Transportation Improvement Program (STIP) and requires endorsement by the Governor.

The MPO relies on a transportation advisory committee, the Joint Transportation Committee (JTC) to carry out the cooperative process during TIP development. The JTC is a group of community appointed officials, MPO member representatives, public and private transportation providers, citizens, and special interest groups and agencies. The JTC establishes and recommends to the MPO procedures for submitting, prioritizing and selecting projects for the TIP. PVPC staff provides the technical support to conduct the TIP development activities for the JTC.

Transportation improvement projects included as part of the FY2020 – FY2024 TIP for the Pioneer Valley Metropolitan Planning Organization must come from a conforming regional transportation plan. Projects included in the FY2020 – FY2024 TIP conform to the 2016 Update the RTP and are presented in this plan for informational purposes. A summary of these projects is presented in Table 14-12.

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Table 14-12 – 2020-2024 Transportation Improvement Program (TIP)

TIP Year	Project ID	Municipality	Project	Funding	Total Funds			Additional Information
2020	607502	Northampton	NORTHAMPTON- INTERSECTION IMPROVEMENTS AT KING STREET, NORTH STREET & SUMMER STREET AND AT KING STREET & FINN STREET	STBG	$ 2,460,910	$ 1,968,728	$ 492,182	Construction / (YOE $3,384,309) / 65 TEC / 25% STBG, CMAQ
2020	607502	Northampton	NORTHAMPTON- INTERSECTION IMPROVEMENTS AT KING STREET, NORTH STREET & SUMMER STREET AND AT KING STREET & FINN STREET	CMAQ	$ 923,399	$ 738,719	$ 184,680	Construction / (YOE $3,384,309) / 65 TEC / 25% STBG, CMAQ
2020	604434	Chicopee	CHICOPEE- RECONSTRUCTION & RELATED WORK ON FULLER ROAD, FROM MEMORIAL DR (RTE 33) TO SHAWINIGAN DR (2.0 MILES)	STBG	$ 6,025,658	$ 4,820,526	$ 1,205,132	Construction / (YOE $8,034,211) / 49.5 TEC / 75% STBG, HSIP
2020	604434	Chicopee	CHICOPEE- RECONSTRUCTION & RELATED WORK ON FULLER ROAD, FROM MEMORIAL DR (RTE 33) TO SHAWINIGAN DR (2.0 MILES)	HSIP	$ 2,008,553	$ 1,807,698	$ 200,855	Construction / (YOE $8,034,211) / 49.5 TEC / 75% STBG, HSIP
2020	608236	Northampton	NORTHAMPTON- RECONSTRUCTION OF DAMON ROAD, FROM ROUTE 9 TO ROUTE 5, INCLUDES DRAINAGE SYSTEM REPAIRS & SLOPE STABILIZATION AT THE NORWOTTUCK	STBG	$10,043,653	$ 8,034,922	$ 2,008,731	Construction / (YOE $10,043,653) / 66.5 TEC / PS&E STBG
2020	608718	Springfield	SPRINGFIELD- INTERSECTION IMPROVEMENTS AT BERKSHIRE AVENUE, COTTAGE AND HARVEY STREETS	STBG	$ 1,254,413	$ 1,003,530	$ 250,883	Construction / (YOE $2,280,751) / 41.5 TEC Score 25% STBG, HSIP
2020	608718	Springfield	SPRINGFIELD- INTERSECTION IMPROVEMENTS AT BERKSHIRE AVENUE, COTTAGE AND HARVEY STREETS	HSIP	$ 1,026,338	$ 923,704	$ 102,634	Construction / (YOE $2,280,751) / 41.5 TEC Score 25% STBG, HSIP
2020	PV0001	Multiple	NORTHAMPTON, AMHERST, CHICOPPE, EASTHAMPTON, HADLEY, HOLYOKE, SOUTH HADLEY, SPRINGFIELD, and WEST SPRINGFIELD: ValleyBike share (phase II)	STBG	$ 1,200,000	$ 960,000	$ 240,000	Construction / YOE $1,200,000 / 35.5 TEC STBG
2020	PV0002	Multiple	P 21 Express Year 3	CMAQ	$ 500,000	$ 400,000	$ 100,000	Funding Year 3 / STBG
2020	608631	Westhampton	WESTHAMPTON- BRIDGE REPLACEMENT, W-27-005, KINGS HIGHWAY OVER N BRANCH MANHAN RIVER	STBG-BR-OFF	$ 1,937,318	$ 1,549,854	$ 387,464	
2020	400103	Westfield	WESTFIELD- BRIDGE REPLACEMENT, W-25-006, ROUTE 10/202 (SOUTHWICK ROAD) OVER THE LITTLE RIVER	NHPP-On	$13,276,980	$10,621,584	$ 2,655,396	
2020	606552	Northampton	NORTHAMPTON- BRIDGE RECONSTRUCTION, N-19-059, I-91 OVER US 5/BMRR & N-19-060, I-91 OVER HOCKANUM ROAD	NHPP-On	$ 4,671,793	$ 3,737,434	$ 934,359	AC Year 1 of 5, Total Cost $56,891,767
2020	608473	South Hadley	SOUTH HADLEY - RESURFACING AND RELATED WORK ON ROUTE 116	NHPP	$ 4,987,500	$ 3,990,000	$ 997,500	
2020	608575	Multiple	CHICOPEE TO HOLYOKE- GUIDE AND TRAFFIC SIGN REPLACEMENT ON I-391	HSIP	$ 1,861,310	$ 1,675,179	$ 186,131	
2020	602911	Chicopee	CHICOPEE- CONNECTICUT RIVERWALK & BIKEWAY CONSTRUCTION, FROM BOAT RAMP NEAR I-90 TO NASH FIELD (2.5 MILES), INCLUDES NEW BRIDGE C-13-060 OVER OVERFLOW CHANNEL	CMAQ	$ 3,041,445	$ 2,433,156	$ 608,289	
				2020 Total	$55,219,269	$44,665,036	$10,554,234	

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Table 14-12 – 2020-2024 Transportation Improvement Program (TIP) Continued

TIP Year	Project ID	Municipality	Project	Funding	Total Funds			Additional Information
2021	607773	Westfield	WESTFIELD- IMPROVEMENTS & RELATED WORK ON ROUTE 20, COURT STEET & WESTERN AVENUE, LLOYDS HILL ROAD TO HIGH STREET/MILL STREET INTERSECTION (PHASE II)	STBG	$ 6,136,732	$ 4,909,386	$ 1,227,346	Construction / (YOE $8,479,708) / 52.5 TEC / 25% STBG,CMAQ,HSIP,TAP
2021	607773	Westfield	WESTFIELD- IMPROVEMENTS & RELATED WORK ON ROUTE 20, COURT STEET & WESTERN AVENUE, LLOYDS HILL ROAD TO HIGH STREET/MILL STREET INTERSECTION (PHASE II)	CMAQ	$ 669,323	$ 535,458	$ 133,865	Construction / (YOE $8,479,708) / 52.5 TEC / 25% STBG,CMAQ,HSIP,TAP
2021	607773	Westfield	WESTFIELD- IMPROVEMENTS & RELATED WORK ON ROUTE 20, COURT STEET & WESTERN AVENUE, LLOYDS HILL ROAD TO HIGH STREET/MILL STREET INTERSECTION (PHASE II)	HSIP	$ 1,115,769	$ 1,004,192	$ 111,577	Construction / (YOE $8,479,708) / 52.5 TEC / 25% STBG,CMAQ,HSIP,TAP
2021	607773	Westfield	WESTFIELD- IMPROVEMENTS & RELATED WORK ON ROUTE 20, COURT STEET & WESTERN AVENUE, LLOYDS HILL ROAD TO HIGH STREET/MILL STREET INTERSECTION (PHASE II)	TAP	$ 557,884	$ 446,307	$ 111,577	Construction / (YOE $8,479,708) / 52.5 TEC / 25% STBG,CMAQ,HSIP,TAP
2021	608782	Springfield	SPRINGFIELD- INTERSECTION IMPROVEMENTS AT COTTAGE STREET, INDUSTRY AVENUE AND ROBBINS ROAD	CMAQ	$ 2,858,325	$ 2,286,660	$ 571,665	Construction / (YOE $2,858,325) / 46.5 TEC Score 25% CMAQ
2021	608084	Amherst	AMHERST- IMPROVEMENTS & RELATED WORK ON ROUTES 9 & 116, FROM UNIVERSITY DRIVE TO SOUTH PLEASANT STREET (0.8 MILES)	STBG	$ 3,489,558	$ 2,791,646	$ 697,912	Construction / (YOE $4,048,448) / 53.5 TEC / 25% STBG, TAP
2021	608084	Amherst	AMHERST- IMPROVEMENTS & RELATED WORK ON ROUTES 9 & 116, FROM UNIVERSITY DRIVE TO SOUTH PLEASANT STREET (0.8 MILES)	TAP	$ 558,890	$ 447,112	$ 111,778	Construction / (YOE $4,048,448) / 53.5 TEC / 25% STBG, TAP
2021	605032	Hadley	HADLEY- RECONSTRUCTION ON ROUTE 9, FROM MIDDLE STREET TO MAPLE/SOUTH MAPLE STREET	STBG	$10,917,509	$ 8,734,007	$ 2,183,502	Construction / (YOE $24,849,741) A/C Year 1 of 2 FFY 2021 $10,917,509, FFY 2022 $13,932,231 /61 TEC / 25% / STBG
2021	608460	Hadley	HADLEY- BRIDGE REPLACEMENT, H-01-005, BAY ROAD (ROUTE 47) OVER THE FORT RIVER	NHPP-On	$ 5,714,160	$ 4,571,328	$ 1,142,832	
2021	606552	Northampton	NORTHAMPTON- BRIDGE RECONSTRUCTION, N-19-059, I-91 OVER US 5/BMRR & N-19-060, I-91 OVER HOCKANUM ROAD	NHPP-On	$ 9,539,115	$ 7,631,292	$ 1,907,823	AC Year 2 of 5, Total Cost $56,891,767
2021	608487	Westfield	WESTFIELD - RESURFACING AND RELATED WORK ON ROUTES 10 AND 202	NHPP	$ 2,730,000	$ 2,184,000	$ 546,000	
2021	608489	Wilbraham	WILBRAHAM - RESURFACING AND RELATED WORK ON ROUTE 20	NHPP	$ 8,283,600	$ 6,626,880	$ 1,656,720	
2021	608413	Northampton	NORTHAMPTON- ROCKY HILL GREENWAY MULTI-USE TRAIL, FROM THE MANHAN RAIL TRAIL TO ROCKY HILL ROAD (0.4 MILES)	CMAQ	$ 812,026	$ 649,621	$ 162,405	
				2021 Total	$53,382,891			

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Table 14-12 – 2020-2024 Transportation Improvement Program (TIP) Continued

TIP Year	Project ID	Municipality	Project	Funding	Total Funds			Additional Information
2022	608374	West Springfield	WEST SPRINGFIELD- RECONSTRUCTION OF MEMORIAL AVENUE (ROUTE 147), FROM COLONY ROAD TO THE MEMORIAL AVENUE ROTARY (1.4 MILES)	STBG	$ 4,251,369	$ 3,401,095	$ 850,274	Construction / (YOE $24,348,731) AC Year 1 of 2 FFY 2022 $4,251,369 FFY2023 $20,097,362 / 70 TEC / 25% / STBG
2022	608577	Easthampton	EASTHAMPTON- IMPROVEMENTS AND RELATED WORK ON UNION STREET (ROUTE 141) FROM PAYSON AVENUE TO HIGH STREET (0.36 MILES)	STBG	$ 3,560,664	$ 2,848,531	$ 712,133	Construction / (YOE $3,560,664) / 60 TEC / Pre 25% STBG
2022	605032	Hadley	HADLEY- RECONSTRUCTION ON ROUTE 9, FROM MIDDLE STREET TO MAPLE/SOUTH MAPLE STREET	STBG	$ 11,284,113	$ 9,027,290	$ 2,256,823	Construction / (YOE $24,849,741) A/C Year 2 of 2 FFY 2021 $10,917,509, FFY 2022 $13,932,231 /61 TEC / 25% STBG, HSIP, TAP
2022	605032	Hadley	HADLEY- RECONSTRUCTION ON ROUTE 9, FROM MIDDLE STREET TO MAPLE/SOUTH MAPLE STREET	HSIP	$ 2,118,494	$ 1,906,645	$ 211,849	Construction / (YOE $24,849,741) A/C Year 2 of 2 FFY 2021 $10,917,509, FFY 2022 $13,932,231 /61 TEC / 25% STBG, HSIP, TAP
2022	605032	Hadley	HADLEY- RECONSTRUCTION ON ROUTE 9, FROM MIDDLE STREET TO MAPLE/SOUTH MAPLE STREET	TAP	$ 529,624	$ 423,699	$ 105,925	Construction / (YOE $24,849,741) A/C Year 2 of 2 FFY 2021 $10,917,509, FFY 2022 $13,932,231 /61 TEC / 25% STBG, HSIP, TAP
2022	606450	Holyoke	HOLYOKE-TRAFFIC SIGNAL UPGRADES AT 15 INTERSECTIONS ALONG HIGH & MAPLE STREETS	STBG	$ 5,095,339	$ 4,076,271	$ 1,019,068	Construction / (YOE $9,884,646 ($4,789,307 in statewide funding) = $5,095,339) / 63 TEC / 25 / STBG
2022	608869	Northampton	NORTHAMPTON- BRIDGE REPLACEMENT, N-19-068, OLD SPRINGFIELD ROAD OVER THE MILL RIVER	STBG-BR-OFF	$ 3,981,000	$ 3,184,800	$ 796,200	
2022	608847	Wales	WALES- BRIDGE REPLACEMENT, W-02-002, HOLLAND ROAD OVER WALES BROOK	STBG-BR-OFF	$ 540,096	$ 432,077	$ 108,019	
2022	608846	Monson	MONSON- BRIDGE REPLACEMENT, M-27-015, OLD WALES ROAD OVER CONANT BROOK	STBG-BR-OFF	$ 1,742,784	$ 1,394,227	$ 348,557	
2022	606552	Northampton	NORTHAMPTON- BRIDGE RECONSTRUCTION, N-19-059, I-91 OVER US 5/BMRR & N-19-060, I-91 OVER HOCKANUM ROAD	NHPP-On	$ 11,128,545	$ 8,902,836	$ 2,225,709	AC Year 3 of 5, Total Cost $56,891,767
2022	608466	Multiple	BELCHERTOWN-GRANBY RESURFACING AND RELATED WORK ON ROUTE 202	NHPP	$ 3,372,062	$ 2,697,650	$ 674,412	
2022	604209	Multiple	HOLYOKE-WEST SPRINGFIELD- REHABILITATION OF ROUTE 5	NHPP	$ 14,489,928	$ 11,591,942	$ 2,897,986	
2022	606450	Holyoke	HOLYOKE- TRAFFIC SIGNAL UPGRADES AT 15 INTERSECTIONS ALONG HIGH & MAPLE STREETS	CMAQ	$ 4,789,307	$ 3,831,446	$ 957,861	
2022	608565	Springfield	SPRINGFIELD- IMPROVEMENTS ON ST. JAMES AVENUE AT ST. JAMES BOULEVARD AND CAREW STREET	HSIP	$ 2,592,000	$ 2,332,800	$ 259,200	
2022	608560	Springfield	SPRINGFIELD- IMPROVEMENTS ON ST. JAMES AVENUE AT TAPLEY STREET	HSIP	$ 1,716,574	$ 1,544,916	$ 171,657	
2022	608719	Multiple	AMHERST- BELCHERTOWN- NORWOTTUCK RAIL TRAIL RESURFACING, FROM STATION ROAD IN AMHERST TO WARREN WRIGHT ROAD IN BELCHERTOWN (1.5 MILES)	CMAQ	$ 1,620,000	$ 1,296,000	$ 324,000	
2022	608157	Springfield	SPRINGFIELD- MCKNIGHT COMMUNITY TRAIL CONSTRUCTION, FROM ARMORY STREET TO HAYDEN AVENUE (1.5 MILES)	CMAQ	$ 3,694,624	$ 2,955,699	$ 738,925	
				2022 Total	$ 76,506,523			

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Table 14-12 – 2020-2024 Transportation Improvement Program (TIP) Continued

TIP Year	Project ID	Municipality	Project	Funding	Total Funds			Additional Information
2023	608374	West Springfield	WEST SPRINGFIELD- RECONSTRUCTION OF MEMORIAL AVENUE (ROUTE 147), FROM COLONY ROAD TO THE MEMORIAL AVENUE ROTARY (1.4 MILES)	STBG	$14,427,945	$11,542,356	$ 2,885,589	Construction / (YOE $24,348,731) AC Year 2 of 2 FFY 2022 $4,251,369 FFY2023 $20,097,362 / 70 TEC / 25% / STBG, CMAQ, TAP
2023	608374	West Springfield	WEST SPRINGFIELD- RECONSTRUCTION OF MEMORIAL AVENUE (ROUTE 147), FROM COLONY ROAD TO THE MEMORIAL AVENUE ROTARY (1.4 MILES)	CMAQ	$ 3,239,667	$ 2,591,734	$ 647,933	Construction / (YOE $24,348,731) AC Year 2 of 2 FFY 2022 $4,251,369 FFY2023 $20,097,362 / 70 TEC / 25% / STBG, CMAQ, TAP
2023	608374	West Springfield	WEST SPRINGFIELD- RECONSTRUCTION OF MEMORIAL AVENUE (ROUTE 147), FROM COLONY ROAD TO THE MEMORIAL AVENUE ROTARY (1.4 MILES)	TAP	$ 809,917	$ 647,934	$ 161,983	Construction / (YOE $24,348,731) AC Year 2 of 2 FFY 2022 $4,251,369 FFY2023 $20,097,362 / 70 TEC / 25% / STBG, CMAQ, TAP
2023	608374	West Springfield	WEST SPRINGFIELD- RECONSTRUCTION OF MEMORIAL AVENUE (ROUTE 147), FROM COLONY ROAD TO THE MEMORIAL AVENUE ROTARY (1.4 MILES)	HSIP	$ 1,619,833	$ 1,457,850	$ 161,983	Construction / (YOE $24,348,731) AC Year 2 of 2 FFY 2022 $4,251,369 FFY2023 $20,097,362 / 70 TEC / 25% / STBG, CMAQ, TAP
2023	606895	Granby	GRANBY- IMPROVEMENTS @ 2 LOCATIONS ON ROUTE 202: SCHOOL STREET & FIVE CORNERS	STBG	$ 1,866,279	$ 1,493,023	$ 373,256	Construction / (YOE $2,865,964) / 42 TEC / 25% STBG, HSIP
2023	606895	Granby	GRANBY- IMPROVEMENTS @ 2 LOCATIONS ON ROUTE 202: SCHOOL STREET & FIVE CORNERS	HSIP	$ 999,685	$ 899,717	$ 99,969	Construction / (YOE $2,865,964) / 42 TEC / 25% STBG, HSIP
2023	608163	Wales	WALES- RECONSTRUCTION & IMPROVEMENTS ON MONSON ROAD, FROM THE MONSON T.L. TO REED HILL ROAD (1.5 MILES)	STBG	$ 4,185,828	$ 3,348,662	$ 837,166	Construction / YOE $4,158,828 / 39.5 TEC / 25% STBG
2023	609120	Ludlow	LUDLOW- BRIDGE REPLACEMENT, L-16-026, PINEY LANE OVER BROAD BROOK	STP-BR-OFF	$ 577,920	$ 462,336	$ 115,584	
2023	608848	Springfield	SPRINGFIELD- BRIDGE REPLACEMENT, S-24-016, ARMORY STREET OVER CSX MAINLINE	NHPP-On	$ 5,723,440	$ 4,578,752	$ 1,144,688	
2023	608853	Springfield	SPRINGFIELD- BRIDGE REPLACEMENT, S-24-026, ARMORY STREET OVER CSX	NHPP-On	$ 3,948,640	$ 3,158,912	$ 789,728	
2023	606552	Northampton	NORTHAMPTON- BRIDGE RECONSTRUCTION, N-19-059, I-91 OVER US 5/BMRR & N-19-060, I-91 OVER HOCKANUM ROAD	NHPP-On	$11,378,353	$ 9,102,682	$ 2,275,671	AC Year 4 of 5, Total Cost $56,891,767
2023	606156	Holyoke	HOLYOKE- RECONSTRUCTION OF I-91 INTERCHANGE 17 & ROUTE 141	HSIP	$ 6,735,389	$ 6,061,850	$ 673,539	
2023	607823	Southampton	SOUTHAMPTON- GREENWAY RAIL TRAIL CONSTRUCTION, FROM COLEMAN ROAD TO ROUTE 10 (3.5 MILES)	CMAQ	$ 6,810,409	$ 5,448,327	$ 1,362,082	
				2023 Total	$62,323,305			

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Table 14-12 – 2020-2024 Transportation Improvement Program (TIP) Continued

TIP Year	Project ID	Municipality	Project	Funding	Total Funds			Additional Information
2024	608881	Longmeadow	LONGMEADOW- SPRINGFIELD- RESURFACING AND INTERSECTION IMPROVEMENTS ON LONGMEADOW STREET (ROUTE 5) AND CONVERSE STREET (0.84 MILES)	STBG	$ 6,064,675	$ 4,851,740	$ 1,212,935	Construction (YOE $6,064,675 / 57.5 TEC / Pre 25% / STBG
2024	609287	Worthington	WORTHINGTON- RECONSTRUCTION & RELATED WORK ON ROUTE 143 (PHASE II) FROM PERU T.L. TO COLD STREET	STBG	$ 9,957,440	$ 7,965,952	$ 1,991,488	Construction / (YOE $9,957,440) / 41 TEC / 75% Project Phase I funded in FFY 2019 Total project cost was $16,300,000 / STBG
2024	608717	Springfield	SPRINGFIELD- RECONSTRUCTION OF SUMNER AVENUE AT DICKINSON STREET AND BELMONT AVENUE (THE "X")	STBG	$ 6,972,689	$ 5,578,151	$ 1,394,538	Construction / YOE $11,672,689) 70.5 TEC / 25% STBG, CMAQ, HSIP, TAP
2024	608717	Springfield	SPRINGFIELD- RECONSTRUCTION OF SUMNER AVENUE AT DICKINSON STREET AND BELMONT AVENUE (THE "X")	CMAQ	$ 3,000,000	$ 2,400,000	$ 600,000	Construction / YOE $11,672,689) 70.5 TEC / 25% STBG, CMAQ, HSIP, TAP
2024	608717	Springfield	SPRINGFIELD- RECONSTRUCTION OF SUMNER AVENUE AT DICKINSON STREET AND BELMONT AVENUE (THE "X")	HSIP	$ 1,100,000	$ 990,000	$ 110,000	Construction / YOE $11,672,689) 70.5 TEC / 25% STBG, CMAQ, HSIP, TAP
2024	608717	Springfield	SPRINGFIELD- RECONSTRUCTION OF SUMNER AVENUE AT DICKINSON STREET AND BELMONT AVENUE (THE "X")	TAP	$ 600,000	$ 480,000	$ 120,000	Construction / YOE $11,672,689) 70.5 TEC / 25% STBG, CMAQ, HSIP, TAP
2024	606552	Northampton	NORTHAMPTON- BRIDGE RECONSTRUCTION, N-19-059, I-91 OVER US 5/BMRR & N-19-060, I-91 OVER HOCKANUM ROAD	NHPP-On	$ 20,173,960	$ 16,139,168	$ 4,034,792	AC Year 5 of 5, Total Cost $56,891,767
2024	609395	Multiple	BELCHERTOWN-WARE - PAVEMENT PRESERVATION AND RELATED WORK ON ROUTE 9	NHPP	$ 8,298,350	$ 6,638,680	$ 1,659,670	
				2024 Total	$ 56,167,114			

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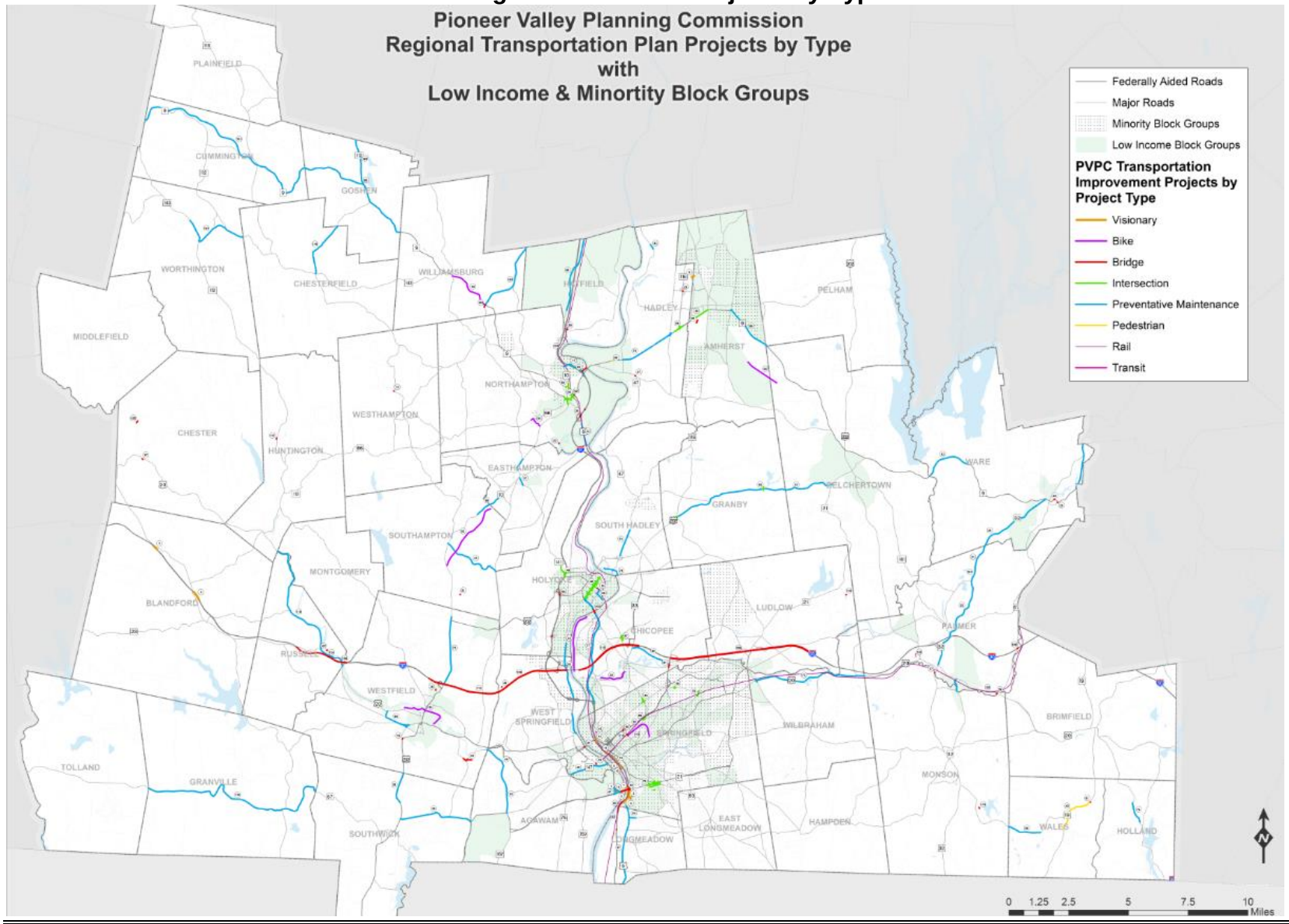
Figure 14-2 – RTP Projects by Type



3. Major Regional Projects

Major regional projects are defined as a project with an inflated project cost that exceeds $20,000,000. Over the next 5 years, there are several projects in the $20,000,000 range at various stages of design. These projects are competing with the complete backlog of projects for regional target funds. The PVMPO programs approximately $26,000,000 in regional target funds per federal fiscal year. On average the PVMPO funds 5 to 6 roadway project per fiscal year. It is difficult to commit 75% of regional target funds in a given year to a single project as less projects advance through the TIP process. As a result, it may take high scoring projects much longer to navigate the TIP process. The Major Regional Projects are listed in Table 14-13 and shown in Figure 14-2.

Table 14-13 – Major Regional Projects

Municipality	SID	Project Name and Description	Design	TEC Score	4% Inflation
Agawam	603372	RECONSTRUCTION ON ROUTE 5 CONNECTOR TO ROUTE 57, INCLUDES A-05-013 & A-05-014	0	53.0	$ 25,572,465
Hadley	605032	HADLEY- RECONSTRUCTION ON ROUTE 9, FROM MIDDLE STREET TO MAPLE/SOUTH MAPLE STREET	25	50.0	$ 24,849,741
Northampton	606552	NORTHAMPTON– BRIDGE REPLACEMENT, N-19-059, I-91 OVER US ROUTE 5 AND B&MRR, BRIDGE REPLACEMENT, N-19-060, I-91 OVER HOCKANUM ROAD AND IMPROVEMENTS TO I-91/INTERCHANGE 19			$ 61,534,135
West Springfield	604746	BRIDGE REPLACEMENT, W-21-006, CSX RAILROAD OVER UNION STREET	0	21.0	$ 26,131,364
West Springfield	608374	RECONSTRUCTION OF MEMORIAL AVENUE (ROUTE 147), FROM COLONY ROAD TO THE MEMORIAL AVENUE ROTARY (1.4 MILES)	25	70.0	$ 24,384,803
Williamsburg	608787	CONSTRUCTION OF THE "MILL RIVER GREENWAY" SHARED USE PATH	0	29.0	$ 21,315,518
					$ 1,925,961,446

D. 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.

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Table 14-14 – Visionary Projects

Project Type	Project Description	Estimated Cost
Region wide - Transit	Umass Maintenance Facility- Expansion for Articulated buses	$ 19,600,000
Region wide - High Speed Rail	East/West high speed rail Capital entire system -Boston to Springfield to Vermont/Canada Line	$ 785,000,000
New I-90 Interchange (currently under study)	Alternative 2 Blandford Maintenance Facility	$ 29,500,000.00
New I-90 Interchange (currently under study)	Alternative 3 Blandford Service Plaza	$ 34,000,000.00
Northampton Intermodal Facility	Northampton Intermodal Facility	$ 14,000,000.00
I-91 Viaduct Improvements - Pref. Alt (No Build)	Cost of constructing all recommendations	$ 827,350,000.00

1. I-91 Viaduct - Springfield

The Interstate 91 Viaduct Study was initiated by MassDOT to study alternatives for the future replacement of the elevated portion of the Interstate 91 in the city of Springfield. This study, completed in 2018, developed a series of conceptual alternatives that focus on potential structural changes to the I-91 Viaduct as well as improvements to improve safety and efficiency along the I-91 corridor. A copy of the full study is available at: https://www.mass.gov/lists/i-91-viaduct-study-documents#final-report-. All total, four alternatives, including a "no-build" alternative, were presented for consideration.

- Alternative 1 – Depressed Section of I-91 with Same Alignment
- Alternative 2 – Depressed Section of I-91 with New Alignment
- Alternative 3 – Elevated Viaduct
- No Build

At the conclusion of the study, the "No Build" alternative was viewed as the most beneficial long term improvement option for the I-91 Viaduct. The No Build alternative still had several near and mid-term improvement recommendations to improve safety and enhance the efficiency of the I-91 Corridor. Most near term improvement recommendations consisted of enhancements to the bicycle and pedestrian network and are included as part of the financially constrained section of the RTP. Proposed near and mid-term improvements for the southern section of I-91 are shown in Figure 14-3.

Mid-term improvements consist of projects to improve safety along the existing curve on I-91 through Longmeadow, improvements to the existing ramps to Route 5 in Longmeadow, enhancements to the South End Bridge between Springfield and Agawam, and elimination of the existing Route 5/57 rotary in Agawam. All of the

above projects are extremely beneficial but are not included in the financially constrained portion of the RTP due to their projected cost. Additional resources will need to be identified by MassDOT to advance these projects to construction. A summary of the mid-term I-91 improvement projects is provided in Table 14-15.

Figure 14-3 – Near and Mid-Term Improvements I-91 South Section

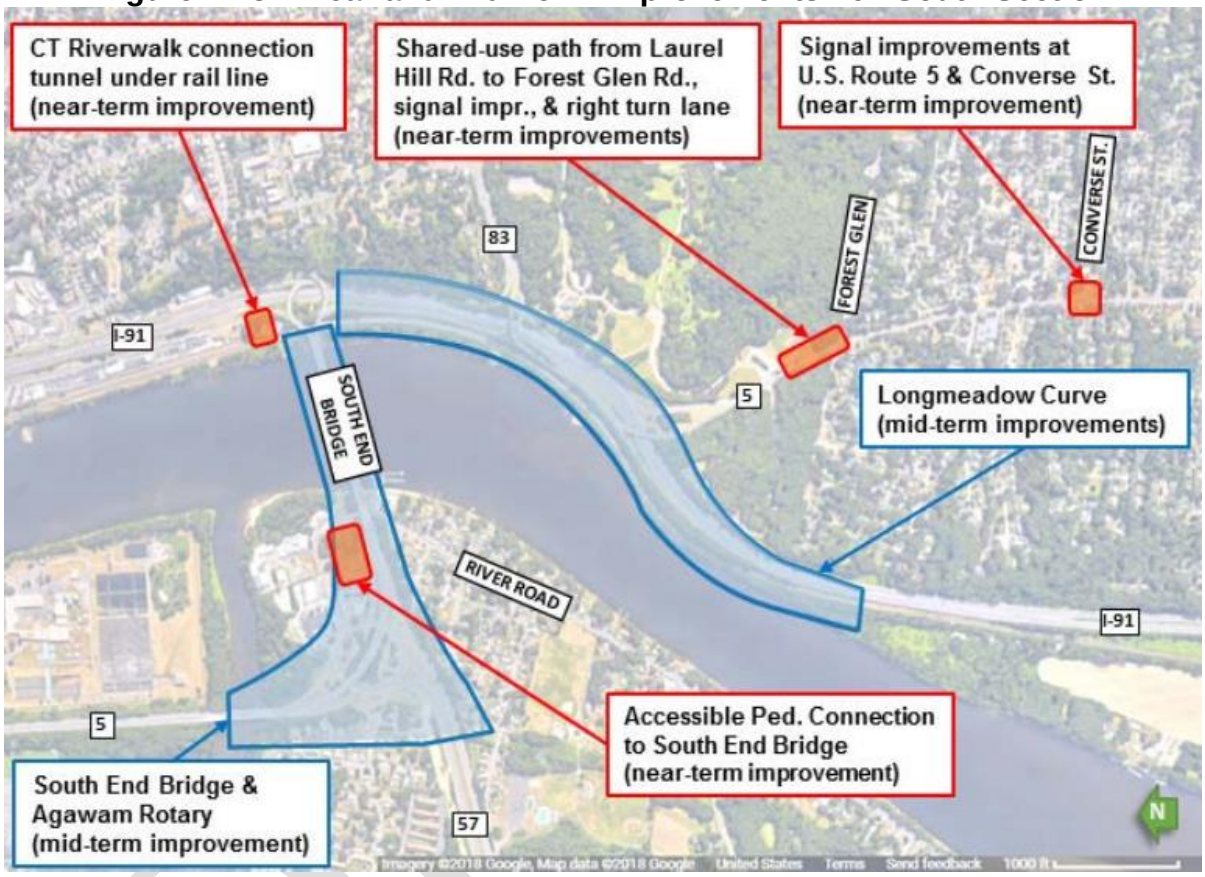


Table 14-15 – Mid-Term I-91 Improvements

Proposed Improvement Project	Estimated Cost
I-91 Longmeadow Curve Improvements	$212,750,000
Forest Park Bikeway to Springfield Riverwalk*	$19,750,000
South End Bridge Upgrades	$206,250,000
Agawam Rotary Elimination and Improvements	$156,600,000
I-291 to I-91 SB Ramp Relocation	$152,000,000
Plainfield Street (Springfield) Improvements	$76,000,000

* Estimate assumes construction concurrently with the Longmeadow curve.

2. I-90 Interchange Study

MassDOT is currently conducting a study to evaluate the feasibility of constructing a new interchange on the Massachusetts Turnpike (Interstate 90 (I-90), between Exits 2 and 3. More information on the study can be found on the project website: https://www.mass.gov/i-90-interchange-study. To date, the study has narrowed the alternatives down to three potential locations:

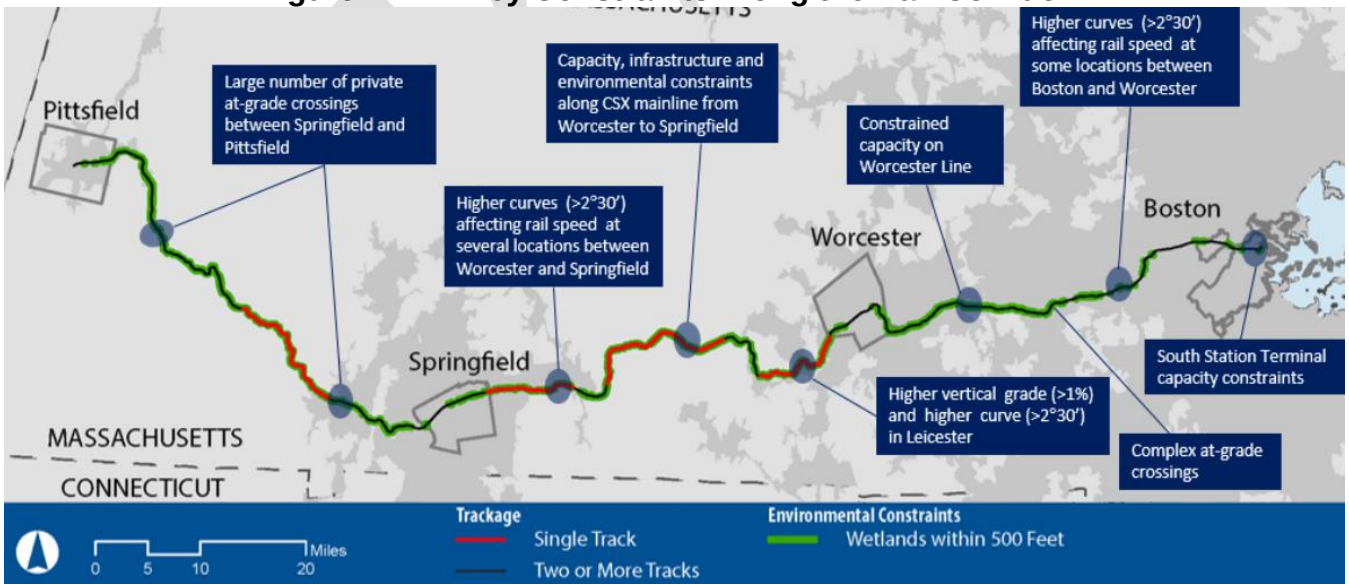
- Alternative 1 – Algerie Road in Otis, MA - $37.8 million
- Alternative 2 – Blandford Maintenance Facility in Blandford, MA - $29.5 million
- Alternative 3 – Blandford Service Plaza in Blandford, MA - $34.0 million

The Algerie Road location is located outside of the Pioneer Valley region but would serve residents of the region living in the western hilltowns. None of the three alternatives are included as part of the financially constrained portion of the RTP. An amendment to include the project in the RTP will be considered based on the recommendations of the MassDOT study.

3. East-West Passenger Rail Study

Passenger rail service from Boston to Springfield and Pittsfield is currently under study by MassDOT. The study will examine the costs, benefits, and investments necessary to implement passenger rail service at a speed and frequency to be a competitive travel option along this corridor. More information can be found on the study website: https://www.mass.gov/east-west-passenger-rail-study.

Figure 14-4 – Key Constraints Along the Rail Corridor



To date, there have been two meetings for the study. While we believe it is important to advance east/west passenger rail service for the region to Boston, the project cannot be included as part of the financially constrained portion of the RTP until a formal recommendation is made through the study.

E. RTP PROBLEM STATEMENTS

Problem statements were originally developed as part of the 2016 RTP to identify the potential obstacles to achieve the region's Vision for the transportation system. The problem statements were revisited and updated as part of the 2020 RTP in relation to the updated vision and goals. Problem statements are concise descriptions of the overarching issues that must be addressed through the implementation of the RTP. A total of 10 problem statement was developed based on the input received during the RTP public outreach process and are summarized below.

1. There are seriously insufficient resources to support the state of good repair of the regional transportation system.
2. Existing passenger rail and transit service does not meet the needs of residents of the Pioneer Valley. Expanded regional passenger rail and transit service is integral to education, economic development and workforce development.
3. There is a need for innovative, cost-effective solutions independent of the regional transit authorities to provide services to rural areas.
4. There are a lack of intermodal connections that support and enhance transportation options for downtown areas and village centers.
5. 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.
6. The regional transportation infrastructure does not sufficiently accommodate the movement and distribution of freight.
7. The built environment for walking, bicycling and transit is hampered by significant barriers that include: narrow road and bridge cross sections, disjointed/unconnected off-road trail networks, a lack of sidewalks, uniformity in signs/markings, transit access points and maintenance issues.
8. The regional transportation system is not prepared to adequately support changes in future transportation technology. The system must be prepared for the safe and seamless integration of innovations in technology which includes autonomous vehicles.
9. People use the regional transportation system differently based on their age, residence and occupation. The regional transportation system must continue to evolve to safely meet the needs of an aging population, young adults and children.
10. There are inconsistencies in how cities and towns regulate development and their requirements to encourage alternative forms of transportation through development.

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1. **There are seriously insufficient resources to support the state of good repair of the regional transportation system.**

   In short, there are not enough resources to fund all the necessary improvements to keep the transportation system in a state of good repair. 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.

   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 yet the federal gasoline tax has not been adjusted in over 20 years. At the local level, communities rely on Chapter 90 funding to advance necessary maintenance projects. This funding is critical to maintain local roads which are not eligible for federal transportation dollars. A 2018 analysis by the Massachusetts Municipal Association estimated that a total of $685 million/year would be required to keep roadways in a state of good repair. This is significantly higher than the $200 million allocated for the Chapter 90 program in 2018.

2. **Existing passenger rail and transit service does not meet the needs of residents of the Pioneer Valley. Expanded regional passenger rail and transit service is integral to education, economic development and workforce development.**

   There is a strong desire to expand passenger rail service in the region. Most trains in Springfield operate south to New Haven as either Amtrak or CTRail trains. There are 11 departures and 11 arrivals on weekdays on this route. The Vermonter travels once a day in each direction between Washington D.C. and St. Albans Vermont. Northbound trains from Springfield stop at Holyoke, Northampton and Greenfield. Four additional trips per day are planned as a pilot program between Greenfield and Springfield in the summer of 2019. East-West rail service consists of one train per day, the *Lake Shore Limited,* providing service between Chicago and Boston. In December of 2018, MassDOT began a study to examine the costs, benefits, and investments necessary to implement passenger rail service from Boston to Springfield and Pittsfield, with the speed, frequency, and reliability necessary to be a competitive option for travel along this corridor.

   The 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.

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This requires an investment in the development and maintenance of rail infrastructure, modern stations and pricing that encourages ridership.

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

   Transit service can be difficult in rural areas that may not have the population density to support traditional fixed route transit services. 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 Regional Coordinating Councils, 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.

   The Quaboag Connector (www.rideconnector.com) serves 4 rural communities in the eastern part of the PVPC region and 5 in the neighboring Central Massachusetts region. This service is coordinated with existing RTA transit service. This may be a potential model to provide transit service for other rural areas.

4. **There are a lack of intermodal connections that support and enhance transportation options for downtown areas and village centers.**

   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. A strong multimodal transportation system must be developed in coordination with complementary land uses at a level that is appropriate for the community.

5. **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 transportation sector is one of the largest contributors to greenhouse gas pollution accounting for nearly 40 percent of all GHG emissions in Massachusetts. One way to assist in the reduction of GHG emissions is the electrification of vehicles. While Massachusetts is committed to the International Zero-Emission Vehicle Alliance, other strategies such as market-based incentives to manage GHG emissions will be required. One such strategy is the multi-state Transportation Climate Initiative to explore potential regional policies to improve transportation systems and reduce pollution.

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PVPC will continue to assist regional communities in municipal vulnerability preparedness, advocate for certified “Green Communities” and implement the region’s smart growth plan, Valley Vision. This work is vital to foster change and promote energy efficient modes of transportation such as walking, biking and using the bus.

6. **The regional transportation infrastructure does not sufficiently accommodate the movement and distribution of freight.**

   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. 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. As a result, it is important to have appropriate design elements in the regional transportation system to safely and efficiently accommodate the movement of freight.

7. **The built environment for walking, bicycling and transit is hampered by significant barriers that include: narrow road and bridge cross sections, disjointed/unconnected off-road trail networks, a lack of sidewalks, uniformity in signs/markings, transit access points and maintenance issues.**

   It is important to provide for the needs of pedestrians, bicycles and transit riders as part of the regional transportation network. The challenge lies in balancing the needs of the maintenance of the existing infrastructure while continuing to expand connections to the pedestrian, bicycle and transit network in a logical manner.

   PVPC advocates for a “Complete Streets” approach as part of its transportation planning activities. 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.

   The identification of gaps in transportation system for all users is a critical task to identify and eliminate existing barriers that restrict travel options. Proper maintenance ensures the continued expansion of a complete transportation system that enhances options for all travel modes in the future.

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8. **The regional transportation system is not prepared to adequately support changes in future transportation technology. The system must be prepared for the safe and seamless integration of innovations in technology which includes autonomous vehicles.**

   Changes in technology have the ability to greatly improve the safety and efficiency in which vehicles operate. This, however, requires the appropriate physical and informational infrastructure to fully support the new technology. It will be important to continue to incorporate the appropriate infrastructure in future transportation improvement projects to support autonomous vehicles, electric vehicles, broadband communications including 5G networks, and ITS infrastructure. Similarly, it will be important to review existing bylaws, ordinances, and motor vehicle laws to ensure they fully and appropriately address new transportation technology.

9. **People use the regional transportation system differently based on their age, residence and occupation. The regional transportation system must continue to evolve to safely meet the needs of an aging population, young adults and children.**

   Our regional transportation system is not intended to be a “one size fits all” model. It is important to recognize that people will have different transportation needs based on their age, income, place of residence and place of employment. As a result it will be important to seek balance in the transportation system to provide modes that support all of our residents. The “Age Friendly” movement is a way to design a transportation system to allow all people to have access regardless of their age or ability.

10. **There are inconsistencies in how cities and towns regulate development and their requirements to encourage alternative forms of transportation through development.**

    The Pioneer Valley has been a leader with respect to promoting and encouraging smart growth, or development that is targeted where there is existing infrastructure to support it, versus development far away from roads, power lines, water and sewer lines etc. As a result, it will be important to continue to work closely with our member municipalities to adopt and revise as needed their existing bylaws and ordinances to promote development while encouraging the use of alternate forms of transportation.

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CHAPTER 15

Photo: South Street in Ware, MA

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 Fixing Americas Surface Transportation (FAST) Act. Financial constraint will be maintained in the 2020 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 The FAST Act, 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 2020 – 2040 is presented in Table 15-1.

Table 15-1 – Estimated Pioneer Valley Region Highway Revenue 2020 – 2040

Year	Target	Other Statewide	Non Interstate	NFA Bridge	Interstate	Total All Funding
	10.8099%	*10.8099%*	*13.0542%*	*10.8099%*	*8.4544%*	
2020 - 2024	$ 134,136,806	$ 121,332,223	$ 47,144,718	$ 54,049,500	$ 13,381,407	**$ 370,044,654**
2025-2029	$ 153,789,263	$ 136,359,264	$ 56,120,172	$ 55,238,590	$ 16,897,096	**$ 418,404,385**
2030-2034	$ 188,833,297	$ 167,431,514	$ 68,908,303	$ 56,453,840	$ 20,747,444	**$ 502,374,398**
2035-2039	$ 209,293,530	$ 185,572,848	$ 76,374,571	$ 57,695,820	$ 22,995,446	**$ 551,932,215**
2040	$ 44,516,326	$ 39,470,984	$ 16,244,722	$ 11,793,026	$ 4,891,087	**$ 116,916,145**
Totals	**$ 730,569,222**	**$ 650,166,833**	**$ 264,792,486**	**$ 235,230,776**	**$ 78,912,480**	**$ 1,959,671,797**

- Federal and state matching funds for the period of 2020 to 2024 reflect current allocations and are inflated 2.2% per year thereafter, beginning in 2025 per MassDOT.
- 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 Bridge funding is not included in table 15-1, MassDOT did not provide regional breakout (see table 15-2)
- Interstate and Non Interstate funding are attributed to each region based upon formula such as a region's % of the total lanes miles of interstate miles/national highway system miles.
- 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 (NFA) eligible.
- Estimated funding for Other Statewide, NFA Bridge, and Regional Target funding is allocated among the MPOs based upon the existing MARPA TIP targets.
- After 2028 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.

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Table 15-2 – Estimated Statewide Bridge Funding

Year	Statewide Bridges
2020 - 2024	$ 985,237,695.00
2025-2029	$ 1,120,781,229.00
2030-2034	$ 1,376,174,182.00
2035-2039	$ 1,525,283,718.00
2040	$ 324,424,877.00
Totals	**$ 5,331,901,701.00**

The estimates of available 5307, 5310 and 5339 transit revenue shown in this RTP were provided by MassDOT in April of 2019. Estimates of available RTACAP revenue were provided by the PVTA. 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 2020-2040 periods is presented in Table 15-3 and 15-4.

Table 15-3 – Estimated Transit Capital Revenue 2020 - 2040

Year	5307	5310	5339	RTACAP	Total
2020-2024	$ 68,180,385	$ 2,933,482	$ 7,224,890	$ 36,688,650	$ 115,027,407
2025-2029	$ 75,572,320	$ 3,253,115	$ 8,718,575	$ 40,357,515	$ 127,901,525
2030-2034	$ 83,765,669	$ 3,607,577	$ 10,521,068	$ 44,393,267	$ 142,287,581
2035-2039	$ 92,847,318	$ 4,000,659	$ 12,696,208	$ 48,832,593	$ 158,376,778
2040	$ 19,744,098	$ 850,992	$ 2,838,307	$ 10,743,170	$ 34,176,567
Total	**$ 340,109,790**	**$ 14,645,825**	**$ 41,999,048**	**$ 181,015,195**	**$ 577,769,858**

- 5307 funding has been inflated 2.08% per year starting in 2021 per MassDOT
- 5310 funding has been inflated 2.09 per year starting in 2021 per MassDOT
- 5339 funding has been inflated 3.83 pear year starting in 2021 per MassDOT
- 5339 funding is a grant based program awarded yearly based on project merit

Table 15-4 – Estimated Transit Operating Revenue 2020 – 2040

	2020-2024	2025-2029	2030-2034	2035-2039	2040	Grand Total
Local Assessments	$ 49,372,389	$ 55,860,326	$ 63,200,831	$ 71,505,940	$ 15,445,284	$ 255,384,770
5307 Federal Urbanized Formula	$ 58,635,131	$ 64,992,195	$ 72,038,475	$ 79,848,693	$ 16,979,925	$ 292,494,419
5339 Federal	$ 7,224,890	$ 8,718,575	$ 10,521,068	$ 12,696,208	$ 2,838,307	$ 41,999,048
5310 Federal Elderly and Disabled	$ 2,933,482	$ 3,253,115	$ 3,607,577	$ 4,000,659	$ 850,992	$ 14,645,825
Fare box	$ 45,399,763	$ 50,125,006	$ 55,342,057	$ 61,102,103	$ 13,198,054	$ 225,166,983
Advertising, other revenue	$ 3,255,020	$ 3,593,805	$ 3,967,851	$ 4,380,829	$ 946,259	$ 16,143,764
Available Operating Funds for Programming in the RTP	**$ 166,820,675**	**$ 186,543,022**	**$ 208,677,859**	**$233,534,432**	**$ 50,258,821**	**$ 845,834,809**

- Local assessments escalated 2.5% annually as allowed by statute based on previous RTP.

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- Federal grant program contributions (5307, 5339, and 5310) escalated 1.5% annually based on previous RTP.
- Farebox revenue estimate based on actual FY15 amount of $7.9 million and escalated 2% annually per PVTA.
- 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 15-5.

Table 15-5 – Total Estimated Revenue 2020-2040

Total Estimated Highway	$1,959,671,797
Total Estimated Transit Capital	$577,769,858
Total Estimated Transit Operating	$845,834,809
Grand Total	**$3,383,276,464****

**Total Estimated Revenue does not include statewide bridge

B. FINANCIALLY CONSTRAINT PROCESS

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 investment as developed by MassDOT.

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1. Regional Target Funding

The PVPC reviewed historic spending by project type to assist in identifying future regional transportation needs. This information is summarized in Table 15-6.

Table 15-6– Summary of Highway Spending by Project Type 2015 - 2019

Expenditure by Improvement Type 2015-2019						
Improvement Type	**# of Projects**	**Expenditure**	**% Maintenance**	**Adjusted Expenditure**	**Actual %**	**2016 RTP Scenario**
Roadway Maintenance	15	$ 59,546,307.00	100%	$ 77,317,334.80	72.2%	70%
Congestion Improvement	7	$ 20,422,908.00	50%	$ 10,211,454.00	9.5%	12.50%
Bike Infrastructure	3	$ 10,881,382.00	50%	$ 5,440,691.00	5.1%	1.25%
Safety	6	$ 7,330,958.00	25%	$ 5,498,218.50	5.1%	12.50%
Transportation Alternative Program	6	$ 3,426,569.00	0%	$ 3,426,569.00	3.2%	0%
Air Quality Improvement	5	$ 2,861,433.00	10%	$ 2,575,289.70	2.4%	2.50%
Pedestrian Infrastructure	2	$ 2,564,842.00	0%	$ 2,564,842.00	2.4%	1.25%
Freight Infrastructure	0	$ -	50%	0	0.0%	0%
Total	**44**	**$ 107,034,399.00**		$ 107,034,399.00	100%	

- Values based on passed 5 year regional discretionary expenditures in the PV Region.

Over the last 5 years on average the region has spent 56% (up from 50% in the 2016 RTP) of its transportation improvement dollars on roadway maintenance projects. Table 15-6 shows a break of the projects funded by improvement type. Each improvement type was then weighted to reflect the % the improvement that included maintenance as part of the improvement. This represents the Actual % column in the table. Table 15-6 was presented to our Joint Transportation Committee (JTC) and feedback was provide on how estimate the highway needs over the life of the RTP. Table 15-7 shows the % of expenditure by project type for our Regional Discretionary funding.

Table 15-7 – Regional Discretionary Funding Project Allocation

2016 RTP	2020 RTP	
70%	67%	Roadway Improvement Projects
12.5%	8%	Congestion improvement Projects
12.5%	12.5%	Safety Improvement Projects
1.25	5%	Bicycle Improvement Projects
1.25	5%	Pedestrian Improvements Projects
2.5	2.5	Air Quality Improvement Projects

The Pioneer Valley MPO used the 2020-2024 Transportation Improvement Program (TIP) to populate target projects in the 2020-2024 targets bin. Starting in the 2025-2029 RTP bin, projects were programmed based on TEC score, project readiness,

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and project cost. Table 15-8 shows the breakdown of any reaming Regional Discretionary dollars for the FY2025-2029, FY2030-2034, FY2035-2039, and FY2040 funding periods. This breakdown was developed using the historical spending data, Cartegraph pavement condition forecasting software analysis, and through consultation with the JTC. Table 15-8 gives the distributions of the regional discretionary funds based on available funding.

Table 15-8 - Regional Discretionary Funding Breakdown

	2020 - 2024	2025-2029	2030-2034	2035-2039	2040	Totals
Target	$ 134,136,806	$ 153,789,263	$ 188,833,297	$ 209,293,530	$ 44,516,326	$ 730,569,222
Programmed	$ 133,715,699	$ 153,789,263	$ 188,833,297	$ 209,293,530	$ 44,516,326	$ 730,148,115
Difference	$ 421,107	$ -	$ -	$ -	$ -	$ 421,107
Roadway Maintenance Projects = 67%	$ 100,535,091	$ 103,038,806	$ 126,518,309	$ 140,226,665	$ 29,825,938	$ 399,609,719
Congestion Improvement Projects = 8%	$ 15,453,664	$ 12,303,141	$ 15,106,664	$ 16,743,482	$ 3,561,306	$ 47,714,593
Safety Improvement Projects = 12.5%	$ 12,976,945	$ 19,223,658	$ 23,604,162	$ 26,161,691	$ 5,564,541	$ 74,554,052
Bicycle Improvement Projects = 5%	$ 2,200,000	$ 7,689,463	$ 9,441,665	$ 10,464,677	$ 2,225,816	$ 29,821,621
Pedestrian Improvement Projects = 5%	$ 2,050,000	$ 7,689,463	$ 9,441,665	$ 10,464,677	$ 2,225,816	$ 29,821,621
Air Quality Improvement Projects = 2.5%	$ 500,000	$ 3,844,732	$ 4,720,832	$ 5,232,338	$ 1,112,908	$ 14,910,810
Constraint	$ 421,107	Constraint	Constraint	Constraint	Constraint	Constraint
Total Expenditures	$ 133,715,699	$ 153,789,263	$ 188,833,297	$ 209,293,530	$ 44,516,326	$ 730,148,115

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C. FINANCIAL CONSTRAINT

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 15-9 and 15-10, the Pioneer Valley Regional Transportation Plan is financially constrained over the life of the plan.

Table 15-9 - Highway Fiscal Constraint Summary

	2020 - 2024	2025-2029	2030-2034	2035-2039	2040	Grand Total
Total Estimated Highway Revenue	**$ 493,112,924**	**$ 418,404,385**	**$ 502,374,398**	**$ 551,932,215**	**$ 116,916,145**	**$ 2,082,740,067**
Interstate	$ 13,381,407	$ 16,897,096	$ 20,747,444	$ 22,995,446	$ 4,891,087	$ 78,912,480
Statewide Bridge	$ 61,534,135	$ -	$ -	$ -	$ -	$ 61,534,135
NORTHAMPTON– BRIDGE REPLACEMENT, I-91 OVER US ROUTE 5 AND B&MRR, BRIDGE REPLACEMENT, I-91 OVER HOCKANUM ROAD AND IMPROVEMENTS TO I-91/INTERCHANGE 19 (605552)	$ 61,534,135	$ -	$ -	$ -	$ -	$ 61,534,135
NFA Bridge	$ 54,049,500	$ 55,238,590	$ 56,453,840	$ 57,695,820	$ 11,793,026	$ 235,230,776
Non Interstate	$ 47,144,718	$ 56,120,172	$ 68,908,303	$ 76,374,571	$ 16,244,722	$ 264,792,486
Other Statewide	$ 121,332,223	$ 136,359,264	$ 167,431,514	$ 185,572,848	$ 39,470,984	$ 650,166,833
Target	$ 134,136,806	$ 153,789,263	$ 188,833,297	$ 209,293,530	$ 44,516,326	$ 730,569,222
Majore Regional Projects Funded with Target Funds						
HADLEY- RECONSTRUCTION ON ROUTE 9, FROM MIDDLE STREET TO MAPLE/SOUTH MAPLE STREET (605032)	$ 24,849,741	$ -	$ -	$ -	$ -	$ 24,849,741
WEST SPRINGFIELD - RECONSTRUCTION OF MEMORIAL AVENUE (ROUTE 147), FROM COLONY ROAD TO THE MEMORIAL AVENUE ROTARY (1.4 MILES) (608374)	$ 24,384,803	$ -	$ -	$ -	$ -	$ 24,384,803
AGAWAM - RECONSTRUCTION ON ROUTE 5 CONNECTOR TO ROUTE 57, INCLUDES A-05-013 & A-05-014 (603372)	$ -	$ -	$ -	$ 25,572,465		$ 25,572,465
WEST SPRINGFIELD - BRIDGE REPLACEMENT, W-21-006, CSX RAILROAD OVER UNION STREET (604746)	$ -	$ -	$ -	$ 26,131,364		$ 26,131,364
WILLIAMSBURG - CONSTRUCTION OF THE "MILL RIVER GREENWAY" SHARED USE PATH (608787)	$ -	$ -	$ -	$ 21,315,518		$ 21,315,518
Total of Programmed Highway Projects in the 2020 RTP	**$ 492,691,817**	**$ 418,404,385**	**$ 502,374,398**	**$ 551,932,215**	**$ 116,916,145**	**$ 2,082,740,067**
Difference	$ 421,107	$ -	$ -	$ -	$ -	$ 421,107

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Table 15-10 - Transit Fiscal Constraint Summary

Estimated Transit Operating Funds 2020 - 2040						
	2020-2024	2025-2029	2030-2034	2035-2039	2040	Grand Total
Local Assessments	$ 49,372,389	$ 55,860,326	$ 63,200,831	$ 71,505,940	$ 15,445,284	$ 255,384,770
5307 Federal Urbanized Formula	$ 58,635,131	$ 64,992,195	$ 72,038,475	$ 79,848,693	$ 16,979,925	$ 292,494,419
5339 Federal	$ 7,224,890	$ 8,718,575	$ 10,521,068	$ 12,696,208	$ 2,838,307	$ 41,999,048
5310 Federal Elderly and Disabled	$ 2,933,482	$ 3,253,115	$ 3,607,577	$ 4,000,659	$ 850,992	$ 14,645,825
Fare box	$ 45,399,763	$ 50,125,006	$ 55,342,057	$ 61,102,103	$ 13,198,054	$ 225,166,983
Advertising, other revenue	$ 3,255,020	$ 3,593,805	$ 3,967,851	$ 4,380,829	$ 946,259	$ 16,143,764
Available Operating Funds for Programming in the RTP	**$ 166,820,675**	**$ 186,543,022**	**$ 208,677,859**	**$ 233,534,432**	**$ 50,258,821**	**$ 845,834,809**
Estimted Transit Capital Funds 2020 - 2040						
	2020-2024	2025-2029	2030-2034	2035-2039	2040	Grand Total
RTACAP	$ 36,688,650	$ 40,357,515	$ 44,393,267	$ 48,832,593	$ 10,743,170	$ 181,015,195
5307	$ 68,180,385	$ 75,572,320	$ 83,765,669	$ 92,847,318	$ 19,744,098	$ 340,109,790
5310	$ 2,933,482	$ 3,253,115	$ 3,607,577	$ 4,000,659	$ 850,992	$ 14,645,825
5339	$ 7,224,890	$ 8,718,575	$ 10,521,068	$ 12,696,208	$ 2,838,307	$ 41,999,048
Available Capital Funds for Programming in the RTP	**$ 115,027,407**	**$ 127,901,525**	**$ 142,287,581**	**$ 158,376,778**	**$ 34,176,567**	**$ 577,769,858**
Total Programmed Transit Funding	**$ 281,848,082**	**$ 314,444,547**	**$ 350,965,440**	**$ 391,911,210**	**$ 84,435,388**	**$1,423,604,667**
Difference	$ -	$ -	$ -	$ -	$ -	$ -

State Contract Assistance is funding determined each year by the Massachusetts Legislature through coordination with MassDOT. This funding is used to support each region's Transit Authority. The following identifies the historical level of funding received by PVTA with a suggested percentage of growth. The MPO is hopeful that such growth will occur based on the findings associated with the RTA Task Force.

	2020-2024	2025-2029	2030-2034	2035-2039	2040	Grand Total
State Contract Assistance	$ 145,747,760	$ 168,961,600	$ 195,872,803	$ 227,070,262	$ 46,776,474	$ 784,428,899

D. NEEDS

1. Operating and Maintenance

a) Highway Needs

The values in Table 15-11 are based on the financial data provided by MassDOT for use in the Financial Plan in Table 15-1. The funding identified as Non Interstate, Other Statewide, and Target where summed and then portioned based on historic TIP funding. The estimated highway needs were summarized in five year increments and are shown in Table 15-11. As shown in section C of this chapter – Alternative Funding Scenario, PVPC believes that it would take 100% of these funding categories to reasonably maintain our existing federal aid eligible roadway system near its current condition. Although table 15-11 does not commit 100% of the funding to Maintenance, many of the improvements would include maintenance as a significant amount of the work completed.

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Table 15-11 – Summary of Estimated Highway Needs over the Life of the RTP

Improvement	2020 - 2024	2025 - 2029	2030 - 2034	2035 - 2039	2040	Totals
Congestion	$ 15,013,160.36	$ 17,178,953.56	$ 21,093,529.97	$ 23,379,030.22	$ 4,972,674.19	**$ 81,637,348.30**
Maintenance	$ 130,838,538.18	$ 149,713,259.37	$ 183,828,491.80	$ 203,746,450.74	$ 43,336,473.23	**$ 711,463,213.33**
*CMAQ	$ 7,192,445.51	$ 8,230,025.15	$ 10,105,404.94	$ 11,200,333.36	$ 2,382,289.09	**$ 39,110,498.05**
Safety	$ 28,105,490.19	$ 32,159,978.25	$ 39,488,287.96	$ 43,766,874.44	$ 9,309,128.95	**$ 152,829,759.78**
Bike	$ 10,953,773.92	$ 12,533,961.47	$ 15,390,081.29	$ 17,057,608.48	$ 3,628,120.10	**$ 59,563,545.26**
Transit	$ 2,980,106.36	$ 3,410,015.44	$ 4,187,057.30	$ 4,640,728.19	$ 987,073.85	**$ 16,204,981.15**
Bridge	$ 107,530,232.49	$ 123,042,505.76	$ 151,080,260.73	$ 167,449,923.56	$ 35,616,272.59	**$ 584,719,195.13**
Total Investmer	**$ 302,613,747.00**	**$ 346,268,699.00**	**$ 425,173,114.00**	**$ 471,240,949.00**	**$ 100,232,032.00**	**$ 1,645,528,541.00**

- *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 financial information provided by MassDOT.

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 15-10 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 in figure 15-1 the estimated highway revenue exceeds the estimated highway needs over the life of the RTP. However it is not feasible to spend over 80% of all funding on maintenance, State and Federal standards require funding to be allocated to different types of projects as show in Table 15-11. 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.

b) Transit Needs

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. In the short term, this along with increased operating assistance allowed PVTA to make both service and capital improvements system wide. Over the past couple of years, funding has not matched the cost increases that occur on a yearly basis at all RTA's. As a result RTA's have been forced to reduce both service and capital projects. A summary of the estimated transit needs over the life of the RTP is presented in Table 15-12.

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Figure 15-1 – Comparison of Estimated Highway Needs and Revenue

Table 15-12 – Estimated Transit Need 2020 – 2040

	2020-2024	2025-2029	2030-2034	2035-2039	2040	Grand Total
SATCO Rehabilitation to Paratransit Facility	$ 4,275,000					$ 4,275,000
Northampton Garage rehabilitation	$ 9,975,000					$ 9,975,000
Northampton Intermodal Center		$ 10,740,000				$ 10,740,000
UMTS Maintenance Facility		$ 24,304,000				$ 24,304,000
PVTA Facility maintenance/Environmental	$ 4,878,466	$ 8,338,181	$ 10,144,672	$ 12,342,545	$ 2,962,211	$ 33,787,609
PVTA Fleet Replacement Program	$ 44,916,297	$ 48,653,279	$ 59,194,153	$ 72,018,738	$ 17,284,497	$ 197,150,667
Vehicle Maintenance	$ 39,749,580	$ 48,361,442	$ 58,839,089	$ 71,586,749	$ 17,180,820	$ 195,968,100
Bus Shelters	$ 1,370,675	$ 1,667,636	$ 2,028,934	$ 2,468,509	$ 592,442	$ 6,757,521
Bus stop sign replacement	$ 532,037	$ 140,824	$ 171,334	$ 208,454	$ 50,029	$ 570,641
ITS/AVL and communication equipment	$ 14,678,720	$ 15,988,258	$ 17,481,787	$ 19,186,055	$ 4,062,383	$ 56,718,482
MAP van program	$ 5,977,051	$ 6,929,041	$ 8,032,657	$ 9,312,051	$ 2,234,892	$ 26,508,641
Total Capital Need	**$ 126,352,826**	**$ 165,122,661**	**$ 155,892,626**	**$ 187,123,101**	$ 44,367,274	**$ 517,461,661**

Estimated Transit Operating Needs 2020-2040

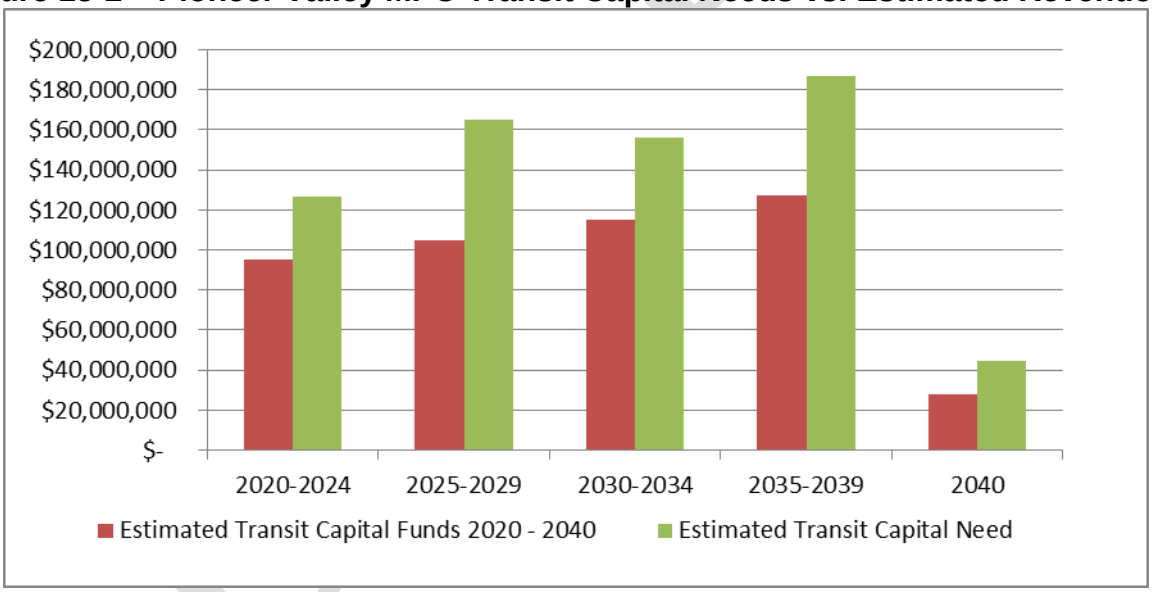
	2020-2024	2025-2029	2030-2034	2035-2039	2040	Grand Total
PVTA Fixed Route	$ 203,498,118	$ 235,696,575	$ 273,091,741	$ 316,544,615	$ 73,438,351	$ 1,102,269,400
PVTA Paratransit	$ 51,416,110	$ 59,551,416	$ 68,999,730	$ 79,978,592	$ 18,555,033	$ 278,500,881
PVTA Administration	$ 29,268,023	$ 33,898,951	$ 39,277,293	$ 45,526,883	$ 10,562,237	$ 158,533,386
FRTA Paratransit	$ 4,415,643	$ 5,114,307	$ 5,925,734	$ 6,868,604	$ 1,593,516	$ 23,917,804
Total Operating Need (4% annual Escalation)	**$ 288,597,894**	**$ 334,261,249**	**$ 387,294,497**	**$ 448,918,694**	**$ 104,149,137**	**$ 1,563,221,472**
Grand Total of Needs	**$ 414,950,721**	**$ 499,383,910**	**$ 543,187,123**	**$ 636,041,795**	**$ 148,516,411**	**$ 2,080,683,133**
% of TIP Increase above		13%	12%	12%	12%	12%
Plus 4% Escalation		17%	16%	16%	16%	16%

Note: FRTA data based on FRTA Financial Statement and supplementary information http://www.pvtaapps.com/opengov/pdfs/frta/FRTAfinal.pdf

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 Needs

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 15-13. 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 15-13 – Estimated Rail Need 2016 – 2040

Project Name	Project Description	Community	2020-2025	2026-2030	2031-2035	2036-2040	2041-2045	Total
Western Mass to Boston Passenger Rail Service Study	East/West high speed rail Capital entire system -Boston to Springfield to Pittsfield	Regionwide	current study					**$0**
Commuter Rail	Commuter Rail - Springfield to Greenfield - Capital	Regionwide	$1,300,000					**$1,300,000**
NECR Track Improvements to accommodate 286K	Freight rail track improvements	Regionwide	$19,200,000					**$19,200,000**
Patriot Corridor	Double Stack freight operations Study	Regionwide	further study					**$0**
Ware River Secondary Projects	1.2 mile connection between MassDOT Ware River line and CSX	Regionwide	$ 9,700,000					**$9,700,000**
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**
Boston to Springfield to Montreal Passenger Rail Service	East/West and North/South Passenger Rail Service from Boston to Montreal	Regionwide		Further Study				**$0**
		Total Need	**$30,200,000**	**$3,595,070**	**$0**	**$0**	**$0**	**$33,795,070**

Rail Operating Needs

Project Name	Project Description	Community	2020-2025	2026-2030	2031-2035	2036-2040	2041-2045	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**
Springfield to Greenfield Pilot	Passenger Rail Service between Spr	Regionwide	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	**$5,000,000**
High Speed Rail Operating for entire corridor	East/West high speed rail Operating entire system -Boston to Springfield to Pittsfield	Regionwide	TBD	TBD	TBD	TBD	TBD	**$0**
			$17,140,641	**$20,637,558**	**$24,892,092**	**$30,068,383**	**$36,366,133**	**$129,104,807**

- 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

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. Inflation plays a big role in the number of projects and cost of projects funded per year as costs rise significantly the further out they are programmed. On average over the past 5 years the PVMPO has been able to fund 5 transportation projects per year using regional discretionary funds. As can be seen in Figure 15-3 the average project cost has been increasing in our region resulting in few projects being built each year.

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 3 scenarios to identify the funding necessary to maintain our regional overall pavement condition index at or near its average level. This information is summarized in Figure 15-4 and Table 15-8.

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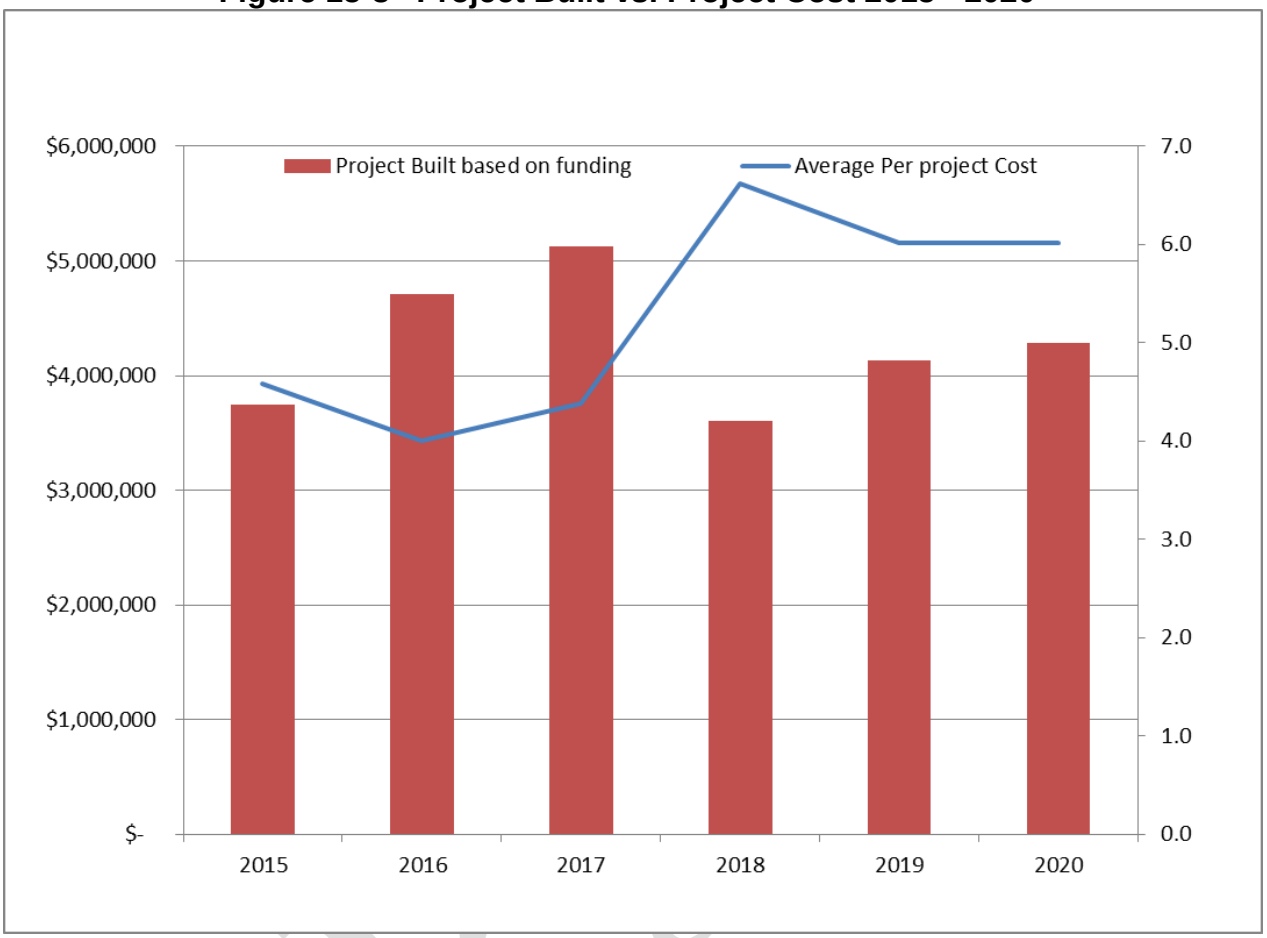
Figure 15-3 –Project Built vs. Project Cost 2015 - 2020



1. Summary of Identified Scenarios

a) 70% Scenario – Uses 70% Regional Discretionary Funds, Non Interstate, and 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.

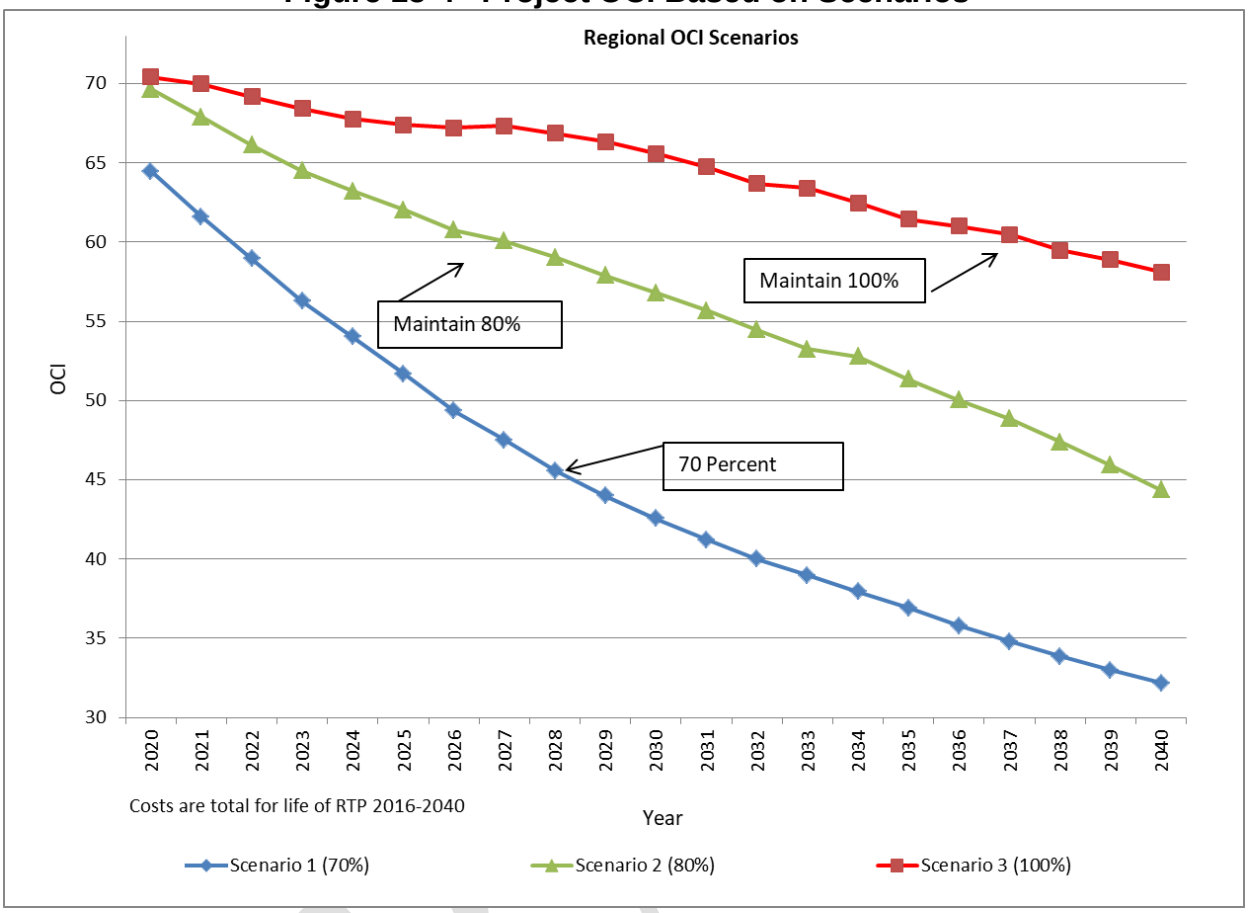
b) 80% Scenario – Uses 80% Regional Discretionary Funds, Non Interstate, and Other Statewide Funds to fund pavement maintenance

This Scenario assumes an investment of 80% of all Regional Discretionary funding and 80% of all Remaining Statewide Program funding over the life of the plan be allocated towards pavement maintenance.

c) 100% Scenario – Uses 100% Regional Discretionary Funds, Non Interstate, and Other Statewide Funds to fund pavement maintenance

This Scenario assumes an investment of 100% of all Regional Discretionary funding and 100% of all Remaining Statewide Program funding over the life of the plan be allocated towards pavement maintenance.

Figure 15-4 –Project OCI Based on Scenarios



Under the 70% Scenario, a significant funding commitment is being made to attempt to bring the roadway system up to a state of good repair. A total of $212 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 2028, this is the result of the GANS payments being complete which will allow for additional funding for roadways.

Under the 80% Scenario, in the first 5 years the investment is $30 million ($242 million) more than the 70% scenario. The results of this scenario show a shallower downward curve, but the OCI trend still shows a significant deterioration over the next 20 years. This scenario is anticipated to have a 2040 network OCI of 44, up from 33 in the 70% scenario.

Under the 100% Scenario, $302 million is committed towards pavement maintenance in the first five years of the plan. As can be seen in Figure 15-4, the deterioration curve is much more gradual. In 2028 we experience a slight improvement in OCI due to additional funding as a result of GANS payments being completed. Although an improvement over the first two scenarios, the results appear to trend in the same direction in the later years as the other scenarios. That

being said, under this scenario the OCI is expected to be significantly better in 2040 than under the other 2 scenarios.

A summary of the investment totals by scenario is shown in Table 15-14.

Table 15-14 - Scenario Funding Summary

RTP Bin	70% Scenario	80% Scenario	100% Scenario
2020 - 2024	$ 211,829,623	$ 242,090,998	$ 302,613,747
2025 - 2029	$ 242,388,089	$ 277,014,959	$ 346,268,699
2030 - 2034	$ 297,621,180	$ 340,138,491	$ 425,173,114
2035 - 2039	$ 329,868,664	$ 376,992,759	$ 471,240,949
2040	$ 70,162,422	$ 80,185,626	$ 100,232,032
Totals	**$ 1,151,869,979**	**$ 1,316,422,833**	**$ 1,645,528,541**

2. Local Revenue Options [7]

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.
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.

[7] http://www.transportation-finance.org/funding_financing/funding/local_funding/

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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 two thirds of all roads in the region are being maintained using Chapter 90 funds or other local sources of revenue. See Figure 15-5.

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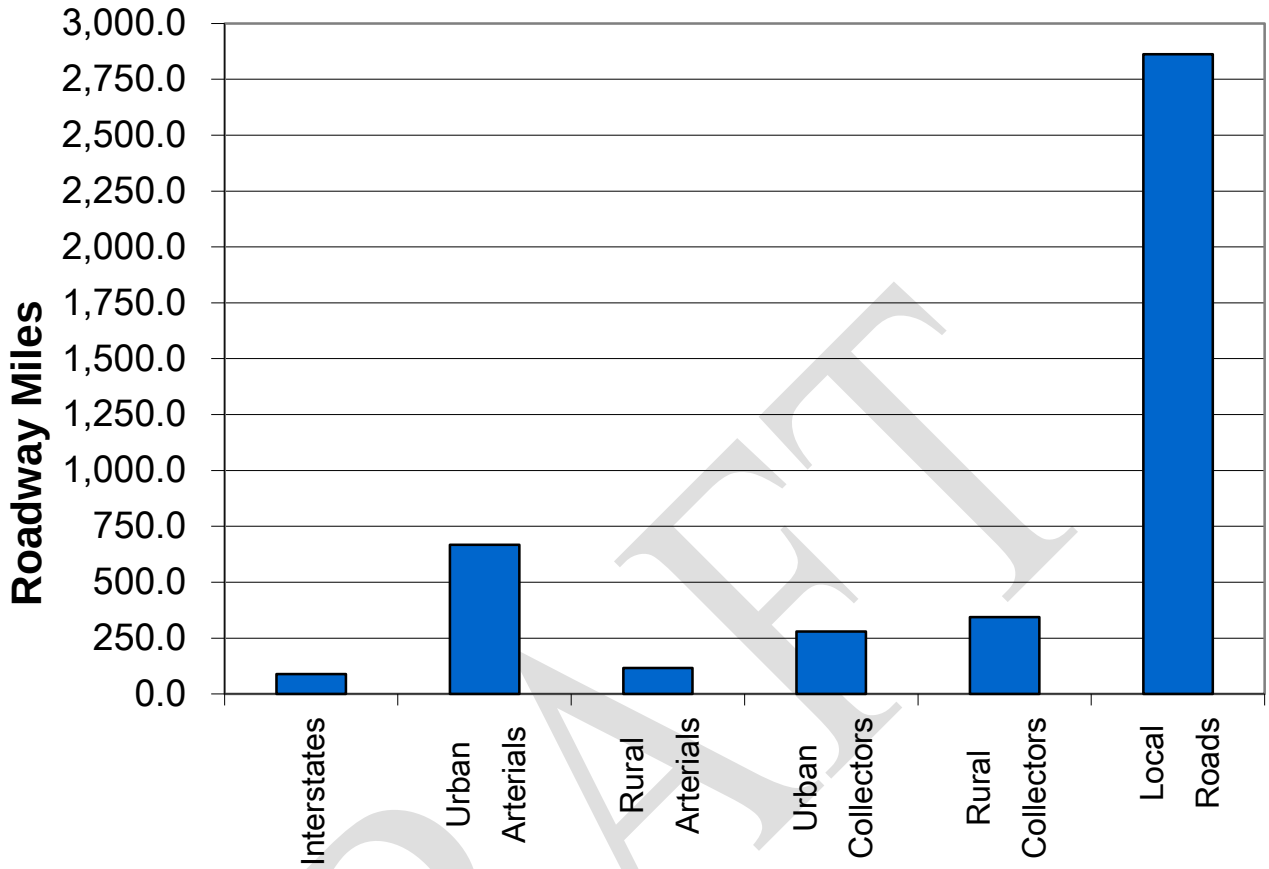
Figure 15-5 – Miles of Roadway by Functional Classification



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 15-6, 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. Over the past couple years the Governor has not match the $300,000,000 committed in 2015, instead level funding Chapter 90 at $200,000,000 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.

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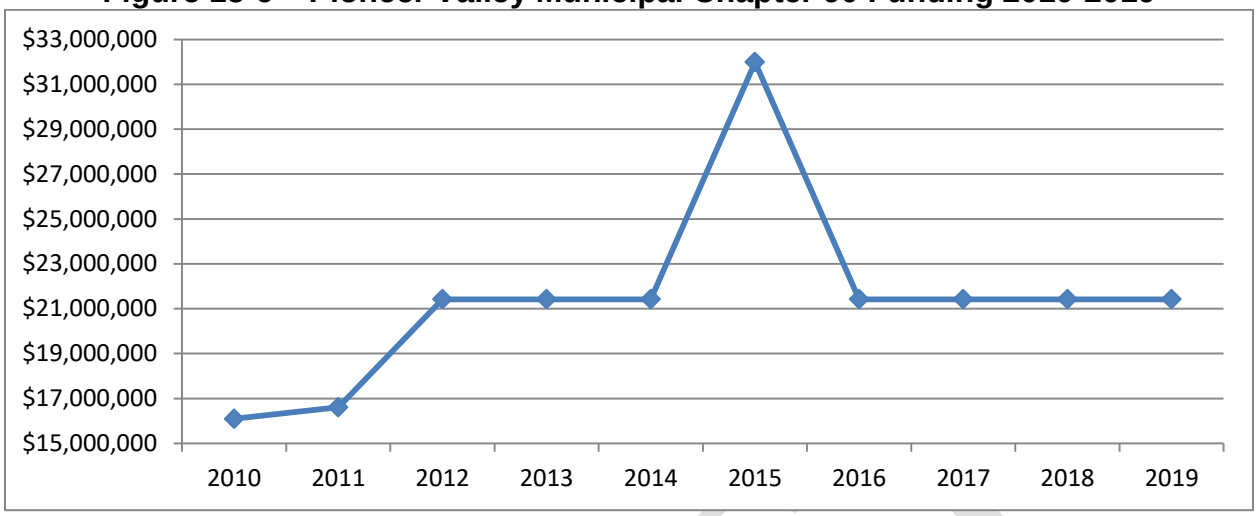
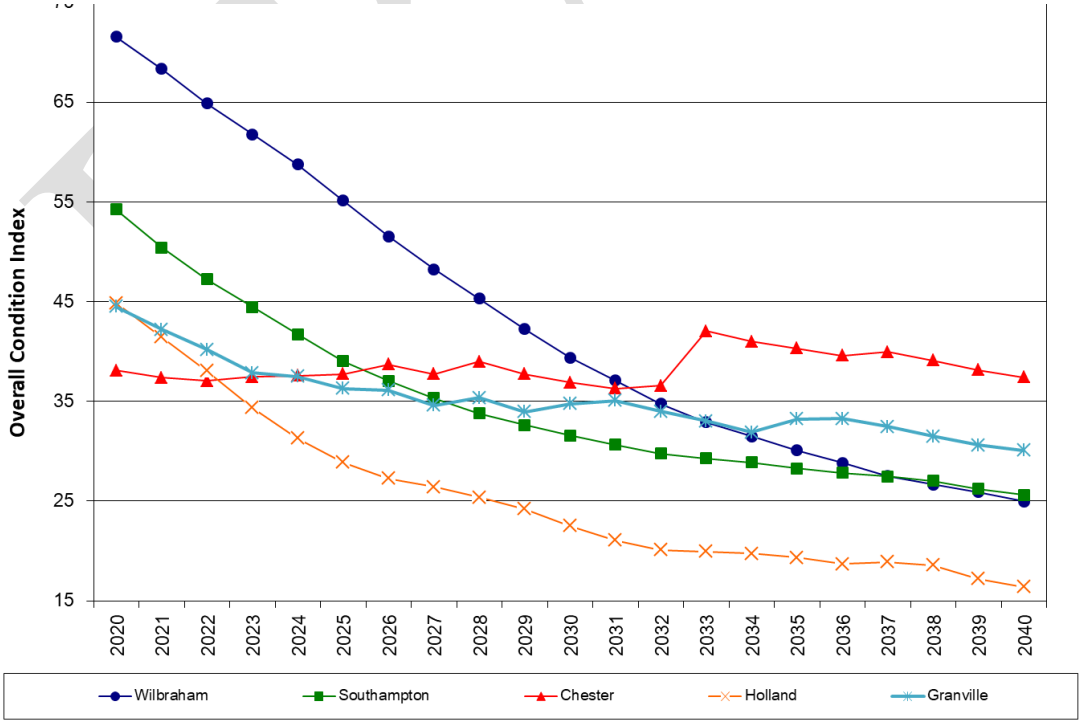
Figure 15-6 – Pioneer Valley Municipal Chapter 90 Funding 2010-2019



PVPC reviewed the long term impact of existing Chapter 90 Funding levels on local roadways in five communities. This information, presented in Figure 15-7, 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.

Figure 15-7 OCI Projections Based on Current Chapter 90 Program

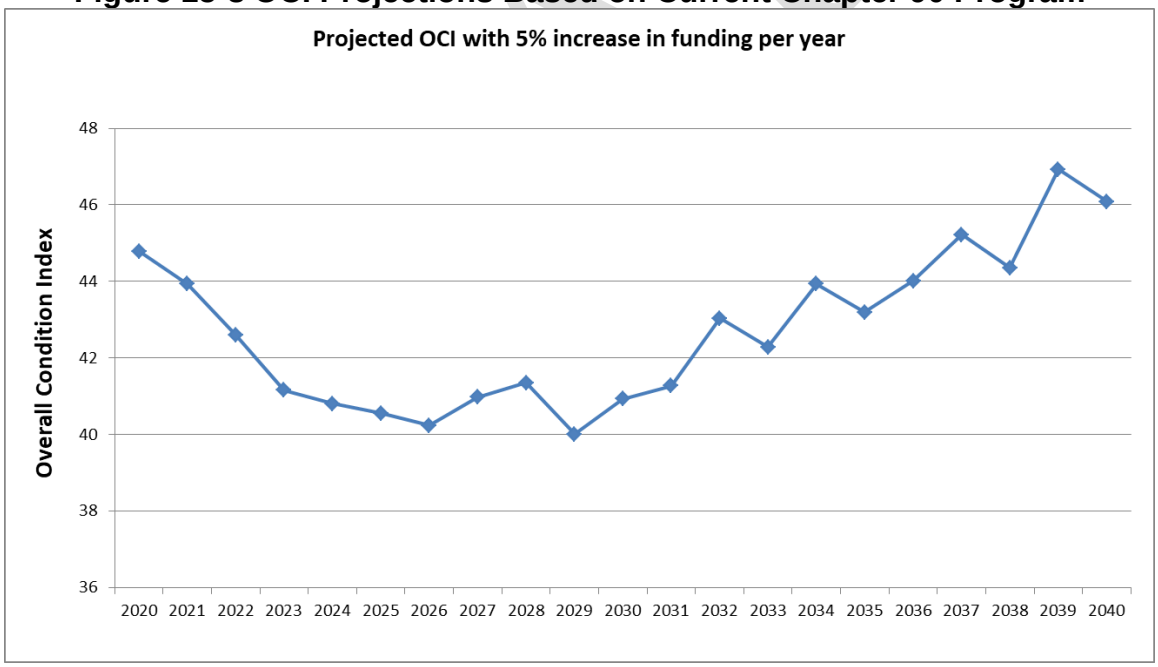


As can be seen in Figure 15-7, overall Condition Index (OCI) is projected to continue to decrease every year over the next 20 years. According to the Massachusetts Municipal Association (MMA), a Chapter 90 funding level of $600,000,000 is needed statewide in order to bring local roads up to a state of good repair. https://www.mma.org/advocacy/chapter-90-funding-is-essential-to-repair-our-roads/

In order to identify the level of funding needed in the Pioneer Valley, PVPC staff developed a scenario to determine how much additional funding would be needed to maintain the current OCI for a municipality. Under 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.

Based on the local funding scenario show in Figure 15-8, a 5% per year increase would allow the sample community to realize an average OCI score in 2040 similar to the estimated average OCI for 2020. As can be seen in the figure, under this scenario the OCI drops for the first couple of years before beginning to shows signs of increasing starting in 2020. In 2040 it is important to note that we begin to see a decline in OCI, it is not clear if this is due to funding or just on continuation in the trend from 2031 to 2038

Figure 15-8 OCI Projections Based on Current Chapter 90 Program



If level funded the Chapter 90 program will provide about $450 million in funding to the PV Region. Based on our scenario the Chapter 90 program would need to experience a 5% per year increase in funding to maintain the current roadway condition. A 5% per year increase would result in a Chapter 90 invest in the PV Region of $800 million over the next 20 years. This would result in a Chapter 90 program in line with the reports released by the MMA.

4. Regional Transit Needs

One of the biggest hurdles for the Regional Transit Authorities (RTA) has been securing funding to maintain current service levels. In 2014 PVTA completed a Comprehensive Service Analysis (SCA). The SCA included recommendations to both enhance existing service as well as expand service. Since the implementation of the original recommendations, PVTA has been forced to cut service twice. The purpose of this scenario is to identify the funding necessary to reinstate service PVTA was forced to cut as well as he funding PVTA would require to expand transit service to better meet the needs of the region.

In order to develop this transit funding scenario, PVPC reviewed the recommendations of the Regional Transit Authority Task Force report and compared those numbers to PVTA's FFY2018 operating budget. The report, released in April of 2019, includes twenty four recommendations. Recommendation #1 - "*The legislature should fund the RTAs in fiscal year 2020 with a base of $90.5 million in state contract assistance (SCA). Each subsequent year increase the SCA by an automatic inflator*" was used to develop this scenario. A 4% per year increase was assumed for the "automatic inflator." This recommendation is intended to provide adequate and consistent funding for RTA's and provides each RTA with the opportunity to provide more consistent service for its riders. In turn, this could result in increased ridership and generate additional revenue for transit operations.

PVTA receives 29% of the SCA released per year. In FFY 2018, PVTA received just over $23 million which accounted for 49% of PVTA's operating budget. According to the Transit Task Force Report, PVTA's FFY 2020 SCA amount should be $26.2 million which would increase each year by the "automatic inflator" (assumed to be 4% for this scenario).

Under this scenario, it was assumed that PVTA would receive a total of $26.2 million in SCA funds in FFY 2020. The operating funding breakdown shown in Figure 15-9 was then used to determine operating funding available over a 5 year range. Figure 15-10 compares the scenario to existing conditions (level funding) as well as PVTA's operating needs. Based on this scenario, PVTA would be able to meet its anticipated operating needs with the first 10 years of funding and exceed its operating needs by 2030. This would allow PVTA to provide additional services for the region.

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Figure 15-9 – PVTA Operating Funds Breakdown

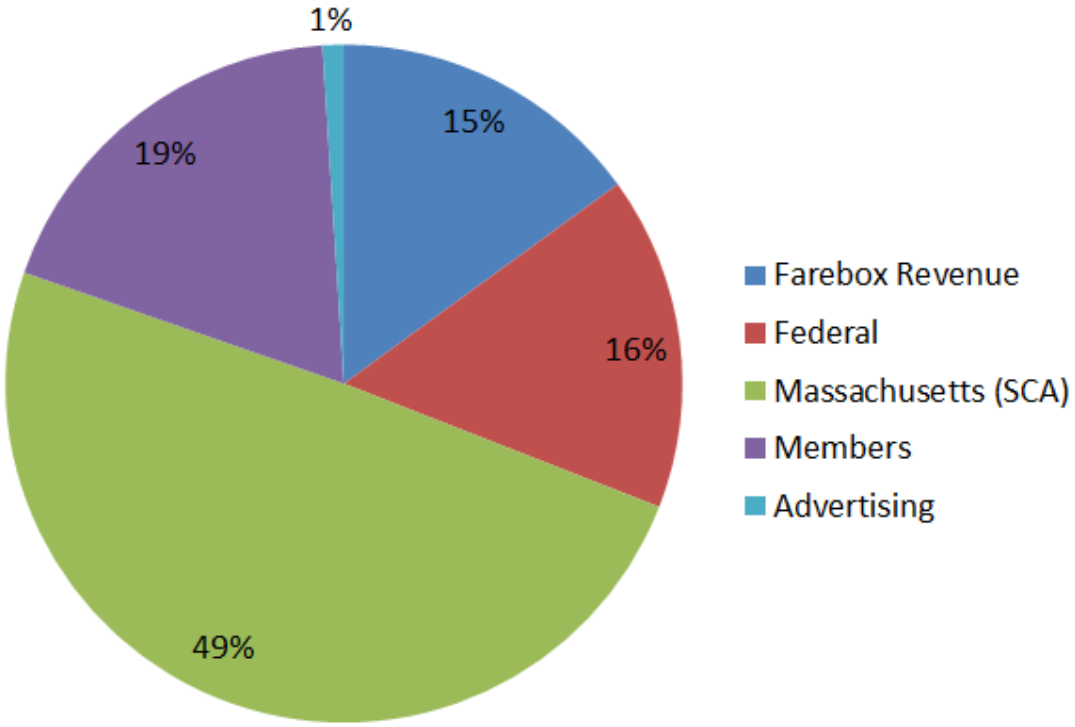
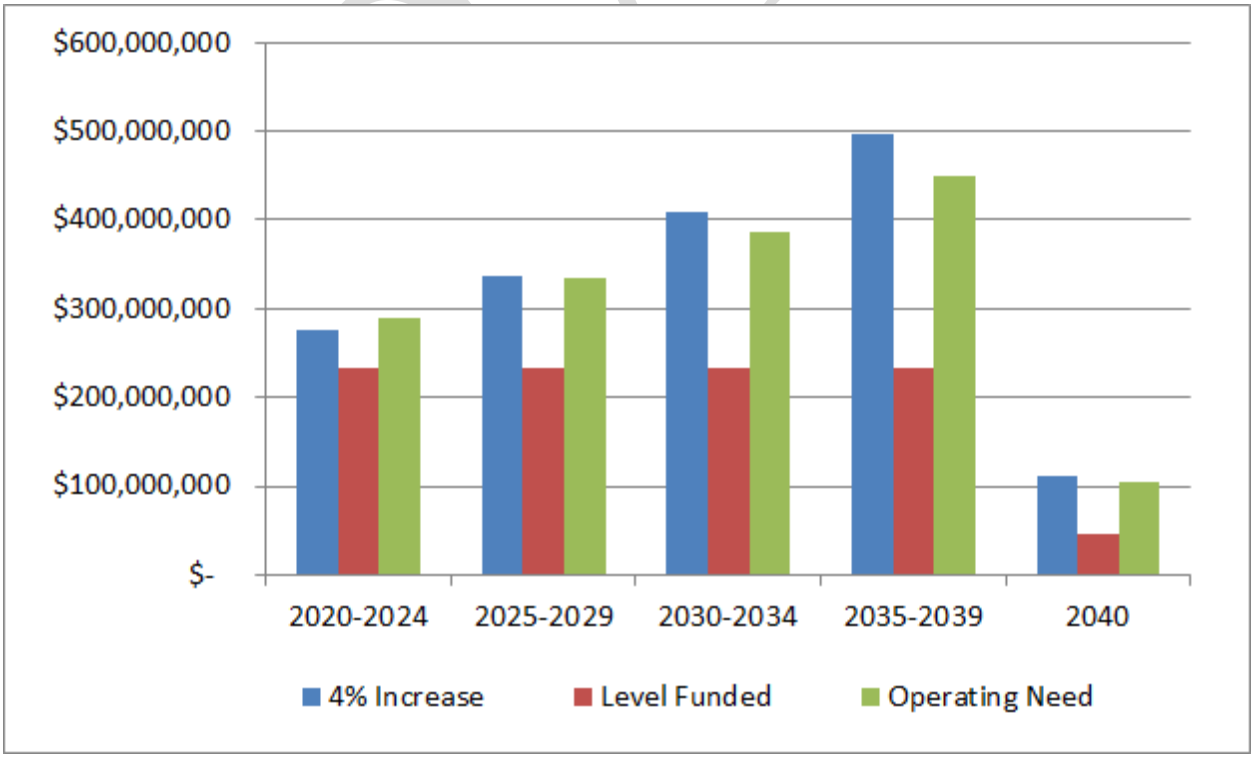


Figure 15-10 – PVTA Operating Funds Scenario



CHAPTER 16

Photo: New Rail Platform at Union Station in Springfield, MA

CONFORMITY

A. AIR QUALITY CONFORMITY INFORMATION

This section documents the latest air quality conformity determination for the 1997 ozone National Ambient Air Quality Standards (NAAQS) in the Pioneer Valley Region. It covers the applicable conformity requirements according to the latest regulations, regional designation status, legal considerations, and federal guidance. Further details and background information are provided below:

B. INTRODUCTION

The 1990 Clean Air Act Amendments (CAAA) require metropolitan planning organizations within nonattainment and maintenance areas to perform air quality conformity determinations prior to the approval of Long-Range Transportation Plans(LRTPs) and Transportation Improvement Programs(TIPs), and at such other times as required by regulation. Clean Air Act (CAA) section 176(c) (42 U.S.C. 7506(c)) requires that federally funded or approved highway and transit activities are

consistent with ("conform to") the purpose of the State Implementation Plan (SIP). Conformity to the purpose of the SIP means that Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) funding and approvals are given to highway and transit activities that will not cause or contribute to new air quality violations, worsen existing violations, or delay timely attainment of the relevant NAAQS or any interim milestones (42 U.S.C. 7506(c)(1)). EPA's transportation conformity rules establish the criteria and procedures for determining whether metropolitan transportation plans, transportation improvement programs (TIPs), and federally supported highway and transit projects conform to the SIP (40 CFR Parts 51.390 and 93).

A nonattainment area is one that the U.S. Environmental Protection Agency (EPA) has designated as not meeting certain air quality standards. A maintenance area is a nonattainment area that now meets the standards and has been re-designated as maintaining the standard. A conformity determination is a demonstration that plans, programs, and projects are consistent with the State Implementation Plan(SIP) for attaining the air quality standards. The CAAA requirement to perform a conformity determination ensures that federal approval and funding go to transportation activities that are consistent with air quality goals.

C. LEGISLATIVE AND REGULATORY BACKGROUND

The entire Commonwealth of Massachusetts was previously classified as nonattainment for ozone, and was divided into two nonattainment areas. The Eastern Massachusetts ozone nonattainment area included Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth, Suffolk, and Worcester counties. Berkshire, Franklin, Hampden, and Hampshire counties comprised the Western Massachusetts ozone nonattainment area. With these classifications, the 1990 Clean Air Act Amendments (CAAA) required the Commonwealth to reduce its emissions of volatile organic compounds (VOCs) and nitrogen oxides (NOx), the two major precursors to ozone formation to achieve attainment of the ozone standard.

The 1970 Clean Air Act defined a one-hour national ambient air quality standard (NAAQS) for ground-level ozone. The 1990 CAAA further classified degrees of nonattainment of the one-hour standard based on the severity of the monitored levels of the pollutant. The entire commonwealth of Massachusetts was classified as being in serious nonattainment for the one-hour ozone standard, with a required attainment date of 1999. The attainment date was later extended, first to 2003 and a second time to 2007.

In 1997,the EPA proposed a new, eight-hour ozone standard that replaced the one-hour standard, effective June 15,2005. Scientific information had shown that ozone could affect human health at lower levels, and over longer exposure times than one hour. The new standard was challenged in court, and after a lengthy legal battle, the

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courts upheld it. It was finalized in June 2004.The eight-hour standard is 0.08 parts per million, averaged over eight hours and not to be exceeded more than once per year. Nonattainment areas were again further classified based on the severity of the eight-hour values. Massachusetts as a whole was classified as being in moderate nonattainment for the eight-hour standard, and was separated into two nonattainment areas - Eastern Massachusetts and Western Massachusetts.

In March 2008, EPA published revisions to the eight-hour ozone NAAQS establishing a level of 0.075 ppm, (March 27, 2008; 73 FR 16483). In 2009, EPA announced it would reconsider this standard because it fell outside of the range recommended by the Clean Air Scientific Advisory Committee. However, EPA did not take final action on the reconsideration so the standard would remain at 0.075 ppm.

After reviewing data from Massachusetts monitoring stations, EPA sent a letter on December 16, 2011 proposing that only Dukes County would be designated as nonattainment for the new proposed 0.075 ozone standard. Massachusetts concurred with these findings.

On May 21, 2012,(77 FR 30088), the final rule was published in the Federal Register, defining the 2008 NAAQS at 0.075 ppm, the standard that was promulgated in March 2008. A second rule published on May 21, 2012 (77 FR 30160), revoked the 1997 ozone NAAQS to occur one year after the July 20, 2012 effective date of the 2008 NAAQS.

Also on May 21, 2012, the air quality designations areas for the 2008 NAAQS were published in the Federal Register. In this Federal Register, the only area in Massachusetts that was designated as nonattainment is Dukes County. All other Massachusetts counties were designated as attainment/unclassified for the 2008 standard. 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 confirmed the removal of transportation conformity to the 1997 Ozone NAAQS.

However, on February 16, 2018, the United States Court of Appeals for the District of Columbia Circuit in *South Coast Air Quality Mgmt. District v. EPA* (“*South Coast II*,” 882 F.3d 1138) held that transportation conformity determinations must be made in areas that were either nonattainment or maintenance for the 1997 ozone NAAQS and attainment for the 2008 ozone NAAQS when the 1997 ozone NAAQS was revoked. These conformity determinations are required in these areas after February 16, 2019. On November 29, 2018, EPA issued *Transportation Conformity Guidance for the South Coast II Court Decision* (EPA-420-B-18-050, November 2018) that addresses how transportation conformity determinations can be made in areas.

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According to the guidance, both Eastern and Western Massachusetts, along with several other areas across the country, are now defined as “orphan nonattainment areas” – areas that were designated as nonattainment for the 1997 ozone NAAQS at the time of its revocation (80 FR 12264, March 6, 2015) and were designated attainment for the 2008 ozone NAAQS in EPA’s original designations rule for this NAAQS (77 FR 30160, May 21, 2012).

D. CURRENT CONFORMITY DETERMINATION

After 2/16/19, as a result of the court ruling and the subsequent federal guidance, transportation conformity for the 1997 NAAQS – intended as an “anti-backsliding” measure – now applies to both of Massachusetts’ orphan areas. Therefore, this conformity determination is being made for the 1997 ozone NAAQS on the Pioneer Valley Regions FFY 2020-2024 Transportation Improvement Program and the 2020 Regional Transportation Plan.

The transportation conformity regulation at 40 CFR 93.109 sets forth the criteria and procedures for determining conformity. The conformity criteria for TIPs and RTPs include: latest planning assumptions (93.110), latest emissions model (93.111), consultation (93.112), transportation control measures (93.113(b) and (c), and emissions budget and/or interim emissions (93.118 and/or 93.119).

For the 1997 ozone NAAQS areas, transportation conformity for TIPs and RTPs for the 1997 ozone NAAQS can be demonstrated without a regional emissions analysis, per 40 CFR 93.109(c). This provision states that the regional emissions analysis requirement applies one year after the effective date of EPA’s nonattainment designation for a NAAQS and until the effective date of revocation of such NAAQS for an area. The 1997 ozone NAAQS revocation was effective on April 6, 2015, and the *South Coast II* court upheld the revocation. As no regional emission analysis is required for this conformity determination, there is no requirement to use the latest emissions model, or budget or interim emissions tests.

Therefore, transportation conformity for the 1997 ozone NAAQS for the Pioneer Valley Region FFY 2020-2024 Transportation Improvement Program and 2020 Regional Transportation Plan can be demonstrated by showing that remaining requirements in Table 1 in 40 CFR 93.109 have been met. These requirements, which are laid out in Section 2.4 of EPA’s guidance and addressed below, include:

- Latest planning assumptions (93.110)
- Consultation (93.112)
- Transportation Control Measures (93.113)
- Fiscal Constraint (93.108)

1. Latest Planning Assumptions

The use of latest planning assumptions in 40 CFR 93.110 of the conformity rule generally apply to regional emissions analysis. In the 1997 ozone NAAQS areas, the use of latest planning assumptions requirement applies to assumptions about transportation control measures (TCMs) in an approved SIP (See following section on Timely Implementation of TCMs).

2. Consultation

The consultation requirements in 40 CFR 93.112 were addressed both for interagency consultation and public consultation. Interagency consultation was conducted with FHWA, FTA, US EPA Region 1, MassDEP, and the other Massachusetts MPOs, with the most recent conformity consultation meeting held on March 6, 2019 (this most recent meeting focused on understanding the latest conformity-related court rulings and resulting federal guidance). This ongoing consultation is conducted in accordance with the following:

- Massachusetts' Air Pollution Control Regulations 310 CMR 60.03 "Conformity to the State Implementation Plan of Transportation Plans, Programs, and Projects Developed, Funded or Approved Under Title 23 USC or the Federal Transit Act"
- The Commonwealth of Massachusetts Memorandum of Understanding by and between Massachusetts Department of Environmental Protection, Massachusetts Executive Office of Transportation and Construction, Massachusetts Metropolitan Planning Organizations concerning the conduct of transportation-air quality planning in the development and implementation of the state implementation plan" (note: this MOU is currently being updated.)

Public consultation was conducted consistent with planning rule requirements in 23 CFR 450.

Title 23 CFR Section 450.324 and 310 CMR 60.03(6)(h) requires that the development of the TIP, RTP, and related certification documents provide an adequate opportunity for public review and comment. Section 450.316(b) also establishes the outline for MPO public participation programs. The Pioneer Valley MPO's Public Participation Plan was formally adopted in 2016. The Public Participation Plan ensures that the public will have access to the TIP and all supporting documentation, provides for public notification of the availability of the TIP and the public's right to review the document and comment thereon, and provides a 30-day public review and comment period prior to the adoption of the TIP and related certification documents.

The public comment period for this conformity determination commenced on June 25, 2019. During the 21-day public comment period, any comments received were incorporated into this Plan. This allowed ample opportunity for public comment and

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MPO review of the draft document. The public comment period will close on July 15, 2019 and subsequently, the Pioneer Valley MPO is expected to endorse this air quality conformity determination on July 23, 2019. These procedures comply with the associated federal requirements.

3. Timely Implementation of Transportation Control Measures

Transportation Control Measures (TCMs) have been required in the SIP in revisions submitted to EPA in 1979 and 1982. All SIP TCMs have been accomplished through construction or through implementation of ongoing programs. All of the projects have been included in the Region's Transportation Plan (present of past) as recommended projects or projects requiring further study.

DEP submitted to EPA its strategy of programs to show Reasonable Further Progress of a 15% reduction of VOCs in 1996 and the further 9% reduction of NOx toward attainment of the National Ambient Air Quality Standards (NAAQS) for ozone in 1999. Within that strategy there are no specific TCM projects. The strategy does call for traffic flow improvements to reduce congestion and, therefore, improve air quality. Other transportation-related projects that have been included in the SIP control strategy are listed below:

- Enhanced Inspection and Maintenance Program
- California Low Emission Vehicle Program
- Reformulated Gasoline for On- and Off-Road Vehicles
- Stage II Vapor Recovery at Gasoline Refueling Stations
- Tier I Federal Vehicle Standards

4. Fiscal Constraint:

Transportation conformity requirements in 40 CFR 93.108 state that TIPs and transportation plans and must be fiscally constrained consistent with DOT's metropolitan planning regulations at 23 CFR part 450. The 2020 Regional Transportation Plan for the Pioneer Valley is fiscally constrained, as demonstrated in Chapter 16 of the RTP.

As of April 22, 2002, the city of Springfield was re-designated as being in attainment for carbon monoxide (CO) with an EPA-approved limited maintenance plan. In areas with approved limited maintenance plans, federal actions requiring conformity determinations under the transportation conformity rule are considered to satisfy the "budget test" (as budgets are treated as not constraining in these areas for the length of the initial maintenance period). Any future required "project level" conformity determinations for projects located within this community will continue to use a "hot-spot" analysis to assure that any new transportation projects in this CO attainment area do not cause or contribute to carbon monoxide non-attainment.

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In summary and based upon the entire process described above, the Pioneer Valley MPO has prepared this conformity determination for the 1997 Ozone NAAQS in accordance with EPA's and Massachusetts' latest conformity regulations and guidance. This conformity determination process demonstrates that the FFY 2020-2024 Transportation Improvement Program and the 2020-2040 Regional Transportation Plan meet the Clean Air Act and Transportation Conformity Rule requirements for the 1997 Ozone NAAQS, and have been prepared following all the guidelines and requirements of these rules during this time period.

Therefore, the implementation of the Pioneer Valley MPO's FFY 2020-2024 Transportation Improvement Program and the 2020 Regional Transportation Plan are consistent with the air quality goals of, and in conformity with, the Massachusetts State Implementation Plan.

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CHAPTER 17

Photo: Route 112 Bridge in Huntington, MA

ENVIRONMENTAL CONSULTATION

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. This chapter demonstrates 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 Tuesday May 28, 2019. 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 1:00 PM to 4:00 PM. Transportation Improvement projects were mapped over several environmental maps including:

- Habitat – Road linkage importance for regional habitat connectivity.
- Habitat – Link importance for regional habitat connectivity.
- Wetlands
- 500 Year Flood
- 100 Year Flood Zones
- Valley Vision Priority Development Areas
- Valley Vision Priority Protection Areas
- Massachusetts Historic Commission Historic Inventory Areas
- Environmental Justice Minority Census Block Groups
- Environmental Justice Low Income Census Block Groups
- Disabled Residents Aged 65+ Census Block Groups
- Disabled Residents Aged 20-64 Census Block Groups

An online interactive version of this map is located through the following link: https://tinyurl.com/pvpcrtpupdate2019. A copy of the complete project listing and Map Key is included as part of the Appendix to the RTP.

Two of these maps are shown in Figures 17-1 and 17-2. 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.

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Figure 17-1 – RTP Projects and Massachusetts Wetlands

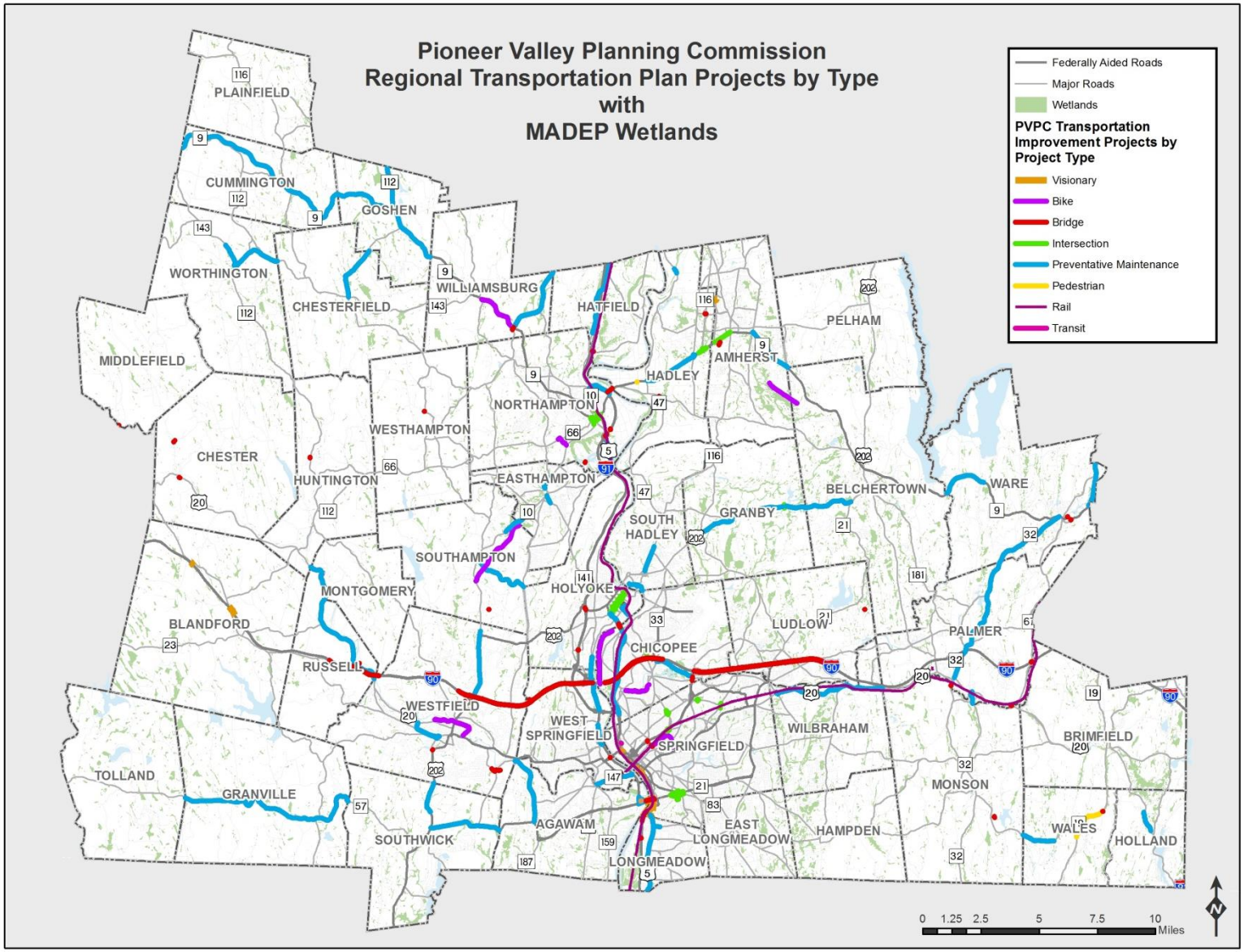

Figure 17-2 – RTP Projects with 100 and 500 Year Flood Zones

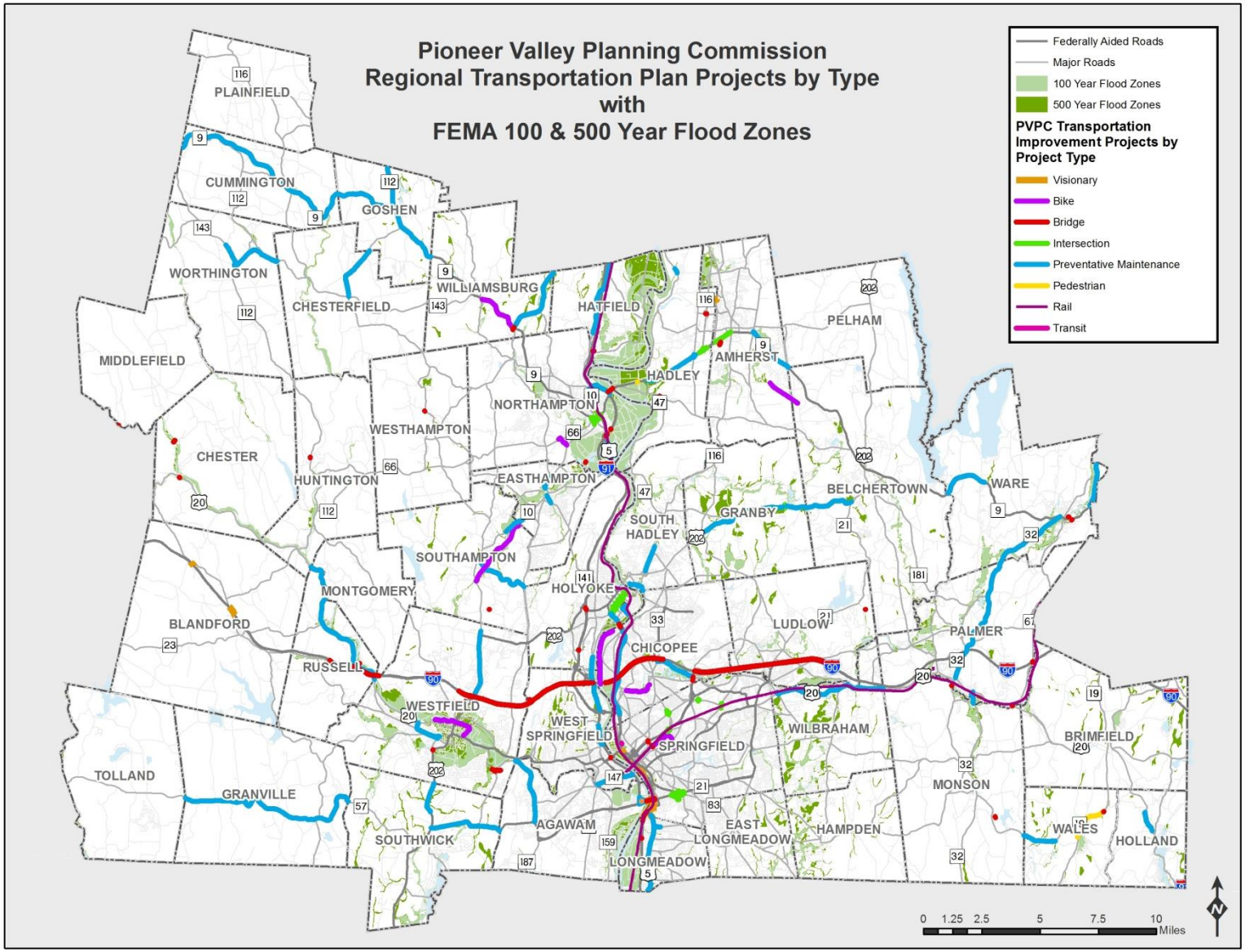

Table 17-1 – RTP Environmental Consultation Mailing List

American Rivers	Massachusetts Historic Commission
Arise for Social Justice	Partners for a Healthier Community
Chicopee 4Rivers Watershed	Pioneer Valley Asthma Coalition
City of Chicopee	Pioneer Valley JTC Members
City of Holyoke	Pioneer Valley MPO Members
City of Northampton	Pioneer Valley EJ and Title VI mailing list
City of Springfield	Stavros
City of Westfield	Stockbridge-Munsee Community
Connecticut River Watershed Council	The Hill Town Trust
Co-op Power	The Kestrel Trust
Environmental Protection Agency	The Nature Conservancy
Home Builders and Remodelers Association of Western MA	Town of Belchertown
Massachusetts Association of Conservation Commissions	Town of Hadley
Mass Audubon	Town of South Hadley
MassDEP	Trustees of Reservations
Massachusetts Division of Fisheries and Wildlife	University of Massachusetts
Massachusetts DCR	US Department of Agriculture
Massachusetts Division of Ecological Restoration	Westfield River Watershed Association
Massachusetts Department of Public Health	Westfield River Wild and Scenic Committee
MassDOT	

In addition to the above list, a meeting notice for the Environmental Consultation was posted on the PVPC website and in the Republican (the local newspaper) in both English and Spanish.

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CHAPTER 18

Photo: Williston Avenue by Nashawannuck Pond in Easthampton, MA

ENDORSEMENT

The Pioneer Valley MPO will vote to endorse the 2020 Update to the RTP at their meeting on July 23, 2019.

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